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EDITORIAL COMMUNICATION

The objective of the special issue of Bioscience Biotechnology Research Communications Vol 14 No (1) 2020 on “Recent Research on Management, Sciences and Technology” is to provide a platform to researchers where they are able to publish their original research work in different areas related to Management, Sciences and Technology.

We are happy to share that quality research work addressing important issues like Cultural Tourism, Investor's Attitude and Perception Towards Mutual Funds, Engineering Properties of Soils, Biology and Medical Science related topic, Topic related to E-Learning and New learning, Women Empowerment, COVID-19 and Pandemic related topics etc. are published in this special issue. This Special issue also has articles related to applied science and technology in various areas of artificial intelligence, software applications, energy management have also been published in this issue.

This special issue aims to foster the growth of a new research community, acting as an international forum for researchers and practitioners in academia and industry to present research that will definitely play a very important role in changing the landscape of our near future.

The published research articles have been aimed to motivate the next generation researchers working in various emerging research areas. The articles published in this issue will be helpful for the researchers working in these new emerging areas. We express our heartfelt gratitude to all the contributors from different colleges and universities of India and Abroad for giving us an opportunity to publish their research work in this Special Issue on Recent Research on Management, Sciences and Technology.

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A Case Based Study on the Implementation of National Health Schemes on Treatment Techniques of Lung Cancer

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ABSTRACT

Looking at the global scenario and studying the health diseases related spatial data, it has been observed that the incidence of cancer is a matter of serious public health concern as compared to others. Since the treatment patterns of cancer and consequent impacts on the households are different, it is necessary to understand the major types of conventional treatments/procedures undertaken from time to time. This in turn is expected to provide information and choice to the patient families before undertaking any decision regarding treatment conditional upon availabilities and their abilities. The study has policy implications in the sense that it is expected to help optimal policy designs for the cancer patients in long run. The present study is first of its kind for patients in Assam and focused on the effect of only two available health schemes viz. Pradhan Mantri Jan Arogya Yojana (PM-JAY) and Atal Amrit Abhiyan (AAA) on treatment of lung cancer. The results show that both the schemes have successfully implemented on the lung cancer patients in Assam as the probability of completion of treatment is 76.6 percent higher if the patients treated through these two schemes as compared to not using these schemes.

KEY WORDS: NATIONAL HEALTH SCHEMES, TREATMENT TECHNIQUES, CANCER, POLICY DESIGN, PUBLIC HEALTH.

INTRODUCTION

Cancer is emerging as a major public health concern in India and other parts of the world due to ongoing demographic and epidemiological transition (Rajpal. et.al, 2018 and Jemal.et.al, 2010). It is a general term used for a group of diseases and develops from the

extra mass tissue known as tumour (Baghestani.et.al, 2015). However, limited study has been undertaken to understand the heterogeneity and impacts of various types cancer separately.

The growing incidence of lung cancer cases are matter of serious burden in the society and considered as common occurring cancer in men and the third most common occurring cancer in women (Aggarwal.et.al, 2016). It is observed that the biggest risk factor for lung cancer is smoking (Aggarwal.et.al, 2016). Each year about 7,300 people who never smoked die from lung cancer caused by passive smoke in the United States (Fernandez.et.al,2014). The risk of developing lung cancer is still high for former smokers, however, quitting smoking can significantly lower that risk. The risk of dying from lung cancer may be dropped by half within 10 years of quitting (Fernandez.

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et.al, 2014). Early symptoms of lung cancer may include lingering or worsening cough, coughing with blood, chest pain that worsens when breathe deeply, laugh or cough, hoarseness, shortness of breath, wheezing, weakness and fatigue, loss of appetite and weight loss.

Talking about the treatment process, one might know about different types of therapies available in the market. The patients are not often informed about the cause, nature and cost of such therapies. Similarly, patients mostly do not have any information on the different treatment techniques/set of processes and tools and their implications. As an example, Radiation therapy (often called ionizing radiation therapy (Baskar. et.al, 2012) might cause damages to genetic material (Deoxyribonucleic acid (DNA)) blocking their ability to divide further (Jackson.et.al, 2009). It might also destroy normal cells in the body and hence is a serious threat to a patient's health in long term is often not known.

Doctors play a crucial role for any type of therapy undertaken while dealing with various types of cancer patients. Wide variations are however observed across age groups and the related health conditions of patients. Information on different treatment techniques (including risks and costs) if available prior to the treatment, might help immensely the patient households and the clinics/hospitals to take optimal decisions for cancer treatments. The government has provided different health schemes, especially for economically weak patients to support financially for the treatment of cancer (<https://www.mohfw.gov.in>). Several health schemes like Health Minister's Cancer Patient Fund, The Health Minister's Discretionary Grants, The Central Government Health Scheme, National Health Protection Scheme, The Prime Minister's National Relief Fund, Pradhan Mantri Jan Arogya Yojana (PM-JAY), State Illness Assistance Fund have been introduced nationwide for the financial support of cancer treatment, but in Assam, only two health schemes viz. Pradhan Mantri Jan Arogya Yojana (PM-JAY) and Atal Amrit Abhiyan (AAA) are available (<https://www.mohfw.gov.in>).

Thus, the present study is mainly focused on the effect of these two health schemes on treatment of lung cancer patients in Assam. The study is first of its kind for patients in Assam and has lot of policy implications in the sense that the common people through this would be able to take appropriate decision for cancer treatment based on socio-economic evaluations undertaken using the available information.

Review of Literatures: Cancer is an issue of major public health concern because not only it causes substantial suffering and shortens the natural lifespan of patients, but also have significant impact upon society as a whole (Chu et. al, 2008). Looking at the global scenario and studying the cancer incidence related spatial data, it has been observed that the incidence of lung cancer is a concerned sites of cancer as compared to others (Aggarwal et. al, 2016). Thus, several health schemes have been implemented for the treatment of cancer as

the cost of treatment is at high (Angell.et.al, 2019). A study reveals that implementation of PMJAY scheme in India is hasty and also poses threats of diverting limited resources available for health in undesirable directions (Keshri.et.al, 2020).

Lahariya claims that to be effective and impactful in achieving the desired health outcomes, there is a need for getting both design and implementation of Ayushman Bharat Program right, from the very beginning (Lahariya C, 2018). In the same year, it was evaluated that success of public health insurance schemes do not depend only on government investments but also on wide spread awareness campaigns to educate the beneficiaries about the importance of such schemes (Agarwal.et.al, 2017). Another study concluded that by introducing PMJDY scheme, the government and RBI is able to bring a large number of people to formal financial channel and thereby helps in removing financial exclusion (Ravindra.et.al, 2020). Again, Yadawar, investigated that even if the base of the beneficiaries' increases, much more needs to be done to increase awareness about the PMJAY scheme to the public (Yadawar S,2020).

The research publications, cited above, indicated that no serious studies are taken up related to the the effect of national health schemes on treatment of lung cancer patients. Thus, this study of implementation of national health schemes on the treatment of lung cancer patients belong to Assam is taken up in order to fill the research gap.

Table 1. Categorization of the patients considered in the study on the basis of clinical and demographic parameters

Site of Cancer	Parameters	Frequencies	Total
Lung Cancer	Treated through Schemes (PMJAY/AAA)		
	Yes	163	
	No	37	200
	Other diseases		
	Yes	85	200
	No	115	
	Treatment status		
	Complete	176	200
	Incomplete	24	

Objective of the study: The paper is designed keeping in view the following objective:

1. To study the impact of national health schemes on the treatment techniques of lung cancer patients.

MATERIAL AND METHODS

The data used for the present study is secondary in nature collected from the Cachar Cancer Hospital and

Research Centre, Silchar, Assam, India for the year 2014-2019. Data were collected from a total of 200 lung cancer patients, who belonged to “Below Poverty Line” category as the health schemes are designed especially for economically weak patients to support financially for the treatment of cancer (<https://www.mohfw.gov.in>). Thus, the patients, who have the BPL card were considered as Below Poverty Line category in this study. The following table gives an overview of the dataset.

Now, Binary logistic regression model is applied to observe the probability of completion of treatment before and after implementation of these two health schemes with the other diseases take into consideration. Note that, the parameter “Other diseases” is considered because sometimes it may create the complication during the treatment and due the other disease, the treatment may be incomplete (Johnson.et.al, 2012).

In the present study, it will be convenient if we write our binary logistic regression model as follows:

$$p = \frac{e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}}{1 + e^{\beta_0 + \beta_1 x_1 + \beta_2 x_2}}$$

where p = Probability of completion of the treatment/therapy

x_1 = Treated through any of these two schemes (PMJAY/AAA)

x_2 = Other disease

Thus, we can write the model as follows:

$$\logit(p) = \beta_0 + \beta_1 \times \text{Treated_through_any_of_these_two_schemes} + \beta_2 \times \text{Other_Disease}$$

Before including the parameters in the model, it is necessary to check the correlation between the independent variables as they can be misleading the overall result. Thus, the Correlation Matrices are computed to check whether independent variables are correlated to each other. Another important point is that some independent variables that can be included in the model may play a redundant role, which could directly effect on the model and thus cannot be considered as reliable. Thus, Variance Inflation Factor (VIF) test has been applied through multicollinearity analysis. The research question is that are both the schemes beneficial for the patients that are suffering lung cancer? Thus, if we find after the analysis that probability of completion of treatment is higher if the patients treated through these two schemes as compared to not using these schemes, then we may conclude that the patients are benefited from both the schemes.

RESULTS

At the outset, the correlation matrices are computed to check whether independent variable are correlated to each other before including them in the model. It

is observed from Table 2 that the variables are not correlated to each other thus can be included in the model. Another important point is that some variables that can be included in the model may play a redundant role, which could directly effect on the model and thus cannot be considered as reliable. Thus, Variance Inflation Factor (VIF) test is also applied through Multicollinearity Analysis. We obtain from the Table 3 that there is no multicollinearity problem exist if we include the parameters in the binary logistic regression model as the VIF values are less than 5. Now, it is confirmed that there will be no misleading result by the inclusion of the parameters and thus obtain the following result.

Table 2. Correlation matrix for the parameters that are considered in the study

Variables		Treated through any scheme	Other disease
Treated through any scheme	Pearson Correlation	1	-0.008
	Sig. (2-tailed)	-	0.909
	N	200	200
Other disease	Pearson Correlation	-0.008	1
	Sig. (2-tailed)	0.909	-
	N	200	200

We obtain from the Table 4 that chance of completion of treatment is 76.6 percent higher if the patients treated through the two schemes as compared to not using the schemes in case of lung cancer. On the other hand, chance of completion of treatment is 28.2 percent lesser if the patients have other disease as compared to have no disease in case of lung cancer. The results are significant as the p value is less than 0.05.

Table 3. VIF values for the parameters that are considered in the study

Site of Cancer	Parameters	VIF values
Lung Cancer	Treated through Schemes	1.000
	Other disease	1.000

DISCUSSION AND CONCLUSION

Economic burden plays an important role in the growing incidence of cancer as the cost of treatment is expensive and the income losses are significant (Nair.et.al, 2014). It seems logical that economically weaker patients are not in the favour of early diagnosis of cancer due to the high cost of the treatments, thus results in poor chance of survival. Taking treatment at early stage of cancer can relief the pain as well prevent the cancer from

metastasis (Sun.et.al, 2017). The patients are not often informed about the cause, nature and cost of therapies/treatments. Since the treatment patterns of cancer and consequent impacts on the households are different, it is necessary to understand the major types of conventional treatments/procedures undertaken from time to time. This in turn is expected to provide information and choice to the patient families before undertaking any decision regarding treatment conditional upon availabilities and their abilities. The study has policy implications in the sense that it is expected to help optimal policy designs for the cancer patients in long run.

The present study is first of its kind for patients in Assam and focused on the effect of only two available health schemes viz. Pradhan Mantri Jan Arogya Yojana (PM-JAY) and Atal Amrit Abhiyan (AAA) on treatment of lung cancer. The results show that both the schemes have successfully implemented on the lung cancer patients in Assam as the probability of completion of treatment is 76.6 percent higher if the patients treated through these two schemes as compared to not using these schemes. Previous study also concluded that by introducing

PMJDY scheme, the government and RBI is able to bring a large number of people to formal financial channel and thereby helps in removing financial exclusion (Ravindra. et.al, 2020).

But the particular study has revealed one surprising fact that even if the medical facilities/equipments in Assam have been improved, the percentage of completion of treatment is still poor if the patients have other disease as compared to have no disease in case of lung cancer. The chance of completion of treatment is only 28.2 percent, if the patients have other disease as compared to have no disease, which is a matter of serious concern and the study of this concerned posts as direction for further research. There may also be some other factors/parameters involved that are having an impact on the chance of completion of treatment/therapy. Thus, study on those factors are left to be explored by researchers. In addition to this, the study has brought up the successful implementation of the national health schemes in Assam for the patients of lung cancer and expect to pave ways for further study on the other states of India as well as for different sites of cancer.

Table 4. Result of binary logistic model for the parameters

Parameters	B	S.E.	Wald	d.f.	Sig.	Exp.(B)	95% C.I.	
							Lower	Upper
Treat_through_scheme								
Yes								
No®	.569	.073	.125	1	.025	1.766	1.711	1.782
Other_disease								
Yes	-.331	.495	.445	1	.004	.718	.710	.720
No®								
Constant	-.438	.348	.176	1	.000	.645		

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A Questionnaire for Assessment of Healthy Living Aspect of Physical Education for Secondary School Children: Initial Development and Validation

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ABSTRACT

Physical education provides a scientific base of knowledge to the children which combines biological, physical, environmental and social studies. The shortage of efficient steps to show the value of physical education in learner growth is a grave problem for the future of the discipline in this era of enhanced transparency (Lund & Kirk, 2010). Based on the curriculum guidelines for assessment in Physical education, there are four aspects, viz., physical fitness, sports skill, healthy living and neuromuscular co-ordination, to assess the efficacy of physical education programs. This paper establishes and validates an instrument for assessing the healthy living aspect. Following the goals of the National Curriculum System Physical Education Policy, the first edition of the statements was prepared. The instrument components were objectively evaluated through professional judgment (n=10) to ensure the high consistency, validity and understandability of the claims and proper association of characteristics. The exceptional findings of the pilot test (n = 600) strengthened the curricular framework and confirmed the quality and efficacy of the questionnaire. Exploratory factor analysis revealed a number of statements that were in accordance with the initial methodology and a connection between the factors and the assertion was sufficient for the confirmatory factor analysis. Fitting indices show that the conclusions coincided well with the questionnaire and also Pearson correlated test corroborated positive, important correlations by the suggested variables. The questionnaire has also demonstrated strong outcomes and has the ability to determine the knowledge of healthy living aspect learnt through physical education in secondary school childrens.

KEY WORDS: HEALTHY LIVING, PHYSICAL EDUCATION ASSESSMENT, QUESTIONNAIRE VALIDATION AND DEVELOPMENT.

INTRODUCTION

For physical education programmes to be successful, the curriculum plays an important role. Focus on the curriculum for physical education is vital because a major problem is that students do not understand and appreciate

the impact of physical education on other faculties not just during the learning phase but all through the life. Hennessy (1996) cites an example of the fact that the knowledge of algebra which a student acquired in the school might not be used later in day to day life, however, there exists endless use of the hand-eye coordination and the slightly bigger lung capacity which resulted from the participation in physical education programmes.

One of the aims of physical education is to educate students to be involved physically. Physical education helps prevent sedentary lifestyle in students by teaching skills, values, and common knowledge about physical exercises. Students are taught the healthy ways of life. They are also taught how to take care of their personal

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health. Physical education also has preventive health benefits for the students. Majority of the health problems can be prevented by physical exercises and the discipline which is imparted by physical education. Obesity, which is now considered a global endemic, can be controlled and surmounted through proper physical education programmes. Another goal of physical education is to help make learning fun.

Using sports to involve the students in the learning process accelerates their development. Use of sports to help in the personal growth of students is a very effective mechanism. For example, improvements in the emotional and communication skills of a student can be very effective through sports. Physical education also instils the values of teamwork and coordination. Yet another goal of physical education is to ensure the inclusion of those students who are typically excluded from the society based on social class, gender and disability. Kidd and Donnelly (2000) demonstrated the need for a physical education programme which ensure girls achieve the parity of esteem. Donnelly (2008) highlights the fact that “poverty is the single greatest barrier to participation” in the context of sports. Physical activities help enhance health, self-efficacy, and community inclusion of persons with disabilities (Moss, Landon & Fleming, 2017)

Ensuring a holistic curriculum for physical education requires an effective assessment of the same. Evaluation is a learning method for pupils, instructors, parents and policy-makers in physical education. The aim of Veal (1995) was to offer guidance to both learners and teachers while evaluation is part of the teaching and learning stage of practice; the key goal of the appraisal.” Anderson & Goode (1997) describe assessment as a “three-way connection between teaching, testing, and learning.”

Healthy Living Aspect in Physical Education: We are living through an era in which overweight and obesity have become a major global health problem, particularly among children and young adults (International Obesity Task Force, 2009; World Health Organization, 2010). It is well known that the habits in adult life are greatly influenced by the patterns developed during childhood. (Freedman et al., 2007). The growing epidemic of obesity among children and young people is also becoming an issue for potential adults. The problem is complex and needs to involve a systematic, multidisciplinary strategy. Worldwide professionals of health, leisure and physical education play an important role in applying responses to this issue. Innovative methods of pedagogy must be included, health and physical education systems must be more efficiently integrated, balance active lifestyle patterns should be promoted, technologies used to teach physical education should be studied, and school activities should be connected with informal community programs with help of physical education teachers. (Edginton et al., 2011).

The national health curriculum standards should encourage the preparation of curriculum for a

comprehensive professional education curriculum for school health. The guidelines are designed to enhance realistic health knowledge and to identify core skills for all forms of healthy living. These techniques include analysis of the value of the actions of family, colleagues, community, media and technologies; studying how to access and use adequate health information; using communication, decision making, metrics and advocacy skills to promote health behaviour. Furthermore the efficiency and effectiveness of health education programs was correlated to an appropriate amount of time spent in health education classrooms.

There is a strong connection between school health curriculum and health literacy. Health literacy is the willingness of citizens to gain important information and services about health, to understand and to develop them. Students must develop their wellness literacy and boost their quality of life in order to accept and maintain healthy behaviour. A research study from the Institute of Medicine on health literacy states that the most effective approach to improve health literacy is to ensure that health education is a part of all educational curriculum. “The research has shown that successful school-level wellness initiatives are intense and begin before risky behaviour, according to the World Health Office (WHO) It is essential for students to obtain adequate time to obtain vital data and health education skills that are gained and improved year on year.

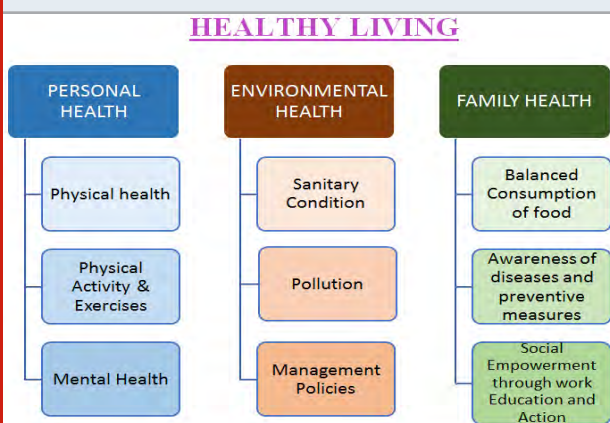
MATERIAL AND METHODS

Main goal: As we are aware that research work in assessment of the physical education is very limited, thus the specific aim of this work was to develop and validate a Healthy Living aspect assessment instrument, which is one of the three aspects of the physical education program: physical fitness, sports skill and neuromuscular coordination.

Procedure: According to earlier works of Alfrey, O'Connor, Phillipson, Penney, Jeanes & Phillipson, 2017; Cumming, Woodcock, Cooley, Holland, & Burns, 2015, Denson & Bowman, 2015; Perry, Nicholls, Clough, & Crust, 2015; Richards, Gaudreault & Woodland, 2017; Rossato, Uphill, Swain & Coleman, 2016; Wang, Shen, Luo, Hu & Garn, 2018 the process of construction and validation of the tool were performed which included: theoretical foundation, initial statement preparation, expert judgement(logical review), pilot study data collection, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Thus the SPSS program used both mathematical methods and the PCA (version 16.0). The Jamovi program was used to execute the CFA.

Participants: Ten experts took part in logical review from field of Physical education and sports sciences with minimum of five years' experience in government or private institution. The empirical review was conducted on 600 secondary school students from government and private schools in Noida, Uttar Pradesh.

Figure 1



Theoretical Foundation and Selection of variables
As per the National curriculum framework, the objective of Physical education is to

Table 1. Rotated component matrix from EFA

	Component 1	2	3
VAR00039	0.89		
VAR00001	0.884	.	
VAR00040	0.878		
VAR00002	0.877		
VAR00011	0.874	.	
VAR00006	0.872		
VAR00058	0.863		
VAR00046	0.861		
VAR00028	0.854		
VAR00009	0.853		
VAR00015	0.847		
VAR00050	0.831		
VAR00018	0.826	.	
VAR00029	0.814		
VAR00007	0.809		.
VAR00041	0.809		
VAR00031	0.806		
VAR00008	0.797		
VAR00032	0.725		
VAR00025	0.669		
VAR00035	0.653		
VAR00037	0.623		.
VAR00052	0.605		
VAR00044		0.863	
VAR00005		0.861	
VAR00024		0.853	
VAR00036		0.85	
VAR00056		0.846	
VAR00016		0.845	
VAR00049		0.831	

- Encourage children to know and embrace the obligation for safe home, school and community life, both personally and collectively,
- Allow them to consider their health condition, recognize health conditions and be told of steps to correct them.
- Sensitizing children to protective laws in appropriate dangerous conditions to minimize collisions and injury.
- Familiarization with first aid procedures on customary disease, injury and accidents.

Table 1. Rotated component matrix from EFA

	Component 1	2	3
VAR00017		0.811	
VAR00060		0.721	
VAR00010		0.704	
VAR00038		0.7	
VAR00033		0.698	
VAR00019		0.694	
VAR00048	.	0.692	
VAR00026		0.691	
VAR00021		0.688	
VAR00053		0.683	
VAR00013		0.681	
VAR00051		0.657	
VAR00003		0.643	
VAR00047		0.57	
VAR00055			0.802
VAR00022			0.74
VAR00004			0.733
VAR00043			0.722
VAR00014			0.721
VAR00030			0.717
VAR00034			0.697
VAR00023		.	0.685
VAR00059			0.68
VAR00054			0.654
VAR00045			0.649
VAR00057			0.635
VAR00020			0.63
VAR00027			0.628
VAR00042			0.627
VAR00012			0.614

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Thus, the variables selected for Healthy living were Personal Health, Environmental health and Family health. As per these variables list of 90 statements were proposed involving 10 statement from each sub variables

for assessing healthy living aspect in secondary school students.

Expert Judgement: We underwent a rational analysis to test the validation of the structure. An professional assessment was used to improve the method. To do this the ten experts from field of Physical education and sports sciences with minimum of five years' experience in government or private institution validated the statements and their belonging categories by filling the document where they had to select the categories for each statement as per their expertise provided in the form of questionnaire online at <https://study.pankajapandey.com/>. The statements which were selected by at least 5 experts for that particular category were select for the second version of the questionnaire and thus 90 statements were reduced to 60 statements for the further validation and pilot test.

Pilot test data collection: Throughout the pilot study, an empirical review of the statements was performed before applying the EFA (Exploratory Factor Analysis) and the CFA (Confirmatory Factor analysis). During the process, the questionnaire including 60 statements finalized after expert review was filled by N=600 secondary school children which is a significant no of samples for pilot study. A five-point Likert scale from one to five cumulative disagreements to consider the knowledge of secondary students with each argument was used. If the claims were closely connected to perform a factor study was checked by the KMO Sampling Calculation Adequacy and the sphericity test by Bartlett. The nearest the KMO value to 1, the more comparable the variations in the declarations are. The high value of 0.981, which is acceptable, was obtained from the KMO examination. The test results of the Bartlett revealed a valuable common ground between the statements (Significance level $p < .05$), it was obtained a result of $\chi^2 (1770) = 9.98, p=.000$. Based on these results, the data obtained from the questionnaire satisfied all the conditions for the factor analysis.

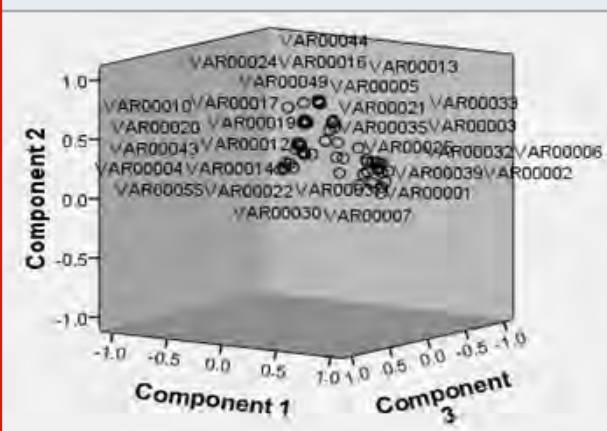
Exploratory Factor analysis: An EFA was done to categorize the statements in order to explain the internal structure of the questionnaire. The EFA was carried out using the principal component analysis process of extraction. The rotation approach used standardisation of Varimax and Kaiser, which converged into six iterations and displayed 4 major categories describing 77.67 percent of total variance. With regard to the extraction of claims, the declarations were divided into three classes or variables shown in Table 1.

To investigate the position of the item/statement, a part plot was derived from the collected data in a rotated space graph. The findings revealed the exact position of the object after rotation during the EFA, which showed that the items were strongly connected in figure 2.

Since the current questionnaire has the same number of categories as the original category proposed (three) the layout of the categories after the EFA was different from

the initial proposal. Although the number of statement selected for the final questionnaire were on the basis of the factor loading values of each statement in each category. Statement with factor loading values 0.6 or more were selected from all the three categories. For the feasibility of students and the time limitation for assessing the students in the subject only 25 statements were finalized for the questionnaire. 9 statement from component one with highest factor loading and 8 statements each from component two and three with highest factor loading were selected for the study as shown in figure 3.

Figure 2: Component plot in a rotated space graphic from the EFA



Confirmatory Factor Analysis: This method tests if the data suit into a hypothesized model of measurement. The purpose of this experiment was to prove the accuracy of the planned new distribution. In the new questionnaire, the route diagram indicated an appropriate connection between the variables (categories) and the objects investigated. (Figure 4).

The relative health indexes displayed outstanding, decent and reasonable results respectively, and results similar to the reference ranges were obtained in the IFI, TLI and CFI indices. The details then fit properly into the default delivery model.

Test for Exact Fit: χ^2 df p
4107 272 < .001

Fit Measures:

RMSEA	90% CI	CFI	TLI	RMSEA	Lower	Upper
0.893	0.882	0.153	0.149	0.157		

Reliability test: Finally Pearson Correlation test was conducted for reliability of the questionnaire for which the 25 statements were then converted in Multiple Choice questions (MCQ) to assess the knowledge of secondary school students about healthy living. The test retest method was then administered for the reliability of questionnaire on 60 secondary school going students. The scores from Time 1 and Time 2 were then tested for correlation by using Pearson Correlation test in order to

evaluate the test for stability over time (Colin and Julie, 2006).The result was found to be acceptable as shown in figure 5

Figure 3

Item No.	Question	Factor Loading (Values)	Component 1	Component 2	Component 3
1	Both Mass media and print media are important for health	0.884	1	0	0
2	One should visit the doctor for regular check-ups	0.877	1	0	0
3	Health related TV programs are useful and should be seen	0.840	1	0	0
4	One must know their own and their family members' blood group	0.813	1	0	0
5	It is important to take care of our personal hygiene	0.801	1	0	0
6	Increased food intake and exercise help in controlling it	0.801	1	0	0
7	It is advised to sleep for 7-8 hours a day for a healthy lifestyle	0.800	1	0	0
8	One can usually watch or play video games on computer, table or mobile phones for more than 2 hours a day	0.797	1	0	0
9	Performing physical activities or exercises make one feel refreshed and relaxed	0.783	1	0	0
10	Before and after performing any physical activity, one must warm up and cool down by stretching	0.764	1	0	0
11	One should prefer using stairs instead of elevators or elevators wherever possible	0.694	1	0	0
12	One should understand the difference between aerobic and anaerobic exercises	0.674	1	0	0
13	One must participate and take part in learning new sports and exercises while in school or academy	0.661	1	0	0
14	One must make good, smart and planned diet choices	0.671	1	0	0
15	Being careful about the quality of drinking water is important	0.667	1	0	0
16	One must be aware of the benefits of cleanliness and the disadvantages of uncleanliness especially their health hazards	0.645	1	0	0
17	Plastic wastes are harmful to the environment	0.611	1	0	0
18	The amount of alcohol drinking (beer, red wine) available in the world is finite and is diminishing with time	0.605	1	0	0
19	Being obese is almost a sign of poor health or a sign of poor mental health	0.604	1	0	0
20	Runners, hikers, cyclists, swimmers, or mountaineers are a sign of inner strength and must be treated	0.630	1	0	0
21	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.600	1	0	0
22	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.610	1	0	0
23	It is important to be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
24	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.603	1	0	0
25	Being happy about ourselves is important	0.600	1	0	0
26	It is important to be happy about ourselves	0.600	1	0	0
27	One must continue to learn the new things they learn and spend time at school or home	0.600	1	0	0
28	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.604	1	0	0
29	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.604	1	0	0
30	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.610	1	0	0
31	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
32	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
33	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
34	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
35	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
36	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
37	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
38	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
39	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
40	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
41	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
42	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
43	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
44	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
45	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
46	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
47	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
48	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
49	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
50	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
51	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
52	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
53	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
54	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
55	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
56	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
57	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
58	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
59	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0
60	One must be aware of the importance of maintaining good physical, emotional, and mental health	0.605	1	0	0

Figure 4: Path diagram from the CFA

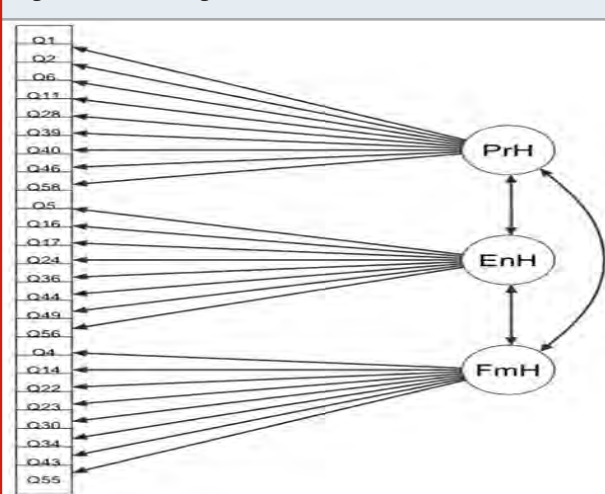


Figure 5: Correlation

	Score1	Score2
Pearson Correlation	1	.987**
Sig. (2-tailed)		.000
N	60	60
Pearson Correlation	.987**	1
Sig. (2-tailed)	.000	
N	60	60

DISCUSSION AND CONCLUSION

It is important to link the benefits and results of physical education to the core learner areas of the 21st Century such as critical learning, problem solving, endurance and acceptance capability, the ability to understand and express information and the ability to act innovatively in order to continue to be valued as part of the basic school curriculum (Bailey, 2006). In the last 40 years major changes and improvements were introduced in physical education including a shift from traditional game playing for recreation to a greater focus on healthy living, wellness and lifelong physical activity (Bocarro et al., 2008; Jago et al., 2009; McKenzie & Kahan, 2008). The importance of physical education programs are constantly being measured worldwide. Physical education initiatives need to produce evidence that will allow the profession to render curriculum interventions even more accountable. The lack of

transparency in physical education assessment programs prohibits physical education subject from being part of any community's wellness infrastructure. Quality expectations and methods of assessing the effect of physical education and its effect are the need of the present scenario in physical education.

In an increasingly structured field of schooling, the requirement for physical education program for children to show their fundamental skills is imperative. The teacher in physical education are constantly called upon to show student abilities to improve the skills to maintain an active lifestyle for wellbeing. The current study for the latest questionnaire creation on healthy living will lead to increase the standard and quality of physical education assessment. All the criteria for development of standardized questionnaire of were followed to establish a structured questionnaire that improves the importance of the questionnaire and makes sure a broad variety of implementations are included. In order to ensure good accuracy, validity and interpretation of the variables in the questionnaire and the right association of

characteristics, the filtering method was performed using expert evaluations. The suitability of the questionnaire, and the apt feature selection to determine the healthy living aspect of Physical Education, is reaffirmed considering the decrease in the number of items and the modifications did not alter the import of the original proposal.

The excellent results from the pilot test statistically strengthened the theoretical foundation for the questionnaire and provided excellent reliability values for the Cronbach alpha test, without substantial changes in deletion of the statements. The KMO and Bartlett resulted in excellent results and significant results, which revealed that the statements were strongly related and was suitable for factor analysis. The EFA of the questionnaire structure established the grouping of the items into three classes aligned to the initial (curricular) approach, which led to little distinction from the original proposal. Without some significant changes from the first edition, the latest delivery was easy to understand and validated the structure of the questionnaire. In comparison, the reliability requirements were high for the new groups. The CFA has further analysed the composition of the questionnaire and the results proved sufficient relations between statements and variables. The absolute, incremental and relative fit indices were excellent, efficient and sufficient results for both the χ^2/df , RMSEA and RMR tests; hence the data were considered to be in accordance with the distribution questionnaire. Finally, the Pearson correlation test has demonstrated that there was a strong correlation between the statements of questionnaire.

To conclude, a precious questionnaire was developed and tested to evaluate the healthy living aspect of physical education in secondary school students and to serve the original intent of this work. This developed tool is valuable for assessment of physical education and contribute in assessing the knowledge of healthy living among children studying in secondary schools.

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Attitude of Under Graduate Students Towards E-Learning in West Bengal

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ABSTRACT

With increasing high speed of internet connection ,opportunities has left a great impact on education . E-learning empowers one's interacting powers, without a doubt has fixed its roots in the field of education. The present study was conducted to find out the attitude towards e-learning among the under graduate student with respect to their gender, locality, academic stream. The major findings of the present study revealed that the college students have positive attitudes towards e-learning. There exists no significant difference in attitude towards e- learning between male and female and rural and urban under graduate students. There exists significant difference in attitude towards e-learning between arts and science under graduate students.

KEY WORDS: E-LEARNING, ATTITUDE TOWARDS, MOBILE LEARNING, BLENDED LEARNING.

INTRODUCTION

Nowadays living without 'Technology' is almost like a nightmare. We see the world today, it invariably means connected to the internet. In this technology era ,the sources of knowledge are many ways and quick approaches in a single click. E-learning is commonly referred to the uses of ICT for the purpose of added value in today's teaching and learning system. E-learning is an empowered by digital technology based on educational tools and systems than enable you to learn anywhere and at any time. In layman terms education contents store or recorded in electronic or digital mode a being transmitted through satellite or airwaves or cable or internet and reaches to students varies devices like computer, laptop, mobile, table and other few smart devices. Fegely .G. Alex (2020) pointed out that e-learning is the ways that

different disciplines and alternatives can focused on the study technically mediate education. E-learning is the method of providing delivering information, in such a way the students don't need to come to the classroom .

They can easily access all the data from any place which is convenient to them. E-learning can be self-paced or self-instruction and affixes media in the form of text, animation, streaming video ,image, and audio. Computer-Based Training, Internet-Based Training, Web-Based Training have been used in e-learning (Yacob, Kadir, Zainudin and Zurairah, 2011). E-learning platform based on the learner-centred strategy which provides learner awareness in real time(EDUCO) and easy to make joint asynchronous annotations on documents (EDUCOSM). With the advent of student centred learning in self-organization and self-evolving (Kurahila, Miettinen, et.al 2004). There are some important models for the success of e-learning during creating and implementing strategies are student , course, students, subject, instructions, organizations, institutional ,policy, Government , region levels are the different e-learning strategies made. A pyramid is created by combining of all the e-learning strategies (Anotonia Berecz 2018). In addition, e-learning is the method where learning put together interactive

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and collaborative by linking each learner and physically long experts, time and location flexibility, time and cost effectiveness for students (Shabha 2013).

Attitude is a psychological factor. It is affected on the students in several ways and it can shape their learning experience. Attitude comes into play in diverse way of the students in the field of their education. Attitude can be a deciding factor between success and unsucess for an individual. As present society has become change day by day. It is advisable to change oneself to keep pace with the changing society. So people must have a positive attitude moving towards the changes. Psychological factor such as "attitude" is mentally concerned with aspects in students' acquisition (Budianto Langgenng 2011). Attitudes towards life of the students there are effects on the essential learning outcomes. Once characterized by intellectual skill communication, interpersonal skill and civic engagement (Kleebbua and Siriparp 2016). There are lots of silent factors for the benefit of e-learning during the stage of implementation in educational Institutions. Low preparedness can affected the use of e-learning facilities and it will lead to poor outcomes. (Al-Doub, Goodwin Al-Hunaiyan, 2009).

Review of Literature: Dhas Sign Jaya (2017) in her study they found that use of various e-learning tools and methodologies plays a important role to make the learning process more effective. Konwar Handique (2017) conducted a research and found that there was no significant differences between the attitudes of students of college students towards e-learning with respect to their gender, locality. One way ANOVA Analysis indicated that way of learning, way of the studying and learning methods had significant impacts on the students' attitude towards e-learning. K.Khirade Santosh (2016), in his study, found that there was a majority of the students have heard of e-learning platform. A huge interest among the students in acquiring education use of e-learning include internet access and significant relationship between technology accessibility. Huang Meli, Liaw (2013) in their research publication, revealed that perceived satisfaction and usefulness in interactive learning environment was influenced by e-learning. Kar, Saha and Mondal (2014) conducted a research and result of the study that students' have high attitude towards e-learning and students attitude scores did not differ significantly with their personal variables such as gender, stream of study and residence. Saha, B & Mondal B.C (2014) i.e. "Attitude of University students towards e-learning in West Bengal" reported that university student's attitude towards e-learning is independent with reference to gender, residence and area of the study.

Objectives of the Study

The following objectives are laid down for the present study:

1. To study the nature of distribution of under graduate students on attitude towards e-Learning.
2. To study the difference in attitude of under graduate students towards e-learning with regard to gender

(Male/Female).

3. To study the difference in attitude of under graduate students towards e-learning with regard to locality (Urban/ Rural).
4. To study the difference in attitude of under graduate students towards e-learning with regard to academic stream (Arts/ Science).

Hypotheses of the Study

H01: There is no significant difference in attitude towards e-learning between male and female under graduate students.

H02: There is no significant difference in attitude towards e-learning between urban and rural under graduate students.

H03: There is no significant difference in attitude towards e-learning between arts and science under graduate students.

Rational of the Study: It is practically impossible to imagine a single moment without technology in this present era. E-Learning has become an integral part of traditional learning in majority of the educational institutions. E-learning foster great reciprocal action and collaboration in the students and it assists various learning activities. In order to keep pace with the era of rapid change, the direction of technological progress should not be overlooked. At the present time, we need to make our young generation learner aware of the rationale behind the use of e-learning and we have to prepare them to handle all the challenges which they may face in the current impending hurdles of technological life. The first thing to look at is how much attitude of the university students towards the use of e-learning. The significance of the study besides its effectiveness, the under graduate level take plays an important role on the future direction. Any natural disaster such as in the pandemic has disrupted the normal lifestyle of the people across the world, virtual mode has come to the rescue. This is how those who have the attitude towards the e-learning who have been able to cope up with the situation.

Operational Definition of Key Terms

1. Under Graduate Students- It connotes the students studying in college of West Bengal.
2. Attitude towards e-Learning - In the present study attitude towards e-Learning refers to the individual's positive or negative feelings of participation in e-learning activities through online use.
3. Gender- It connotes the students male and female.
4. Stream- It refers the students belongs to arts and science stream.
5. Locality: It refers the student belongs to rural and urban area.

Delimitations of the Study

1. The study was restricted to only three district i.e .Kolkata, north 24 Parganas and Nadia District of the state.

- The study was delimited to the under graduate students only.
- The study was confined to academic stream i.e arts and science.

METHODOLOGY

Design: The present study is descriptive survey in nature.

Sample: The sample consists of 200 students (200 male and 200 female) studying in under graduate students of West Bengal . Simple random sampling techniques has been used to collect the data.

Tool Used: Attitude Towards e-learning Scale developed by Dimpal Rani was used to collect the requisite data for the present study. This scale contains 65 statements. Out of sixty five items thirty eight were positive and twenty seven were negative items. The scale has four major areas, viz., 1. E- Learning interest, 2. Usefulness, 3. Ease of e-learning and 4. E-learning confidence. The 65 items (both positive and negative type) have been distributed in these four areas. The scale is a five – point scale viz. Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. Scoring was done separately for the positive and negative terms. A positive item carries the weights of 5, 4, 3, 2, 1 respectively for the categories of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree. The negative item is scored 1,2,3 , 4 and 5 respectively for the Strongly Disagree , Disagree , Undecided, , Agree, Strongly Agree.

Reliability: The reliability of the scale was established by Test-Retest method. The coefficient of correlation found was +0.87 which is significant at 0.1 level of significance.

Validity: Content Validity of the items was ensured by rational logical analysis of the technology experts

Statistical Techniques Used: The researcher used the statistical techniques like Mean, standard deviation and ‘ t’-test, etc for the shake of the fulfil the hypothesis of the study. The analysed results are presented in the following tables under different headings.

Analysis And Interpretation: The objective - wise analysis of collected data for the study are presented below:

Studying the Nature of Distribution of Scores:

Objective1 : To study the nature of distribution of under graduate students on attitude towards e-Learning

H01: There is no significant difference in attitude towards e- learning between male and female under graduate students. After analysing the collected data the researcher found the following result regarding the different nature of distribution of under graduate students on attitude towards e-learning.

E-Learning Among Under Graduate Students With Respect To Gender

Table 1. Distribution of Scores for total under graduate students on the variable ‘eLearning’

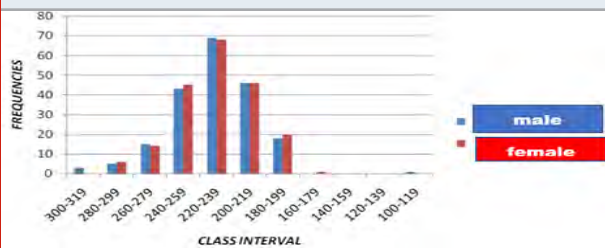
Class Interval	Male percentage	Male percentage	Frequency		Total Frequency (Male/Female)	Total
			Female	Female Percentage		
300-319	3	1.50%	0	0	3	0.75%
280-299	5	2.50%	6	3.00%	11	2.75%
260-279	15	7.50%	14	7.00%	29	7.25%
240-259	43	21.50%	45	22.00%	88	22%
220-239	69	34.50%	68	34.00%	137	34.25%
200-219	46	23.00%	46	23.00%	92	23%
180-199	18	9.00%	20	10.00%	38	9.50%
160-179	0	0	1	0.50%	1	0.25%
140-159	0	0	0	0	0	0
120-139	0	0	0	0	0	0
100-119	1	0.50%	0	0	1	0.25%
Total	200	100%	200	100%	400	100%

Interpretation: It is revealed from frequency distributions for male and female sample given in Table 1 and corresponding bar diagram given in Figures 1 that the scores on the variable of e-learning are distributed over a range of 196 for male and 134 for female sample. Thus, it may be said that the under graduate students

differ in their level of e-learning. Hence, the hypotheses that “male college students do not differ in their level of e-learning”; “female under graduate students do not differ in their level of e-learning” are rejected. This is evident from the fact that 88.00 and 89.50 per cent subject fall between the scores 180 to 259 for the male

and female sample respectively indicating almost similar concentration of scores in a limited range.

Figure 1: Bar Diagrams Based upon Frequency Distributions for Male, Female and Total Sample of under graduate students for the Scores on e-Learning

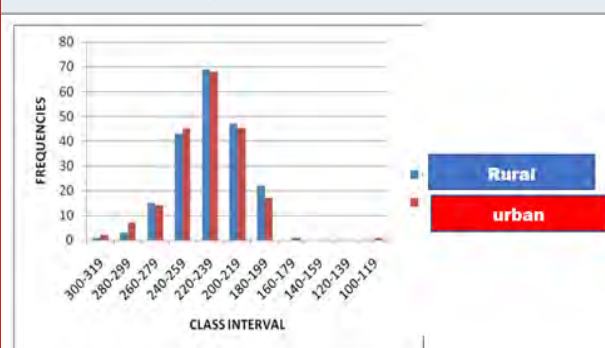


Interpretation: It is revealed from frequency distributions for rural and urban sample given in Table 2 and corresponding bar diagrams given in Figures 2 that the scores on the variable of e-learning are distributed over a range of 133 for rural and 188 for urban sample. Thus, it may be said that the under graduate students differ in their level of e-learning. Hence, the hypotheses that “Rural under graduate students do not differ in their level of e-learning”; “urban under graduate students do not differ in their level of e-learning” are rejected. This is evident from the fact that 90.50 and 87.50 per cent subjects fall between the scores 180 to 259 for the rural and urban sample respectively indicating almost similar concentration of scores in a limited range.

Table 2. Distribution of Scores on Locality for under graduate Students on the Variable ‘e-Learning’

Class Interval	Rural	Rural percentage	Frequency		Total Frequency of locality	Total Percentage of locality
			Urban	Urban Percentage		
300-319	1	0.50%	2	1.00%	3	0.75%
280-299	3	1.50%	7	3.50%	10	2.50%
260-279	15	7.50%	14	7.00%	29	7.25%
240-259	43	21.50%	45	22.50%	88	22%
220-239	69	34.50%	68	8.50%	137	34.25%
200-219	47	23.50%	45	0.50%	92	23%
180-199	22	11.00%	17	0.00%	39	9.75%
160-179	0	0	1	0.50%	1	0.25%
140-159	0	0	0	0.00%	0	0.00%
120-139	0	0	0	0.00%	0	0.00%
100-119	0	0	1	0.50%	1	0.25%
Total	200	100%	200	100%	400	100%

Figure 2: Bar Diagrams Based upon Frequency Distributions for Rural and Urban Sample of college students for the Scores on eLearning



Interpretation: It is revealed from frequency distributions for arts, science and total academic Stream of the sample given in Table 3 and corresponding bar diagrams given in Figures 3. that the scores on the variable of e-learning are distributed over a range of 196 for arts 115 for science

and 196 for the total academic stream of the sample. Thus, it may be said that the under graduate students differ in their level of e-learning. Hence, the hypotheses that “arts under graduate students do not differ in their level of attitude towards e-learning”; “science under graduate students do not differ in their level of attitude towards e-learning” and “Total Academic stream of the sample of under graduate students do not differ in their level of attitude towards e-learning” are rejected. This is evident from the fact that 88.50, 89.50 and 89.00 per cent subjects fall between the scores 180 to 259 for the arts, science and total Academic stream of the sample respectively indicating almost similar concentration of scores in a limited range.

It is revealed from Table 3. that t-value came out to be 0.07, which is not significant. This indicates that male and female under graduate students do not differ significantly with respect to their mean scores on e-learning. Hence, the hypothesis that “Male and Female under graduate students do not differ significantly with respect to

their attitude towards e-learning” is accepted. Hence, it may be inferred that male and female under graduate students exhibit more or less similar attitude towards

e-learning. Such data for its better understanding have been presented in figure 4 in the form of bar diagram.

Table 3. Distribution of Scores on Academic stream (arts/ Science) for under graduate Students on the Variable ‘e-Learning’

Class Interval	Arts	Arts (F) percentage	Frequency		Total Frequency of academic stream	Total Percentage of Academic stream
			Science	Science (F) Percentage		
300-319	3	1.50%	0	0	3	0.75%
280-299	4	2.00%	6	3.00%	10	2.50%
260-279	14	7.00%	15	7.50%	29	7.25%
240-259	39	19.50%	49	24.50%	88	22.00%
220--239	56	28.00%	81	40.50%	137	34.25%
200-219	54	27.00%	38	19.00%	92	23.00%
180-199	28	14.00%	11	5.50%	39	9.75%
160-179	1	0.50%	0	0	1	0.25%
140-159	0	0	0	0	0	0
120-139	0	0	0	0	0	0
100-119	1	0.50%	0	0	1	0.25%
Total	200	100%	200	100%	400	100%

Figure 3: Bar Diagrams Based upon Frequency Distributions for Academic Stream (arts/ science)Total Sample of under graduate Students for the Scores on e-Learning

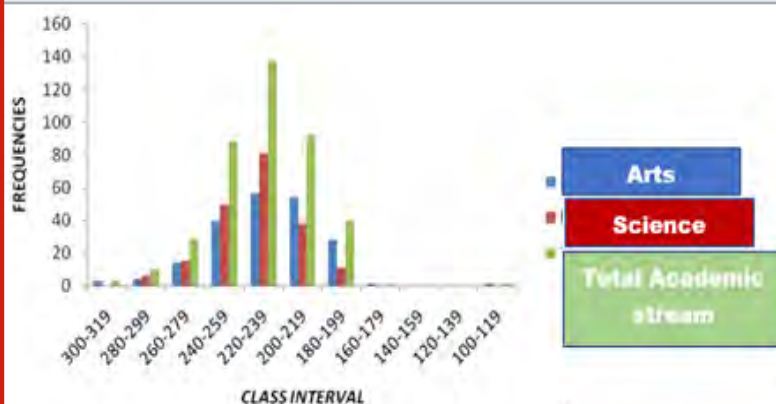


Table 4. t-value for Gender (male and female) under graduate students in respect of the variable of e-Learning

Gender	N	Mean	SD	SEm	df	t- value
Male	200	230.20	25.72	1.82	398	0.07
Female	200	230.02	23.72	1.68		NS

NS= not significant

Figure 4: Bar Diagram depicting mean scores on e-Learning among Male and Female under graduate students



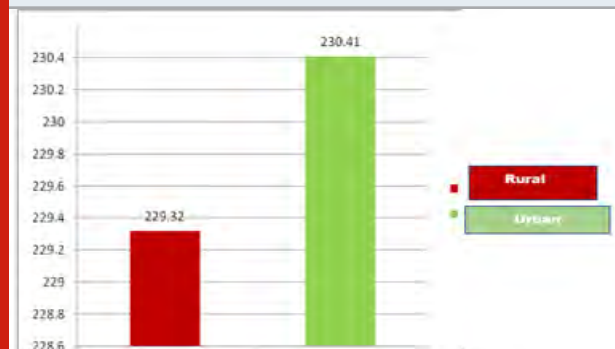
It is revealed from Table 4 that t-value came out to be 0.45, which is not significant. This indicates that Rural and Urban under graduate students do not differ significantly with respect to their mean scores on e-learning. Hence, the hypothesis that “Rural and Urban under graduate students do not differ significantly with respect to their attitude towards e-learning” is accepted. Hence, it may be inferred that Rural and Urban under graduate students exhibit more or less similar attitude towards e-learning. Such data for its better understanding have been presented in figure 5. in the form of bar diagram.

Table 5. t-value for Locality (rural and urban) under graduate students in respect of the variable of e-Learning

locality	N	Mean	SD	SEm	df	t-value
Rural	200	229.32	23.16	1.63	398	0.45 NS
Urban	200	230.41	26.02	1.85		

NS= Not Significant

Figure 5: Bar Diagram depicting mean scores on e-Learning among Rural and Urban under graduate students



It is revealed from Table 6. that t-value came out to be 2.81, which is significant at 0.01 level of confidence. This indicates that arts and science under graduate students differ significantly with respect to their mean scores on e-learning. Hence, the hypothesis that “arts and science under graduate students do not differ significantly with respect to their attitude towards e-learning” is rejected. Since, the mean score on e-learning is higher for science (233.30) as compared to arts (226.43), it may be inferred that science under graduate students exhibit significantly higher attitude towards e-learning in comparison to the arts. Such data for its better understanding have been presented in figure 6. in the form of bar diagram.

Findings of the Study: The major findings of the present study are as follows:

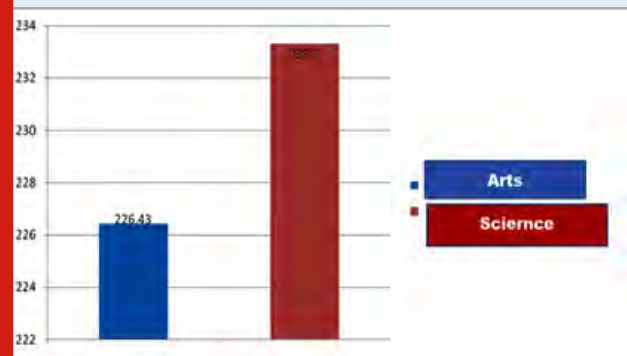
- The study revealed that the s under graduate students have positive attitudes towards e-learning.
- There exists no significant difference in attitude

Table 6. t-value for Academic Stream (Arts and Science) under graduate students in respect of the variable of e-Learning

Academic Stream	N	Mean	SD	SEm	df	t-value
Arts	200	226.43	27.50	1.92	398	2.81**
Urban	200	233.30	21.32	1.51		

**Significant at the 0,01level of confidence

Figure 6: Bar Diagram depicting mean scores on e-Learning among arts and science college students



towards e- learning between male and female under graduate students.

- There exists no significant difference in attitude towards e- learning between urban and rural under graduate students.
- There exists significant difference in attitude towards e-learning between arts and science under graduate students.

CONCLUSION

From the above study investigator arrived that the attitude of under graduate students towards e-learning is independently with regards to gender and locality. Also revealed that the academic stream differ significantly with respect to their attitude towards e-learning. As the under graduate students attitude towards e-learning have been found to be very high among under graduate students, it is expected that they are ready to take opportunity of online learning mode.

Educational Implication: The study will be helpful for orienting align workshops, training programmes for under graduate students should be organized for developing their attitude towards e-Learning. The teachers and parents should motivate the students to get up to date information by using e-Learning. Teachers uses the blended learning method during the class sessions. Storyboards are great way to beneficial for the learners. It can help visual ideas, in a way interest to the learners.

Suggestion

1. The objectives of the curriculum should be fulfilled through e-learning course.
2. There are myriad e-learning tools are allow that keep track accessible anywhere and anytime learning in comprehensive.
3. Develop a productive content plan on e-learning and plan should be outline all of the basics of e-learning strategies and target learners.
4. Productive e-learning is not just about providing information for learner instead motivated them .
5. Learners easily optimizing by mobile. As a result learner who have not computer or laptop like expensive gadgets they also can learn from the use of the mobile data.
6. Constantly boost up learner's to engagement with the real – incentives for productive learning.

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Abundance of Non-Heterocystous Blue Green Algae of Rice Field of Mangaldoi Sub Division, Darrang District Assam

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ABSTRACT

In these studies total 40 numbers of non-heterocystous blue green algal species were identified from Feb 2017 to Jan. 2019 in Mangaldoi sub division, Darrang District Assam, belonged to the genus Microcystis, Chroococcous, Aphanocapsa, Oscillatoria, Phormidium. Out of which the Genus Gloeocapsa shows highest number of species, and Genus Aphanothaceae shows lowest number of species

KEY WORDS: ABUNDANCE, BLUE GREEN ALGAE, NON HETEROCYSTOUS, RICE FIELD, GENUS GLOEOCAPSA, GENUS APHANOTHACEAE.

INTRODUCTION

Blue green algae, constitute a fascinating group of prokaryotic photosynthetic organisms, some of them fix atmospheric nitrogen by which they can increase fertility in the tropical rice field. Many workers have studied the cyanobacterial flora of rice fields of our country. (Rai and Bergman, 2002; Jaiswal et al., 2008; Karthikeyan et al., 2009, Anamika Singh, Hema Joshi 2018,) cyanobacteria have enormous potential in serving humanity in many ways. Their diazotrophic nature, wide distribution pattern and capability to enter into N₂-fixing symbiosis make them attractive research interest.

Cyanobacteria have a long history of usage in agriculture as biofertilizer (Whitton, 2000). They improve the texture of soil and increase the biochemical quality of the soil which forms a rapidly multiplying cover of microscopic plants. They have highly colonization with almost all types of soils. (Bold and Wanne, 1978) These strains are having special concern in microbiology as they are widely used as biofertilizer.

MATERIAL AND METHODS

Water samples were collected from seven different location of Mangaldoi sub-division of Darrang District, Assam. To perform the proposed taxonomical study in a precise manner, the Mangaldoi Sub-division is specified into seven selected sites. During the field survey, specimens are being collected in wide mounted bottles, test tubes, polythene bags, plankton net. Scalpel, blade, forceps are being used to collect blue green algae from running water. Sampling bottle is filled up with specimen along with water collected from the area to its one third capacities, the remaining parts is for aeration. Species of

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different levels of water is being collected by using pipes & tubes. Few samples will be collected from the same area in each case. Most of the methods and techniques are used on the basis of “Standard Operating Procedures for the Collection and Analysis of Aquatic Algae” June 2016 (Version 2.0) Published by North Carolina department of Environmental Quality. 2016.

Identification: Identification of collected species was carried out by consulting keys given by, Fritch (1935) Smith(1950), Desikachary, (1959) Randhawa, (1959), and some published literature, monographs of algal taxonomy also studied. However Desikachary's (1959) classification is followed in arranging the genera and species.

Name of the species

1. *Microcystis robusta* (Clark) Nygaard
2. *Microcystis bengalensis* Banerji
3. *Microcystis elongata* Geitler
4. *Microcystis lamelliformis* Holsinger
5. *Microcystis aeruginosa* Kutzing
6. *Microcystis flos-aquae* (Witt) Kirchner
7. *Microcystis elabens* (Breb) Kutzing
8. *Chroococcus giganteus* West
9. *Chroococcus macrococcus* (Kutzing) Rabenhorst
10. *Chroococcus turgidus* (Kutzing) Naegeli
11. *Chroococcus tenax* (Kirchner) Hieronymus
12. *Chroococcus minutus* (Kutzing) Naegeli
13. *Chroococcus cohaerens* (Breb) Naegeli
14. *Gloeocapsa decorticans* (Agardh) Richter
15. *Gloeocapsa montana* Kutzing
16. *Gloeocapsa gelatinosa* Kutzing
17. *Gloeocapsa polydermatica* Kutzing
18. *Gloeocapsa calcarea* Tilden
19. *Gloeocapsa punctata* Naegeli
20. *Gloeocapsa atrata* (Turp) Kutzing
21. *Gloeocapsa nigrescens* Naegeli
22. *Gloeocapsa stegophila* var. *crassa* Rao
23. *Gloeocapsa coracina* Kutzing
24. *Gloeocapsa magma* (Breb) Kutzing
25. *Gloeocapsa pleurocapsoides* Novacek
26. *Aphanocapsa pulchra* (Kutzing) Rabenhorst
27. *Aphanocapsa koordersi*: Strom
28. *Aphanocapsa banarensis* Bharadwaja
29. *Aphanocapsa bifurmis* A Braun
30. *Aphanocapsa grevillei* (Hase) Rabenhorst
31. *Aphanocapsa crassa* Ghose,
32. *Aphanothece stagnina* (Spring)
33. *Oscillatoria vizagapatensis* Rao
34. *Oscillatoria sancta* (Kutzing) Gomont
35. *Oscillatoria perornata* Skuja
36. *Oscillatoria ornata* Kutzing ex Gomont
37. *Oscillatoria subbrevis* Schmidle
38. *Oscillatoria curviceps* Frey
39. *Phormidium microtolum* Skuja
40. *Phormidium stagnina* Rao

RESULTS AND DISCUSSION

The identified non-heterocystous blue green algae are structurally different in shape, size and structure. The identified blue green algal species of rice field are 40 in numbers. Genus *Gloeocapsa* having 30% including 12 species (*Gloeocapsa decorticans* (Agardh) Richter, *G. Montana* Kutzing, *G. gelatinosa* Kutzing, *G. polydermatica* Kutzing, *G. calcarea* Tilden, *G. punctata* Naegeli, *G. atrata* (Turp.) *G. nigrescens* Naegeli, *G. stegophila* v. *crassa* Rao, *G. Coracina* Kutzing, *G. magma* (Breb.) Kutzing, *G. pleurocapsoides* Novacek.) Followed by genus having species *Microcystis* 17.5% *Chroococcus* 13%. *Aphanocapsa* 13% *Oscillatoria* 13% *Phormidium* 5% *Aphanothaceae* 2.5%.

CONCLUSION

Algal species add readily available nutrition to crop plants in agricultural lands and ensure better crop nutrient management. They improve the texture of soil and increase the biochemical quality of the soil which forms a rapidly multiplying cover of microscopic plants. They have highly colonization with almost all types of soils. (Bold and Wanne, 1978). The study shown Genus *Gloeocapsa* 12/40 x 100 = 30 % in rice field of Mangaldai sub division. In another study “Taxonomic Enumeration of blue green algae of tea garden area of Mangaldai sub division Darrang District Assam”. Blue green algae are sensitive to environmental change and nutrient fluctuation has been suggested by Frempong (1981), Tilman et al. (1982), Sudhakar et al. (1991).

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Diagnostic Role of Circulating Immune Complexes During Cow Leukemia

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ABSTRACT

In chronic infections caused by retroviruses, "antigen antibody" immune complexes (AAC) appear in body fluids. In the course of the studies to clarify the structure of the AAC we proved that immune complexes in cattle leukemia could contain the virus's viral DNA. The role of circulating immune complexes in the pathogenesis of the bovine leukemia virus (BLV) infection is not sufficiently studied. AAC containing the viral DNA may be formed during the death of infected B-lymphocytes by linking non-invasive viral DNA to surface IgMs with high DNA affinity. Determining the appearance of AAC with the viral DNA in biological fluids depending on the stages of the infectious process is an important criterion in antileukemia measures. The article describes the results of research to determine circulating immune complexes containing the provirus DNA in the milk of cows infected with BLV as compared with hematological changes at different stages of the infection process. It is reported that the viral DNA in the AAC of the milk of cows infected with BLV is detected much earlier than hematological changes that allow to consider them leukemia patients. Of the 12 cows studied, by the end of the experiment, six cows had AAC containing the viral DNA in their milk samples. And only one cow with the detection of the viral DNA in the AAC of milk showed parallel hematological changes typical for leukemia. The use of milk samples for molecular genetic analysis to identify BLV in AAC is quite a promising area for assessing the epizootic situation on farms and is very informative in determining the animal status.

KEY WORDS: BOVINE LEUKEMIA, POLYMERASE CHAIN REACTION, IMMUNOSORBENT ASSAY, PROVIRUS, IMMUNE COMPLEXES.

INTRODUCTION

Bovine leukemia virus is one of the most widespread chronic infectious diseases of farm animals not only in Russia, but all over the world. BLV infects livestock around the world and poses serious problems for livestock

production (Ernst and Zinovieva, 2008). One of the factors inhibiting the effectiveness of health-improving measures in leukemia is the late diagnosis of the disease due to the use of methods that do not have high sensitivity and specificity, as well as due to insufficient study of the peculiarities of pathogenesis of the infectious process (Kalashnikova, 2003). As is known, diagnostic tests for leukemia are carried out using serological, molecular genetic, hematological and other methods (Khabibrakhmanova, 2009). The diagnosis of cattle leukemia is based on serological methods, which are based on the detection of specific antibodies to cattle leukemia virus antigens in animal blood serum (Balakirev et. al., 2018; Giblin et. al., 2010; Zinnatov et. al., 2017).

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However, the relationship between free and serum-bound antibodies is constantly changing as the infection process progresses. Therefore, one-off serological tests in the diagnosis of cattle leukemia may not be effective enough. At present, along with serological methods of research, the use of polymerase chain reaction (PCR) in the diagnosis of cattle leukemia is regulated (Giblin et al., 2010; Zinnatova et al., 2014). It is also recommended that the detection of proviral load levels (PLV) be used as an indicator of animal infection in an anti-leukemia measures. Most retroviruses are considered to be infectious, and the relative amount of integrated provision in the host genome, known as the viral load (PVL), is associated with an increased risk of infection spread (Zinovyeva and Ernst, 2006).

In addition, it is known that in chronic infections caused by retroviruses, immune complexes "antigen-antibody" (AAC) appear in body fluids. Immune complexes in serum of infected BLV cows contain immunoglobulins G, M and viral components. In studies to clarify the structure of AAC we proved that immune complexes in cattle leukemia may contain the virus's viral DNA

(Sukhareva and Gagloeva, 2008). Given that diagnostic measures for cattle leukemia in milk samples are more cost-effective, the purpose of this paper was to determine the dependence of the appearance of AAC in milk samples containing the viral DNA on the stages of the infection process.

MATERIAL AND METHODS

An experimental group of 12 cows infected in vivo was created from the first diagnosis of immunodiffusion reaction (IR) and confirmed by ELISA and PCR methods. Blood and milk samples were examined every 2 months to detect AC, the viral DNA and hematological changes. The immunoenzyme analysis was carried out using the "Antibody Detection Kit for Bovine Leukemia Virus (BLV)" produced by NPO "Narvak" according to the generally accepted method and with preliminary dissociation of AAC in samples. The results of IR studies were obtained from the Republican Veterinary Laboratory. PCR was set using reagents of the test system "Leukosis cattle provirus" for detection of the viral DNA in leukocytes and AAC of milk.

Table 1. Results of blood and milk samples of BLV infected cows

Sample No.	Research order, indicators								
	1			2			3		
	leukocyte count in 1 ml (x 10 ⁹)	AAC titre	Proviral DNA	leukocyte count in 1 ml (x 10 ⁹)	AAC titre	Proviral DNA	leukocyte count in 1 ml (x 10 ⁹)	AAC titre	Proviral DNA
1	9.7	1:8	-	9.1	1:8	-	9.8	1:2	-
2	10.2	1:8	-	9.9	1:2	-	10.1	rel.	-
3	8.6	1:2	-	9.2	1:8	+	14.5	1:8	+
4	8.9	1:8	-	8.9	1:8	-	9.2	1:8	-
5	9.1	rel.	-	9.2	1:2	-	10.1	1:4	-
6	9.5	1:2	-	8.9	1:4	-	9.9	1:2	-
7	8.7	1:8	-	9.7	1:4	+	10.1	1:2	+
8	8.8	1:8	-	10.1	1:2	-	10.1	1:8	-
9	9.1	1:16	-	9.8	1:8	-	10.2	1:16	-
10	8.8	1:2	-	8.7	1:2	-	9.8	1:8	-
11	9.7	1:16	-	8.8	1:8	-	10.3	1:8	-
12	10.1	1:8	-	9.5	1:2	-	9.9	1:8	+

Circulating immune complexes were isolated by the method of precipitation in polyethylene glycol (PEG). At the same time, serum samples were mixed in a ratio of 1 : 1 with 7% PEG-6000 solution in 0.1M borate buffer (pH 8.8), stirred and incubated at +4 °C for 72 hours. The precipitate was precipitated by centrifugation at 5000 g for 20 minutes and washed three times with tenfold PEG volume in concentrations: 3.5%, 7% and 10.5% in borate buffer. The isolated immune complexes were dissolved in physiological solution and their activity in ELISA was studied. Counting of white blood cells was carried out in a counting chamber with Goryayev's grid. Animal leukemia status was determined based on the number of leukocytes and lymphocytes in 1 µl of animal blood according to the "leukemia key".

RESULTS AND DISCUSSION

In the experimental group of animals, observations were made throughout the year. Every two months, blood and

milk samples were taken. The number of leukocytes in 1 µl of blood, the titers of circulating immune complexes in milk and the presence of viral DNA in AAC were determined. The research results are presented in the table. All cows of the experimental group from one herd, 2-4 years old, were diagnosed as infected with BLV for the first time, i.e. no more than 6 months had passed since the infection. As can be seen from the results of studies presented in the table, after the first and second studies the number of leukocytes in the blood of all experimental animals is within the physiological norm. Consequently, there are no hematologically ill animals.

It should be noted that in milk samples of all animals except No. 5 after the first study AAC containing antileukemia antibodies in titers from 1:2 to 1:16 were found, which later did not disappear in almost all animals during the whole experiment. The only exception is cow number 2, which was not found in the AAC sample for the third time (6 months later). The provirus DNA

in the AAC of milk is detected for the first time in two cows under No. 3.7 for the second time, i.e. 4 months after the beginning of the studies. It is important to note that hematological indicators in those animals are currently within the physiological norm. Cow number 7 still has this indicator within the norm even after the third study.

After the third time or 6 months from the beginning of the experiment, the viral DNA in AAC of the milk is detected in another sample - No. 12. At the same time, hematological indicators are also within normal limits. 9.9 thousand leukocytes in 1 µl of blood. It is known that according to the "leukemia key" in hematologically ill cows, at the age of 2-4 years, the content of leukocytes in 1 µl of blood is more than 11 thousand. After the fourth time, only 6 samples of viral DNA in AAC of the milk are detected. Three of them, No. 4, 5, 9, have them first discovered. Only in cow No. 9, in parallel with the detection of the viral DNA in AAC of the milk hematological changes characteristic of leukemia also appeared. The content of leukocytes is more than 12 thousand per 1 µl of blood.

According to the rules for the prevention and control of cattle leukemia, animals whose serums have given a positive result in IR or ELISA are considered to be infected with the leukemia virus and shall be examined every 6 months by a haematological method for leukemia. Animals with blood changes specific to leukemia are recognized as sick, isolated and slaughtered. According to the existing regulations, cattle infected with BLV can be used in economic needs in compliance with veterinary and sanitary rules. However, the discovery of AAC in blood and milk containing the viral DNA calls into question existing methods for the duration of possible animal exploitation and for recognition of animals as leukemia patients. Moreover, the ability of DNA to remain viable even after prolonged heat treatment is considered proven.

CONCLUSION

The role of circulating immune complexes in the pathogenesis of the bovine leukemia virus (BLV) infection is not sufficiently studied. AAC containing the viral DNA may be formed during the death of infected B-lymphocytes by linking non-invasive viral DNA to surface IgMs with high DNA affinity. It is obvious that they appear in milk in the later stages of the disease with a pronounced virus presence in the blood flow, when the animal becomes a potentially dangerous source of

herd infection. Hematological changes during this period remain stable in most cases. The use of milk samples for molecular genetic analysis to identify BLV in AAC is quite a promising area for assessing the epizootic situation in farms and is very informative in determining the status of the animal, as well as the possibilities and duration of operation of the infected animal in production conditions. The results of the research give grounds to revise the criteria for an animal that is "infected" and "leukemia-positive".

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Health and Safety in Construction Field: A Bibliometric Analysis From 1964 – 2019

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ABSTRACT

To observe and evaluate, the contribution of authors and collaboration of institutes in research productivity in field of Health and Safety in Construction, published in journals indexed in Scopus-Elsevier database from 1964 – 2019. The research data such as publication year, document type, authorship pattern, title, language, subject area, geographical location and keywords on file format with comma-separated value (CSV) techniques used, downloaded on the date June 6, 2020 for tabulations in MS Office Excel Sheet 2010 for bibliometric analysis. A total 6821 documents retrieved from Scopus-Elsevier database with an average of 121.8% documents during the 56 years. These years divided into four groups and there is a huge comparison found in publications by the first group existing years 2006 - 2019 published 5256, 77% documents, remaining 1565, 23% literature published in 42 years. Articles 4042, 59.2% in form of document got first place, followed by Conference Papers 1890, 27.7%, and Review Articles 467, 6.8% out of 6821 documents. Ten journals associate with safety, civil and industrial engineering published 717, 10.5% of documents. Majority research 6296, 92.3% documented in the English language, meanwhile remaining 525, 7.6% attract more 32 languages and show there richness in scientific vocabulary. This study explains the determinations of researchers affiliated with a huge group of scientists attached to health and safety-related works in the construction industry around the globe. The caregivers in health and safety keen involve error-free environment for avoiding, reducing, and provision of the hazard-free arena to develop society.

KEY WORDS: BIBLIOMETRIC, HEALTH AND SAFETY, CIVIL ENGINEERING, MATERIAL SCIENCE AND CONSTRUCTION INDUSTRY.

INTRODUCTION

Working at heights, electric shocks, moving heavy loaded machinery, slip and trips, unawareness about the use of proper personal protective equipment (PPPE)

and poor working conditions are the mixed appearances of health and safety in construction industry. 1 Fall from height (FFH) is emerging research areas in the construction industries, in context; computer and information technology tools help evaluate existing safety management programs in prevention of damages and losses. 2 All construction projects carry some level of risk. Which needs to identify and managed through skills, careful planning, and being able to make good decisions promptly. 3 A truly effective health & safety management system establishes and maintains a culture of safety that permeates the entire organization. Ensuring safety on construction sites is major contest in terms of management commitment with meeting deadlines

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between work related accidents and work-related diseases. 4 Health and safety management are essential in the construction and installation areas for enterprise sustainability, employee health and social stability. 5 The potential harm to workers, a serious accident can cause work to stopped or delayed and lead to a decrease in productivity due to low morale. 6 Notwithstanding association size or type, the best wellbeing and security the executives frameworks apply a good judgment approach dependent on an exhaustive comprehension of the particular dangers and dangers the organization faces day by day. 7.

Recently, a study conducted on Web of Science (WoS) to check rapid growth of literature on progress and evolving trends on employee sickness absence, safety performance and the relationship between safety culture/atmosphere. Study categorize 4,852 research documents mainly on industrial environment, occupational health care and covering business management, medicine, psychology and safety sciences published between 1900 and 2018. 8 A research similar above, on topic of human reliability in the Web of Science Core Collection (WOSCC) database between the years 2000 – 2019. Study evaluates 117 out of 198 documents existing on journal articles and conference papers, under the two criteria, a) monitoring health and safety of workers on construction sites, and b) integrated techniques of computer vision. This study suggests the usage of computer vision techniques helps to improve psychological state of employee in progress of workability and prevent occupational health diseases and accidents. 9 This is also interesting that, how bibliometric studies are helpful to know to make chemical industry of China more sustainable through the progress and shortcomings in current research in safety as basis from 1955 – 2019.

Web of Science Core Collection (WOSCC) database support to retrieved 1285 out of 2996 publications limiting the affiliation of country. 10 In 2019, an assessment conducted on 513 research articles, which published in Scopus-Elsevier Database based indexed journals in the area of construction safety. This study reveals that a variety of topics related to management in simulation and fall from height in recent past get attention in developing countries. 11 Same year, Zhao pointed another angle of studies and studied 2980 articles published from 2000 – 2016 with a bibliometric approach, to analyze subject categories of green building technologies in construction process. 12 Before Zhao, an observational study conducted on the research productivity of the Pakistan Journal of Science and Industrial Research (PJSIR) from 1957 – 2007. This study expressed that 4929 articles published during the studied period in 340 issues, with the caption of physical, biological and technological sciences. 13 An interesting study explains that Nordic country; Netherlands, Italy, and the United Kingdom frequently performed bibliometric methodological studies on the Web of Science (WoS) database, to observed and assess the growth of publications, subject domain, authorship pattern, influential institutes, and research performance. 14.

MATERIAL AND METHODS

The research data in Health and Safety in Construction published in the journals indexed in Scopus-Elsevier Database from 1964 to 31 December 2019, downloaded on the date June 6, 2020, for tabulations in MS Office Excel Sheet 2010. The file format with comma-separated value (CSV) and Abstract on Note-paid techniques used, typed “Health and Safety in Construction”, in the Boolean operator AND appears by default. To calculate year-wise publications, b) to identify document type, c) to estimate the position of authors, d) to calculate the institutional participation in research, e) to evaluate the association of topic with subject specialties, f) to check the involvement of countries in publications, g) to analysis language pattern with keywords of publications were set to explore as objectives.

Figure 1: research published in Health & Safety in Construction from 1964 – 2019

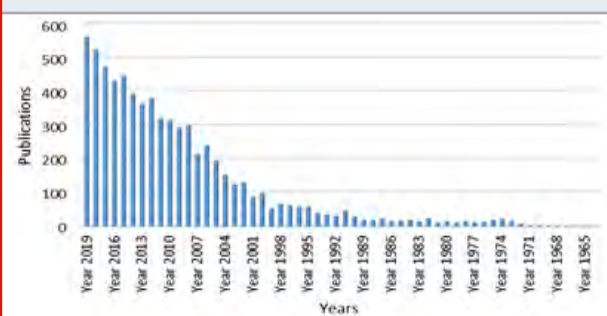


Table 1. Document Type

S. No	Document Type	Publication	%
1	Article	4042	59.26%
2	Conference Paper	1890	27.71%
3	Review	467	6.85%
4	Book Chapter	124	1.82%
5	Conference Review	78	1.14%
6	Short Survey	63	0.92%
7	Book	51	0.75%
8	Note	45	0.66%
9	Letter	14	0.21%
10	Editorial	13	0.19%
11	Business Article	10	0.15%
12	Report	7	0.10%
13	Abstract Report	5	0.07%
14	Data Paper	2	0.03%
15	Erratum	2	0.03%
16	Retracted	1	0.01%
17	Undefined	7	0.10%
			Total documents 6821

RESULTS

Figure 1, shows that, 6821 with an annual average of 121.8 documents written by 43,375 authors and with an average of 15.7 authors participated published documents, maximum 563 and minimum 1 research were included yearly and through-out from year 2002 this study found incline position of publications from the 1964 – 2019.

Table 1 reveals that, the information of 6821 publications divided in seventeen sections were extract from the Scopus databases, the majority 4042, 59.2% research existing on research “Articles” followed by 1890, 27.7% Conference papers and 467, 6.8% Review Articles. The extract data of study reveals 28 subject areas, but we divided into four main catagories due to requirement and sentimentality of the study. Table 2, shows the influences of material sciences in hierarchy of subjects.

Table 2. Subject Areas of Health and Safety in Construction 1964 - 2019

S. No	Subject Areas	Publications	%
1	Engineering & Applied Engineering Sciences	3524	51.6%
2	Medicine & Health Sciences	2162	31.7%
3	Mathematics & Computer Sciences	743	10.8%
4	Earth and Planetary Sciences	392	5.7%
	Total documents 6821		

Table 3 & Figure 2, categorized authors into twenty-five basic lots to understand the nomenclature of document producers. The first twelve rows reflect the name of contributors in productivity as solo or as participators and second thirteen rows showing the positions of documents written by authors collaboratively. Total 1735 multiple by 25 groups resulted, study found 43,375 authors. Then the ratio of 15.7 authors wrote 6821 documents. Lingard, H. took a high position with 51, 0.75% followed by Smallwood, J. 33, 0.48% and Anon and Gibb, A. with 29, 0.43% article published out of 6821 articles.

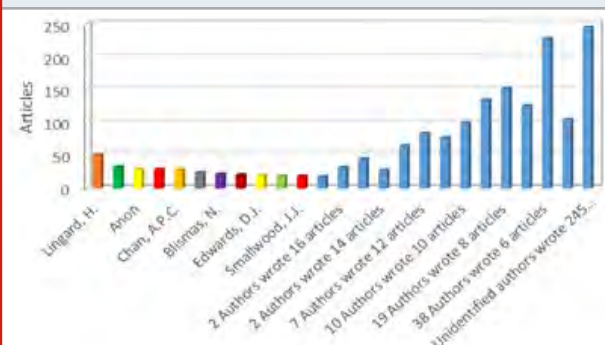
The data of the study pointed-out only the names of 160 institutes which contributed as a minimum 10 and maximum of 145 articles in publishing from 1964 – 2019. Figure 3, shows the name of institutes with participation of publications. The National Institute for Occupational Safety and Health, Cincinnati, Ohio United States of America with 145, 2.1% ahead in publications and followed by Loughborough University, United Kingdom 98, 1.4%, RMIT University, Australia 79, 1.16% and Hong Kong Polytechnic University, China 78, 1.14%.

Figure 4, reveals globally participation in the research productivity. United States of America put its input with 1928, 34% articles followed by United Kingdom, People Republic of China, Australia, Canada, Italy, Germany, India and Brazil.

Table 3. Breakdown of contributed authors in documents

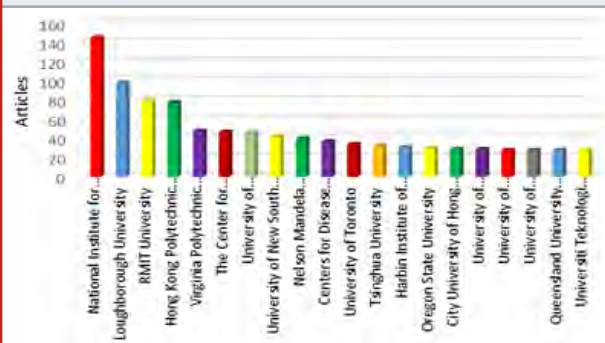
S. No	Authors	Documents	%
1	Lingard, H.	51	0.12%
2	Smallwood, J.	33	0.08%
3	Anon	29	0.07%
4	Gibb, A.	29	0.07%
5	Chan, A.P.C.	28	0.06%
6	Lipscomb, H.J.	24	0.06%
7	Blismas, N.	22	0.05%
8	Gibb, A.G.F.	21	0.05%
9	Edwards, D.J.	20	0.05%
10	Li, H.	19	0.04%
11	Smallwood, J.J.	19	0.04%
12	Gambatese, J.A.	18	0.04%
13	2 Authors wrote 16 articles	32	0.07%
14	3 Authors wrote 15 articles	45	0.10%
15	2 Authors wrote 14 articles	28	0.06%
16	5 Authors wrote 13 articles	65	0.15%
17	7 Authors wrote 12 articles	84	0.19%
18	7 Authors wrote 11 articles	77	0.18%
19	10 Authors wrote 10 articles	100	0.23%
20	15 Authors wrote 9 articles	135	0.31%
21	19 Authors wrote 8 articles	152	0.35%
22	18 Authors wrote 7 articles	126	0.29%
23	38 Authors wrote 6 articles	228	0.53%
24	21 Authors wrote 5 articles	105	0.24%
25	Unidentified authors wrote 245 articles 25 X 1735 = 43375	1735	0.56%
	6821 ÷ 43375 X 100 = 15.7 authors	43375	

Figure 2: Contribution of authors in publications from 1964 - 2019



Word is a single unit of spoken language. A word always symbolizes the main idea of thinking, sharing experiences, or feature concepts of plans, stories, decisions, signs, and emotions. Table 5 shows the usage of 160 different individual or compound words as word, keywords utilized in 6821 documents, which enriched the research content. The Finnish, Korean, and Lithuanian languages contributed 3, 0.04% articles, Arabic, Danish and Hungarian with 2, 0.03% articles and Bosnian, Bulgarian, Greek, Hebrew, Latvian, Malay, Norwegian, Romanian, Serbian, Slovenian, Swedish and Ukrainian languages participated with one 0.01% article.

Figure 3: The contribution of top 15 Institutes in research published from 1964 – 2019



DISCUSSION AND CONCLUSION

The various types of documents published during the period of 1964 – 2019, this study download 6821 articles. The studied period can be distributed in four eras i.e first cluster 1964 – 1977 published 99, 1.4%, second group 1978 – 1993 published 275, 4%, third span 1994 – 2005 published 1191, 17.4%, and fourth era 2006 – 2019 published 5256, 77% documents out of 6821 documents. This study can assume that the changes in postal and traditions in information communication technology strongly effect the style of dispatching and reviewing of manuscripts to publish the ideas, and experiences of researchers in collaborative manners.

The research data of study merged sub-specialties into the main specialty with creations of four main classes to easy understanding of concerned topic. The spectrum of topic involves every corner of information from chalking the plans of project infrastructure, presenting it on surface with physical resources, covering-up with financial resources, designing, assigning the responsibilities, getting observations, analysis, findings and suggestions in form of reporting. Receiving every bit of information from human resources is a significant opportunity or threat to personals of construction industry for maintaining guidelines, standards to deal in health and safety. The fourth decade covers the huge amount of research, applying the guidelines and standards of health and safety in construction work, consequently receiving the results of success or damaging the assets with lives of human beings. These scenarios push planners to rethink,

Figure 4: The contribution of top 20 countries in research from 1964 – 2019

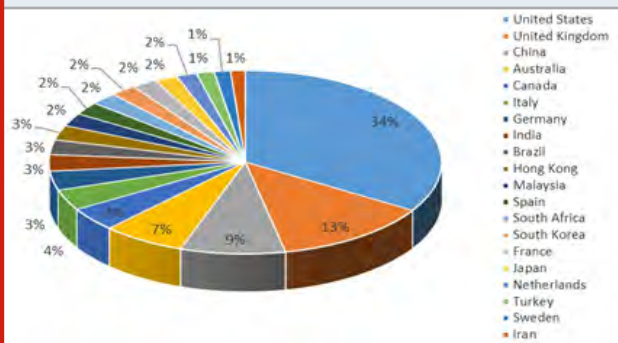


Table 4. The usage of key-words and languages in research published from 1964 – 2019

S. No	Key-words	Words	Language	Articles	%
1	Human	2048	English	6296	92.30%
2	Article	1586	Chinese	101	1.48%
3	Humans	1582	German	90	1.32%
4	Construction Industry	1452	Italian	71	1.04%
5	Safety	1116	Spanish	52	0.76%
6	Accident Prevention	939	French	46	0.67%
7	Occupational Health	775	Portuguese	40	0.59%
8	Occupational Risks	763	Russian	40	0.59%
9	Risk Assessment	724	Persian	16	0.23%
10	Male	662	Polish	11	0.16%
11	Adult	651	Japanese	9	0.13%
12	Health And Safety	629	Dutch	7	0.10%
13	United States	588	Czech	6	0.09%
14	Health	585	Turkish	5	0.07%
15	Female	576	Croatian	4	0.06%

remap, reconsider and research the new horizons without any errors.

This study reveals the missionary movements of health and safety caretakers in construction industries; their observations support to evaluate the policies, modification and redesigning of measures, to deal sensitivity of clear danger, avoiding the culture of losses of every asset from any hazard. The interesting part of this study is the usage of 160 different words as single or compound in keywords. Human, Humans, Articles, Safety and Construction Industry are the words used as keywords in most of the articles published in studied period. The topic of health and safety in construction industry grab the attention of the researchers of 33

languages around the world. Twelve languages of different countries present one article, nine articles published in other three languages, and the majority of 6296, 92.3% articles published in the English language followed by Chinese, German, Italian, Spanish, French, Portuguese and Russian minimum 10 to maximum 101 articles out of 6821 articles.

The organization's performance measured against agreed standards to reveal when and where improvement needed. Active self-monitoring reveals how effectively the safety and health management system is functioning. 15 Self-checking takes a gander at both equipment (premises, plant and substances) and programming (individuals, strategies and frameworks, including singular conduct and execution). On the off chance that controls come up short, receptive observing should discover why they fizzled, by examining the mishaps, sick wellbeing or occurrences, which could have caused damage or misfortune. 16 Keeping workers safe should be the top priority of every company, the potential harm to workers, and a serious accident can cause work be stopped or delayed. The high levels of ill health, accidents and injuries within construction workers explained by a high variety of risk factors at the workplace. 17

Authors' Contributions: Dr. Abdullah Alabdali programmed this bibliometric research for this study, collected data from Scopus-Elsevier Database from 1964 to 31 December 2019 Indexed Journals for statistical analysis and reviewed. Author read and approved the final manuscript.

Disclaimer: This data published in Scopus-Elsevier Database from 1964 to 31 December 2019 Indexed Journals; it supports only participation and not inclined or declined of any organization, city, country, and standards.

Conflict of Interest: None to declare.

Funding Disclosure: None to declare

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Molecular Insights into Bromelain Application in Industry and Health Care

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ABSTRACT

Bromelain is a cysteine protease derived from the stem and fruit of the pineapple. It has a significant role in pharmacological and clinical applications. Studies have shown Bromelain to be a potent photoactive compound that has a wide application in industry. It has also been shown to be effective in treatment of cancer, inflammation, and allergies. It has a distinct immunomodulatory activity which forms an important strategy in its utilization as a therapeutic agent. Bromelain plays a significant role at molecular level by regulating the expression of proteins that are potential therapeutic targets. Bromelain is used extensively worldwide as an herbal medicine as it promises good efficacy and has no side effects. This paper reviews the general characteristics of Bromelain, its separation process, and its use in industries and healthcare as a therapeutic agent. The present review identifies that there is lack of knowledge pertaining to the mode of action of Bromelain in inhibiting transcriptional factors and in controlling cancer. An in-detail analysis in this area might help in expanding the therapeutic scope of Bromelain.

KEY WORDS: BROMELAIN, CANCER, PHARMACOLOGICAL ACTIVITY, SEPARATION, TRANSCRIPTION FACTORS.

INTRODUCTION

The Bromelain protease is isolated from the stem and fruit of Pineapple (*Ananas comosus*). Pine apple belongs to the family Bromeliaceae. It finds extensive utilization in tropical and subtropical countries. Bromelain is a sulfhydryl activated protease enzyme (EC 3.4.22.32). Since 1875, without proper scientific evidence, bromelain has been widely used by the tribal community and natural healers in its crude extract form to treat various health issues. The enzyme is also used as dietary supplement

because of its wide benefits to the human system. The stem part of the plant, which is inexpensive and is usually discarded, has a high concentration of bromelain and forms an important raw material for the isolation and purification of the enzyme. The growing demand for pineapple has led to high disposal of its stems, which can instead be reused in an innovative and scientific way. Due to the significant role of the enzyme in food, textile, dairy, healthcare industries, the pineapple stems have formed an excellent raw material for extraction of the enzyme, thereby avoiding large-scale wastage and environmental pollution.

Bromelain has been found to be useful in treatment of platelet aggregation, traumas, bronchitis, thrombophlebitis, and angina pectoris. Bromelain is used as anti-inflammatory and anti-cancer agent. It is useful in treatment of bronchitis and allergic air-way diseases. The enzyme upon the administration via the oral route is easily absorbed from the human intestine without undergoing any significant changes and retains

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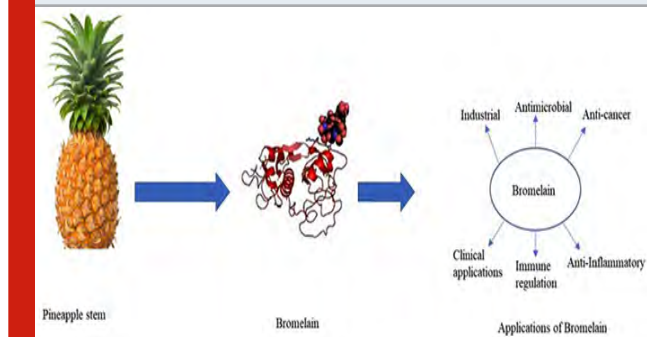
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its physical and biological properties. The significant and ample application of bromelain in industry and health care forms an important aim in the research area for potential exploration of the molecule as shown in Figure 1.

Figure 1: Over all representation of source and uses of Bromelain



Separation Strategies and Biochemistry of Bromelain:

The demand for bromelain due to its extensive application in clinical research and other industries emphasizes the need for developing high throughput technology for its separation and purification. The main strategy of purifying bromelain effectively is to obtain a high fold of purification, along with a high percentage of product recovery. Thus, the main objective of the researcher should be to shorten the purification process, thereby reducing the associated cost and time.

The chromatographic separation of bromelain using different column matrices such as CM Sephadex, and DEAE sephacel 6, showed six fractions namely SBB1, SBB2, SBB3, SBB4, SBB5, and SBA which contain the enzyme. These fractions migrated as a single band on SDS gel electrophoresis with different migration rates revealing their difference in molecular weights. Sequencing of the enzyme by cyanate method showed that the amino terminal position of fractions SBB 1-5 and SBA have valine. Sequencing post hydrazinolysis showed that carboxyl terminal had glycine residue in SBB 1-3, SBA and serine in SBB4 and SBB5 fractions. Of the various fractions tested for enzymatic activity SBB4 and SBB5 were more active than the other fractions [5]. Recently, there is an increased demand for novel separation and purification techniques that involve fewer steps in the separation and purification process and offer a higher product-recovery percentage.

Aqueous two-phase extraction is a liquid-liquid extraction method shows a fold purification of 16.3 and recovery of 55.6%. The method requires minimum inputs of time and energy and gives maximum yield at the end of the process. It is a low-cost process that can be scaled up with ease. The purification steps are easily deduced, and the method can be used as an early step in the purification process. Active Bromelain enzyme with recovery of 113.54% and 2.23 purification fold has been extracted from pineapple peel using a combination of 15% polyethylene glycol (PEG) and 14% magnesium

sulphate. Utilizing a similar method Bromelain was isolated from stem, leaves, and bark of pineapple bromelain using 10.86% PEG and 36.21% ammonium sulphate which yielded 66.83% activity of the product with the purification fold of 11.8. The method shows that increasing the PEG/ salt percentage in the top layer increases the recovery of protein. Parallel to the above study, thermo separation process was carried out in the aqueous medium with the system of polypropylene oxide (PPO)-polyethylene oxide (PEO)-PEO block. The method showed an activity recovery of 79.5%, and a purification fold of 1.25 suggesting that it is not an effective method compared to the previous study.

Using Ion exchange chromatography highly pure bromelain was obtained. Three times purer bromelain was obtained using cation, exchange resin, diethylaminomethyl (DEAE) based resin, DEAE-Sepharose resin and carboxymethylcellulose resin [16] with the overall enzyme activity recovery of 84.5% and the purification fold of 10. Precipitation was used to remove the trace contaminants. Different techniques have been adapted with a difference in the type of ion exchange used and the lysis buffer to get the purified form of bromelain from various parts of the pineapple. Lysis of pineapple stem in 50mM lysine buffer followed by purification using CM Sephadex gave pure bromelain from pineapple stem. Various other conditions successful in purifying bromelain from stem include use of 0.02M sodium citrate buffer for lysis, 0.2M potassium phosphate with DEAE cellulose, and 10mM Tris-HCl buffer. Isolation from fruit was done using Anion (Q-Sepharose) and 0.1M sodium phosphate, 5mM EDTA, 5mM cysteine buffer, Anion (DEAE cellulose) and 0.02M potassium phosphate buffer, Anion exchange resin (Duolite A-2) with 0.05M potassium phosphate, Cation (Mono Q HR) resin with 20mM Tris-HCl bromelain, and Anion DEAE cellulose resin with potassium phosphate buffer [24]. SP-Sepharose and a combination of a 20mM acetate buffer and a 0.1mM of EDTA were also used for purification of Bromelain from stem.

Precipitation of bromelain from the pineapple stem with 99.5% alcohol was carried out in a fed-batch system. The entire process is temperature sensitive in order to avoid the loss in the enzyme activity. In order to improvise the yield and activity various methods have been tested, from the fruit. Ammonium sulphate precipitation followed by chromatography yielded 50-70% of the enzyme by spray dry and 96% of enzyme by freeze dry with purification fold 2.8. Ethanol concentration from 30-70% precipitated 98% of a protein and fold purification of 2.28. Glucose (10% w/v) as a cryoprotectant was added to prevent denaturation of the protein after the lyophilization process. Alternatively, ethanol precipitation (30-70%) at 4°C gave 98% recovery and a purification fold of 2.07. Precipitation using carrageenan polysaccharide to avoid salts and organic solvents showed recovery of 80-90% of bromelain from the stem and peel. Reverse micellar extraction followed by precipitation gave 78.90% recovery and 3.96 purification fold of bromelain from stem.

By using a system of a sequential batch membrane in which microfiltration with 8µm mineral and followed by ultrafiltration, bromelain was recovered. Post ultrafiltration the sample was subjected to 65% ammonium sulphate precipitation and ultracentrifugation at 27,000xg at 2-3°C. Freeze drying of the final product yielded 98% of protein. Polyvinyl fluoride microfiltration utilizing 10 kDa Millipore ultrafiltration unit could recover protein activity of 85%. Purification with a reverse micellar system utilizing cetylammmoniumbromide-isooctane-hexanol-butanol extraction followed by purification with cellulose acetate ultrafiltration resulted in recovering 95.8% of enzyme activity with fold purification of 5.9-fold.

Bromelain is a protein-digesting enzyme. Though it has protease activity predominantly other activities associated with it include phosphatase, cellulase, peroxidase and glucosidase. Bromelain isolated from stem comprising 212 amino acids exist as a single polypeptide chain with two domains and are stabilized by disulfide, and hydrogen bonds. The molecular mass of bromelain is 24.5 kDa, with a pI value of 9.55 and diffusion coefficient of 7.77×10^{-7} cm²/s. The important feature of stem bromelain is its thermal stability at the temperature range between 40-60 °C where usually most of the enzymes get denatured. Bromelain isolated from the stem is an endoprotease, which can cleave the peptide bond in the protein molecule. The interaction of bromelain and substrate complex was found to be non-covalent bonding. The enzyme substrate reaction

is followed by the acylation and deacylation processes where the enzyme undergoes acylation and produces amine as a first product, which is followed by deacylation process between water and acyl-enzyme to release a free enzyme of carboxylic group. Bromelain is active in the pH range of 5.5 to 8.0.

The amino acid sequence analysis of the whole enzyme indicated a frequency of occurrence of valine at the amino terminal region of the protein. At the N-terminus presence of other amino acid residues like alanine, and glycine was observed to be at a frequency of 0.2 and 0.06 residues per molecule of enzyme. The Amino-terminal of bromelain isolated from the fruit also contains alanine, valine, serine, and glucose at a frequency of 0.9, 0.3, 0.2, and 0.1 residues per molecule respectively. The enzyme isolated from the stem is basic in nature, which is based on observations from an amino acid analysis of the enzyme. The analysis showed the presence of a high amount of basic amino acids like lysine and arginine. In 1967, Murachi verified glycoprotein nature of enzyme is confirmed by the presence of carbohydrate moieties attached covalently to protein. Purification of the bromelain revealed 2.1% of carbohydrates and hexosamine moiety per molecule. The molecular weight of the enzyme was reported to be 33,000daltons. Overall, various studies show that the bromelain isolated from the stem is a glycoprotein and it's percentage recovery and fold purification is shown in Table 1. The structure of the enzyme and its overall biochemical properties confirm its pharmacological role.

Table 1. Summarizes the percentage recovery and fold purification of Bromelain by different purification techniques.

Sl. No.	Purification technique	Recovery (%)	Fold purification	Reference
1	Aqueous two-phase extraction	55.6	16.3	[6]
2	15% PEG and 14% Magnesium sulphate	113.54	2.23	[10]
3	10.86% PEG and 36.21% Ammonium sulphate	66.83	11.8	[11]
4	PPO-PEO block	79.5	1.25	[10,11]
5	Ammonium sulphate precipitation and chromatography	50-70	2.8	[13]
6	Ammonium sulphate precipitation and Spray drying	96	2.8	[13]
7	Ethanol concentration of precipitated protein	98	2.28	[27]
8	Ethanol precipitation at 4 °C	98	2.07	[28]
9	Reverse micellar extraction followed by precipitation	78.9	3.96	[30]
10	Reverse micellar extraction followed by cellulose acetate ultrafiltration	95.8	5.9	[32]

2. Industrial Application of Bromelain

2.1. Baking Industry: In the baking industry, bromelain is used for improving dough quality and rise. Gluten is a major component of wheat. As Gluten is insoluble in water, it forms a lattice-like structure. Bromelain removes gluten from wheat, ensuring proper dough formation. Bromelain is also used to produce flour of hypoallergic nature.

2.2. Tenderization: Bromelain helps in the hydrolysis of myofibril proteins in meat, chicken, and oyster. The protease activity of the enzyme bromelain breaks collagen fiber leading to meat tenderization process. The sulfhydryl group of cysteine in the protease is responsible for the proteolytic action of collagen fiber, leading to the process of tenderization that makes the meat more palatable.

2.3. Fish protein hydrolysis: The Bromelain enzyme produces fish hydrolysate by hydrolyzing the proteins in fish. The hydrolysate is widely used as a nutritional supplement and an important ingredient in some pharmaceutical industries. The study recorded that bromelain was responsible for a high index of emulsion stability and foaming capacity.

2.4. Anti-browning agent: Bromelain is used in preventing undesirable changes due to phenol oxidation that affects the flavor and the nutritional quality of fruits. Phenolic oxidation produces a brown color pigment and is primarily responsible for causing undesirable changes. A sliced apple ring when treated with bromelain showed a significant reduction in the browning process and potentially increasing the fruit shelf- life.

2.5. Alcohol stability: Bromelain is used for enhancing the stability of the protein and preventing haziness in beer. Bromelain enhances the stability of the white-wine protein. The bromelain isolated from the stem was active at the minimum pH value of wine and showed an increase in the K_a value by 42%, acting as an alcoholic-acid buffer and thereby acting as an excellent protease enzyme in the production and stabilization of wine.

2.6. Animal feed: Bromelain is used for the estimation of protein degradation in the feed of the ruminant. In weanling pigs, 0.2% of bromelain was used as a dietary supplement, improving the growth rate of pigs, with reduced *E.coli* contamination and NH_3 gas in the feces.

2.7. Textile industry: The conventional method of cocoon cooking and treating it with a strongly alkaline solution reduces the quality of the silk thread. Alternatively, the use of pineapple juice and sodium carbonate reduces the cooking time of a cocoon for its softening. Pineapple juice is found to be effective in removing impurities from wool and silk fibers and enhancing the production scale. It also improves the properties of the dyeing of fibers.

2.8. Tooth whitening: Bromelain helps in removing stains, plaques, and food debris from the teeth. Certain food and beverages impart extrinsic coloration to the teeth. The dentifrice bromelain, by its proteolytic activity, degrades the accumulated protein on the tooth and gives higher lightening.

2.9. Cosmetic industry: Bromelain can be used to treat acne and wrinkles, and to reduce swelling, bruising and drying of the skin. Bromelain proteolyses the protein of the upper layer of skin cells, paving a way for the replacement of young cells. The study also reports that the application of bromelain on the skin reduces the bruises caused during cosmetic surgeries.

3. Application In Healthcare

3.1. Antimicrobial Activity: Beverages and citric juices are acidic and undergo deterioration caused by spore-forming bacteria *Alicyclobacillus* sps. Studies have shown that papain and bromelain, obtained from papaya

and pineapple are the main proteolytic enzymes that are used as preservatives in the pharmaceutical and food industry. The minimum inhibition concentration, minimum bactericidal concentration, the death-time logarithmic curve of a bacteria, and enzymatic mechanism against bacteria revealed that bromelain is effective in controlling the deterioration of the products due to *Alicyclobacillus* sps. The activity of this enzyme as an antibacterial agent is due to other activities associated with an enzyme such as amidase and esterase.

Bromelain protects animals from infections caused by *E.coli* and *Vibrio cholera*, by acting on signaling cascades like a calcium-dependent pathway. It is effective on adenosine 3'-5'cyclic monophosphate, and guanosine 3'-5'cyclic monophosphate pathways. The K88+ETEC is an enterotoxigenic strain of *E.coli* that is responsible for diarrhea in piglets. Treatment with bromelain showed proteolysis of this adhesion molecule and thereby inhibiting the attachment of the strain to the receptor. Bromelain which is a cysteine protease is active against gastrointestinal nematode *Heligmosomoides polygyrus*. Bromelain has anti-helminthic activity against *Trichuris muris*, which is a rodent intestinal nematode.

3.2. Anticancer Activity: Bromelain was tested as an oral drug in the year 1972. Patients with the breast and ovarian cancer were treated with 600mg of bromelain daily for about 6 months. The study observed that there was a considerable decrease in cancer mass and metastasis rate post treatment. The studies showed that combination therapy of the 1000mg bromelain with a chemotherapeutic agent such as 5-FU and vincristine on a daily basis gave a significant regression in the tumor growth. In-vivo analysis of the anti-tumoral and anti-leukemic activity of bromelain on various cancer induced in B6D2/F1 mice by intraperitoneal injection of various cell lines such as S-37, P-388, LLC, EAT, ADC-755, and MB-F10 showed an increase in survival time, except for MB-F10 which is a melanoma cell line. The Murine model is routinely used for the evaluation of antitumor and antimetastatic activity of Bromelain. The cell line used for the study of the anti-cancer activity of bromelain is Syngenic sarcoma (L-1).

The L1 cells were incubated with bromelain and injected into murine mice (BALB/C) intravenously or subcutaneously and compared with L-1 cells injected into mice that were later treated with bromelain. In the first case, the experiment proved a reduction in tumor growth and metastasis rate. In the second case, the experiment showed a reduction in tumor growth, but the colonization of the cancer cells was not reduced significantly. Bromelain and N-acetylcysteine were evaluated individually and in a synergic combination for their growth-inhibitory action against gastrointestinal human carcinoma cell lines using the sulforhodamine B assay method. The cell lines selected for the study are KATO-III, HT-295F12, HT29-5M21, LS174T, and MKN45. The results revealed that the growth was significantly controlled and the cytotoxic effect was highly regulated by a combination of Bromelain and N-acetylcysteine [58].

C57B1/6 laboratory mice chow was used to study the anti-metastatic activity of Bromelain. Lewis lung cancer cells were injected subcutaneously for the development of lung cancer, and treatment with Bromelain resulted in a reduction in the lung metastatic rate.

The formulated bromelain nanoparticles were 130.4 ± 8.81 nm in size and showed sustainable release of the drug, resulting in antitumor activity in the second-stage skin cancer model in mice, with a reduction in tumorigenesis, the percentage rate of mortality, and reduced tumor volume. The skin of the mouse, when pretreated with bromelain and injected with cancer cells, showed a reduction in the CNT (cumulative number tumor). The study also showed a reduction in the volume of the tumor. Bromelain targets the signal transduction pathway in the cell. The enzyme targets the proteins that are involved in the cell cycle arrest and cell death. The study showed that bromelain upregulated genes are involved in the apoptotic pathway. p53 and BAX are upregulated which results in activation of caspases 3 and 9, which subsequent decrease in the expression of Bcl-2 along with inactivation NF- κ B and inhibition of Cox-2. Bromelain curtailed some proteins that are associated with extracellular signaling pathways like MAPK, p38, ERK1/2, and Akt activity. Studies were done in the A431 epidermoid carcinoma and the A375 melanoma showed bromelain inhibiting the process of proliferation.

The Akt regulated kappa B nuclear factor activation was inhibited through the suppression of phosphorylation of "inhibitory-kappa B α ". This resulted in inhibition of the activity of cyclooxygenase 2 which results in the suppression of inflammatory signals. The drug-induced the arrest of the cell cycle at the G2/M phase by depleting the level of glutathione. Bromelain inhibits the translocation of nuclear factor kappa B thus causing induction of apoptosis. In the invivo lung metastasis models bromelain showed anti-metastatic activity in its active and inactive state (anti-coagulant and proteolytic activity) in a dose-dependent manner. Treatment with Bromelain results in the Up-regulation of p53 and Bax with subsequent activation of caspases 3 and 9 in stage two skin cancer models of the mouse. Bromelain inhibits Bcl-2 which in turn affects Cox-2 activity by inactivating NF- κ B (nuclear factor-kappa B). Thus, the protease affects the extracellular signaling pathway by inhibiting MAPK and Akt/protein kinase B signaling pathways which demonstrates the potent anti-tumorigenic activity by Bromelain. Gastric carcinoma cell lines KATO-III and MKN45 and colon adeno carcinoma cell lines HT29-5M21, HT29-5F12 when treated with bromelain show reduction in the cell proliferation rate and enhanced apoptosis. Bromelain acts by blocking the Akt pathway and also attenuating the oncoprotein Bcl2 and MUC1 in these cell lines.

Treatment of breast cancer and pancreatic cancer with adjuvant bromelain along with 5-FU and cisplatin showed a reduction in levels of MUC1 which serves as biomarker protein for these cancers. Intraperitoneal injection of bromelain and fastuosain in C57B1/6 the

mice model, induced with B16F10-Nex2 melanoma cells showed reduced expression of CD44. Treatment of glioma cells with Bromelain suggests that the drug significantly reduces the adhesion property, the invasion, and migration of glioma cells, without affecting its viability. The study demonstrated that there is a reduction in the CD44 protein expression even though the RNA expression level of this protein was unaltered post treatment. A detailed study of signaling pathways affected by Bromelain showed that there was a suppression of the CRE-mediated signaling pathway. Thus, bromelain has a major role to play at the molecular level. The study revealed the effect of bromelain on advanced colon rectal cancer in zebra fish and in mouse model. The protein induced apoptosis and inhibited CRC cell progression.

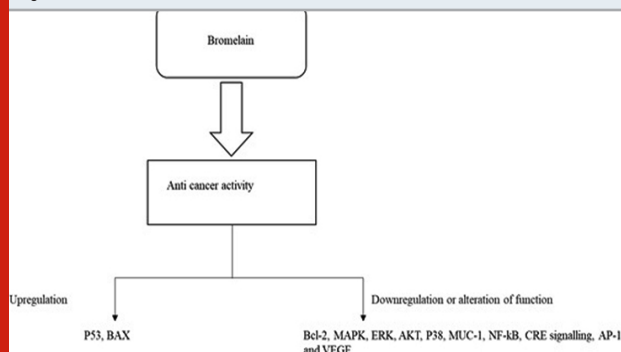
Angiogenesis and Metastasis are the major reasons for high mortality rates in different forms of cancer. As the cancer cells enter into the circulatory system, they spread the growth of tumor in a different part of the body by stimulating new blood vessels for its growth and progression. For cancer cells to metastasize mechanisms such as angiogenesis, adhesion, invasion and proliferation of the cell are extremely important. The studies have proved that bromelain interferes in these disease-progressing mechanisms and can control the spread of tumor. The migrating cancer cells attach to the receptor protein molecule at different site in each tissue. These proteins play an important role in adhesion and invasion. Bromelain inhibits various such cell-adhesion proteins. Suppression of (MMP)-9, a matrix metalloprotein, by bromelain prevents the cancer cell invasion. Bromelain inactivates AP-1 protein and inhibits the signaling pathway of NF- κ B.

Studies have shown that tumor cells and platelets are related and mutually associate with the progression of malignancies. Cancer cells activate the production of platelets, which in turn leads to angiogenesis. The main property of a tumor cell is that it aggregates with the platelets as a whole and evades the immune response in the body. Bromelain inhibits this aggregation when administered orally into the system. Angiogenesis is highly regulated by signaling molecules and pro-angiogenic genes. Bromelain has been studied as an anti-angiogenic molecule on different types of cancerous cells. The various factors like COX-2, MMP-9, AP-1, NF- κ B, VEGF and angiopoietin-1, 2 shown in Figure 2 are regulated by bromelain. In the mouse model, bromelain showed a reduction in the activity of a tissue remodeling enzyme MMP-9, which is essential for the formation of new blood vessels. In hepatocellular carcinoma, the study revealed the effective reduction of the COX-2 and VEGF in the cells treated with bromelain.

3.3. Immunological Activity: Bromelain showed effects in the patient with encephalomyelitis. It influenced the proliferation of PBMC. Bromelain exhibited an improved increase in the cytokines, IL-6, GM-CSF, TNF- α , and IFN- γ . The increase of IFN γ produces an increasing amount of CD4⁺ T cells, thereby stimulating innate immunity and adaptive immunity. The lymphocytes

treated with bromelain showed reduced cell surface staining molecules like CD62-L and CD44. There was no effect of treatment on the surface expression of CD56, CD16, and CD49-d. $\beta 2$ integrins and the CD11 a-c expression was slightly elevated in the treated lymphocytes. The production of TNF- α , IL-1 β , and IL-6 based on the dose and time of exposure to the treatment of bromelain showed increased IFN- α and IFN- γ along with an increase in the production of TNF- α because of the tryptic activity of bromelain. Bromelain removes CD44 T-cells from lymphocytes, thereby affecting the T-cell activation which was tested on PBL (peripheral blood lymphocytes) and HUVEC (Human umbilical vein endothelial cells) which showed reduced expression of CD44. F9 fragment of Bromelain showed a high rate of inhibition on the expression of CD44. The active CD4+ T cell shows the expression of CD25 on its surface, which forms an insoluble fraction that is the main target for treating immunological challenges. Treatment with bromelain reduces the expression of CD25 in a dose-dependent manner, suggesting its proteolytic effect on CD25.

Figure 2: The schematic highlights of the up-regulation and down-regulation of major transcription factors involved in the progression of cancer that are controlled by Bromelain.



3.4. Anti-Inflammatory: Bromelain decreases the expression levels of mRNA coding cytokines, which are pro-inflammatory markers in human leukocytes under in-vitro condition. The effect of bromelain on cytokines in IBD (Inflammatory bowel disease) patients showed a decrease in the level of G-CSF, IL-6, IL-1 β , IFN- γ , MIP-1 β and TNF, making it a potent drug for treating inflammatory bowel diseases. The IL-10 deficient murine model with IBD when treated orally with bromelain showed a reduction in the colonic inflammation with less damage to tissue. An inflammatory mediator such as interleukin 1 β , IL-6 and tumor necrosis factor α production was increased in a dose-dependent pattern when PBMNC (peripheral blood mononuclear cells) were treated with a proteolytic enzyme like bromelain.

4. Other Clinical Applications: Bromelain being a proteolytic enzyme plays an important role in preventing IgE mediated allergic reactions such as the immediate, delayed or late phase hypersensitivity symptoms which are mainly associated with the respiratory

tract. Bromelain induced changes in CD62P make it a potent platelet inhibitor. Treating with the 2.5mg of bromelain reduces the ADP induced platelet aggregation and shows a significant reduction in TRAP-6 induced plate aggregation. Incubating with 2.5mg/ml, 5mg/ml of bromelain showed a drastic reduction in TRAP-6 induced aggregation of platelets. Under in-vitro conditions, bromelain showed an effect on plasminogen. Plasminogen was activated to produce plasmin known for its activity to cleave fibrin. Bromelain, a protease enzyme, is efficient in reducing the human platelet's aggregation process. Pre-incubation of platelets with bromelain showed inhibition of the thrombus-induced platelet aggregation process in a time-dependent manner. Bromelain showed an effect in reducing the level of TGF-beta (Transforming Growth Factor-beta) which is overexpressed in the blood during disease conditions.

The protein trigger Akt dependent pathway, a survival pathway that can be used as a cardioprotective drug against I/R injury. Bromelain was used as a debriding agent in the formulation of a gel known as DGB (Debriding gel dressing) for treating intense burns. Immunomodulation activity in blood samples from COVID (common variable immune deficiency) and XLA (X-linked agammaglobulinemia) patients suffering with infection from *Candida albicans* showed enhanced phagocytic activity upon treatment with Bromelain. Skin disease caused by Pityriasis lichenoides chronica is completely cured by bromelain. Bromelain influences the penetrability of the antibiotic amoxicillin and its increase in blood and urine. It along with trypsin and rutin as a combination is used as an adjuvant with antibiotics to treat children suffering from sepsis. Enzymes purified from *Aspergillus niger* and bromelain provides as a feed supplement through tube feeding in elderly nursing people showed an increase in the protein uptake. It also acts as a digestive enzyme and can be treated in intestinal disorders such as pancreatotomy.

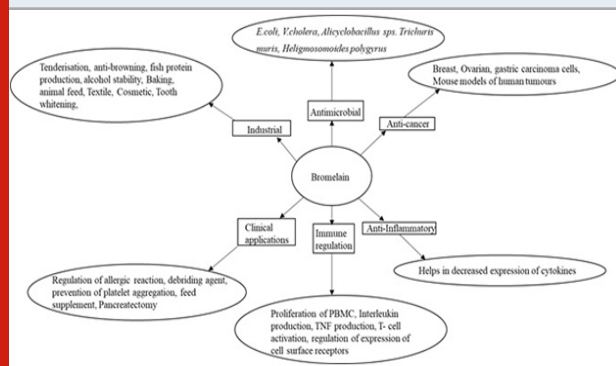
Intraduodenal or by the parenteral administration of bromelain into traumatized rats with hind limb edema showed stability in the protein molecule on absorption in the gut region and considerable reduction in edema determined volumetrically. Studies on bromelain showed a reduction in the activity of fibrinolysis, inhibiting the formation of thrombus and reducing the plate aggregation. Analogous studies on coronary heart disease revealed that there was reoccurrence of angina attacks when the bromelain treatment was discontinued for almost 2months. An oral administration of bromelain on hypersensitive people showed that thrombophlebitis can be treated. In case of ischemic experiments, myocardial injuries can be reduced by treating with bromelain, which restores the functional status of the heart. The study found that bromelain also resulted in the increase in the blood flow in aorta, reducing the apoptotic process and reducing the damage in the endothelial cell in the case of hepatic ischemic patients.

In patients with knee osteoarthritis, the administration of bromelain showed a significant decrease in stiffness

and pain in the joints. Furthermore, bromelain also treats patients with inflammatory bowel disease by exerting a negative control on the expression of the colony stimulating factor and $\text{INF-}\gamma$ which are pro-inflammatory molecules [107, 108]. Studies have shown that bromelain up to 12g/d can be consumed with no side effects. On absorption, bromelain is highly stable in the gastrointestinal tract with an absorption rate of 40% as claimed by researchers. In the blood, the proteolytic nature of the enzyme is retained and is linked with anti-proteases. It is claimed that 3.66mg/ml and 2.44mg/ml of bromelain after four hours of administration is maintained stable in artificial environment with stomach juices and blood respectively.

Present pandemic situation in the world due to COVID-19 (Corona virus disease-19) by SARS-CoV-2 (severe acute respiratory syndrome coronavirus-2). In this study, authors demonstrated that bromelain reduced the expression of angiotensin-converting enzyme-2 (ACE-2) and Transmembrane serine protease-2 (TMPRSS2) which are responsible for viral pathogenesis. Hence, the researcher suggests that bromelain can be used to cure COVID-19 (this research is preprint and is not peer reviewed till date). In line with the above study here, the authors reported that Bromelain in combination with Curcumin can control COVID-19 pathogenesis due to its anti-inflammatory property which might significantly block the transcription factors and down-regulates the pro-inflammatory markers. Hence bromelain has a wide spectrum of activities as shown in Figure 3 and plays a vital role in treating various kinds of clinical complications and is an effective natural phytochemical compound.

Figure 3: Schematic highlights of the major applications of Bromelain in different sectors of Industry and Healthcare.



CONCLUSION

Bromelain which is a protease enzyme plays a major role in various sectors of health care and industries. The purification strategies revealed improvisation in the techniques for good percentage recovery with better fold purification. It is used as a food supplement to increase protein uptake in elderly patients. In cancerous tissue, bromelain down-regulates the molecules like CD44 which

are responsible for the invasive nature of metastasis cancer. The protein kinase, a potent anticancer drug significantly blocks the Akt/ PKB signaling pathway, inhibits the expression of Cox-2, masks Bcl2 and alters the ratio of Bcl2/ Bax involved in cancer cells and induces the expression of cancer repressor protein p53, thus preventing the growth of cancer cells. In anti-inflammatory reactions, it reduces platelet aggregation and cytokines production. Despite its promising action as an anti-cancer drug, there is a lacuna in understanding the effect of bromelain on the major transcription factors and its signaling pathways that are involved in the progression of normal cell to metastatic condition. Hence, the present review article suggests the need for scientific emphasis on the same for the complete insight of bromelain as a promising anti-cancer agent so that the drug targeted therapy will be the scope of future research. The structural, functional properties and bioavailability of bromelain make the molecule a pharmacological active drug. Finally, bromelain is a potent drug that can be explored for various health care applications.

Conflict of Interest: The authors declare that there are no conflicts of interest.

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The Impact of Capital Structure and Financial Performance on Stock Returns in India: A Review

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ABSTRACT

Changes in the capital structure and financial performance are of central importance in assessing the overall returns of firms and, more importantly, in knowing whether stock returns are sensitive to changes in the capital structure. In order to quantify this impact, stock returns were taken as dependent variables and debt to equity, return on equity ratios, earnings per share were used as independent variables. The results were drawn from the mentioned variables using the regression model. Debt-to-equity ratio, return-to-equity ratio, earnings per share have a positive effect on stock return. Based on the finding, it was concluded that the change in capital structure and firm performance had an impact on the stock returns.

KEY WORDS: CAPITAL STRUCTURE, FINANCIAL PERFORMANCE, STOCK RETURNS, IMPACT, FIRMS.

INTRODUCTION

Capital structure is particular mix of debt and equity a company uses to finance its entire improvement as a result. Deficits occur from loans as well as government bonds, whereas capital may come as part of corporate equity ownership, cumulative preferred stock, or retaining. Current liabilities are assumed to be part of capital structure. The current research report is based on the impact capital structure has on financial performance and its effects on return on equity, so the study points out that the variance and effects of certain aspects of the capital structure is related to the relationship between aspects such as the relationship of variables such as Return on

Equity, return on investment, earnings per share on return on equity, relationship of both and return on equity, how it affects profitability, market valuation as well as assets of stakeholders, the relationship between leverage and return on equity, etc. The reason for evaluation and collection secondary data from independent individuals and recurring statements that can direct us to the desired outcome and identify how different factors affect the financial performance and what the impact of these factors on stock return is. Murtaza and Azam (2019) mention that ownership structure variables are also influenced by capital structure decisions.

In addition, the concentration of ownership is widely used worldwide, which is prominent in selecting the financial structure of the organization and as well as corporate governance practices. The ownership concentration concerns the number of shares owned by entities and main block shareholders (the company's top shareholders hold at least 5 percent of fair ownership). The ownership concentration has great effect on policymaking strategies for the capital structure. The study was therefore undertaken to justify the prevalence of research gap,

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to examine the relationship between the structure of ownership and capital structure. Ligocká and Stavárek (2019) note that several factors can affect stock prices. Some studies are attempting to classify them into two variables types that can be determined to have effect stock prices: macro and microeconomic variables. Up to 50 percent of stock prices are impacted by the individual characteristics of firms, according to an earlier study.

The analysis demonstrated the contribution of a lot of market and sector variables against European stock price fluctuations. The analysis is to define the financial ratios affecting the prices of listed food companies on the European stock exchanges, especially in Austria, Poland, and Switzerland. Al Salamat and Mustafa in (2016) described the relationship that exists between capital structure and stock return. A detrimental and important correlation between capital structure and stock return was found in the product of the regression model. A really important and positive association between turnover and return on assets as wells as equity return also is reported in the results. There is a positive but insignificant relation with the equity return for the company size and market to book ratio. Avci (2016) examines the relationship between companies' financial and real decisions on capital structure and performance. Between 2003 and 2015, study was performed on manufacturing companies trading in Borsa Istanbul.

To measure firm performance, equity return and asset return is used and as explanatory variables, short-term debt to total assets, long-term debt to total assets, and debt to equity are used; total assets are contingent variables. Both banks listed on the Tehran Stock Exchange in 2009–2016 are included in the statistical community. The results indicate beneficial consequences of the banks' financial structure, ROA and ROE. Moreover, the results show that the relationship between financial structure and ROA and ROE is substantially moderated by capital intensity and scale. Singh and Bansal (2016) examined the impact of financial leverage on the company's financial results and the company's value. Data from 58 Fast Moving Consumer Goods (FMCG) firms listed on the National Stock Exchange (NSE) and Bombay Stock Exchange (BSE) for a 10-year period from 2007 to 2016. This is the S&P BSE FMCG Index. To research the effect of financial leverage on company efficiency and valuation, four regression equations were created. SPSS used the panel data regression methodology.

Results revealed that leveraging has a substantial negative effect on the company's EVA and ROA success indicators and Tobin's Q indicator. Rajhans (2013) objectively observed determinants of firm value creation. For this reason, 16 companies listed on the Bombay Stock Exchange (BSE) from 2002 to 2011, namely Metal, Fast Moving Consumer Goods (FMCG), Information Technology (IT and Automotive, were specified based on market capitalization in their industry. Data from 2002 to 2011 was all secondary data. Finding implies that the suggestion of Modigliani and Miller, i.e., Capital structure does not change a corporation's valuation. However,

this research finding suggests that WACC has a major impact on the valuation of the firm. Other main factors identified by the proposed model are capital assets, net sales and profit.

Talwar (2020) studied the effect of accounting-based efficiency indicators, financial structure and corporate governance on company valuation, measured by Tobin's Q, of Indian firms in the fast-moving consumer goods (FMCG), automotive (auto) and IT (IT) sectors from 2004 to 2017. The research used the Less Square Dummy Variables (LSDV) panel approach to show income growth, asset return, debt-equity ratio, and corporate governance were statistically important predictors of firm value for the sectors being tested. The Wald test showed the fixed-effect model to be more stable than the pooled regression model, confirming various dynamics for and area between the dependent and the explanatory variables. Since the influence of variables on firm value for manufacturing and service sectors was distinct, the main contribution of the results is that management should consider the sectoral effect when calculating firm value.

Literature Review: Study by (Murtaza & Israel, 2019) reported shipping firms' productivity in allocating resources. They also investigate the impact of ownership accumulation on business value. A sample size of 126 listed companies was evaluated for 1997–2016. The final findings of their study clarify that ownership concentration has a favorable impact on business valuation. Homaidi (2019) found a strong correlation between the two variables, indicating that the audit category size and board size have the highest transparency variables, while government ownership is the bottommost variable disclosed to tourism businesses. Research has showed that board composition has a favorable impact on a company's financial performance. It shows that the level of corporate transparency has a positive connection to the "board size, ratio of members of the audit team to total board members, family control, the duality of CEO, business size, profitability, liquidity." Ghosh (2019) performed research on major post-World War II oil price tremors like the 1956–57 Suez Crisis, the 1973–1974 OPEC oil embargo, the 1978–1979 Iranian Rebe. The study strengthened the understanding of economic penalties from oil price shocks.

Previous scholars studied the differential influence of oil price fluctuations on US economies and their policy insinuations. Among other items, the study highlighted why US consumers reacted so little when oil prices increased from \$41 per barrel in July 2004 to \$65 in August 2005 (a 59 percent increase), but otherwise responded to the rise in oil prices from \$72 in August 2007 to \$134 (an 86 percent rise) in June 2008. According to Ariyani et al (2019), the study has said that profitability is a metric for producing corporate profits. This incentive is a benefit goal that guarantees a return in the future. If the benefit target and the potential to raise profits is in line, so it may be concluded that the company performs efficiently. Here too, the two kinds

of profitability ratios relative to sales and those related to spending will be discussed a bit. The revenue ratio is the margin of gross profit and net profits. Return on assets is the investment-related return on assets (ROA). Yudha et al (2019) The paper on the Indonesian Stock Exchange focuses on a phenomenon of lower stock prices for building and construction subsectors during government infrastructure development.

Using data panel regression, it analyzed the impact of financial performance and macroeconomics on the stock returns of the construction and construction subsectors of the Indonesian Stock Exchange. Government policies, Return on Equity (ROE), Price Book Value (PBV), inflation rates, Debt to Equity Ratio (DER) and have a great impact on construction projects stock returns and the Turn Over, Inventory Ratio and Price to Earnings Ratio of net assets, post-sectors have a huge impact on stock returns. Boller, L., F. S. Morton's. (2020) estimated that by exploring an alternate route to an economic-wide study, research supports common ownership literature. Research data allowed many businesses and companies to quantify the impact of shared ownership. These analyses allowed the experiment to draw a causal inference. It was determined that the strategy is constant with an upsurge in common ownership interpreting likely profits and increasing returns into the advanced future.

By assessing the value of our BTR scale, Dou (2019) investigated empirical analyses. By comparing the BAV data with Compustat/CRSP, external authentication analysis was performed to investigate the relationship between our BTR metric and various representations of meaningful reward. The study showed that firms with lower BTRs are related to higher one-year deferred management investment, R&D spending, and executive pay, indicating significant expertise is more important for businesses. The survey-based BTR test is unlikely to be mechanically related to the resulting financial variables, as opposed to other brand indicators extracted from company financial and accounting variables. According to Nuber et al (2020), Continental Europe has a long custom of code law, whereby the U.S. system depends on case law. Code law systems are particularly dependent on variety-oriented clients and rely not only on shareholder interests, but also on rendering environmental management an important method to minimize conflicts of interest.

Previous studies documented the effect of code and case law legal frameworks on sustainability management behavior. Study is divided into French (e.g., France, Portugal, Spain) and German (e.g., Austria, Germany and Switzerland) Code Rules. Singh et al (2019) explained that annual surveys of agricultural cooperatives are conducted by the USDA each year. The survey reports showed the number of agricultural cooperatives present in United States of America, although, on the other side, gross amount continues to decline without interruption. During 2000–2016, the number of agricultural cooperatives dropped from 3338 to a little 1953. The gross volume shot up from \$118.9 billion to \$191.1 billion over the

same period. Trends have been credited towards smaller and larger agro-cooperatives and have awareness of the causes of such transition. The degree of achievement of the U.S. cooperatives is often expressed in their financial output, calculated conventionally by the use of accounting ratios.

As per previous studies, for such transition, the role of technology has been well known. Other variables have also contributed, such as financial determinants, instability, institutional inventions, and the efficiency of human resources. From Prombutr and Phengpis (2019), creating characteristic-balanced (CB) collections, resolved the correlation problem. The CB collections were zero-cost collections with a long position in high factor loading collections and a short position after monitoring for company features such as market size and ratio of book to market in low factor loading collections. On the other hand, the CB collections have a substantial positive average return if the company-feature statement is correct, since the firm features are the real driver which are now in check. Sadaf (2019) stated that the investment of companies also has an effect on their dividend policy choices. In the theoretical sense of Miller and Modigliani (1961), relationships between dividend and investment decision policies are clear.

This theory argued that a flawless capital market is sovereign by the process of funding those choices, optimal investment choices by businesses. As investment choices were not judged by dividends, the core principle had a significant outcome, and dividend decisions had no impact on investment choices. Empirical proof of violence to the theorem was proven in this view. Subsequently, there was no indication of an established relationship between dividends and investment choices that needed simultaneous equation models (SEM) to provide them. Alqattan and Alhayky in (2016) analyzed relation that exist the prices of oil as well as the price on the stock market in GCC between 2006–2015. The study found that fluctuations in oil prices played an important role in defining the short-term fluctuations in stock market prices in GCC countries. This research also found that in GCC countries but in Oman, the long-run market stock price is insensitive to prices of oil variations.

CONCLUSION

Capital structure philosophers such as pecking order theory, market signal theory, and agency theory have checked the out-of-date trade-off theory because debt capital is presented as behavioral characteristics in the capital structure because of less power and knowledge needed for the function of the pecking order, a way to improve directors' professional ambition. Theorists have argued that capital structure adversely affects the efficiency of an organization and therefore; managers cautiously use debt capital to foot cost activity. The findings suggested that, instead of rising the percentage of equity capital in their capital structure mix, companies should reduce the use of debt capital. Furthermore, the analysis finalizes clear findings with the theory of

agencies, pecking order theory, and the theory of market signals. The findings support the various stakeholders as well as the owners of the corporations, the government, the stockholders, the finance practitioners, and the academic society. The results provide support for owners, especially stakeholders with managerial influence in the business. It is also important to understand how to cut down managers' excesses because they engage in business resources to improve the value of the company rather than the benefits that are contrary to the wealth of smaller owners.

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Cultural Tourism Model for Chinese Tourists Based on the Bali-China Cultural Landscape

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ABSTRACT

The research article on the Cultural Tourism Model for Chinese Tourists based on the Bali-China Cultural Landscape aims to examine the mass tourism model for Chinese tourists who are developing in Bali and develop a cultural tourism model for Chinese tourists based on the Balinese-Chinese cultural landscape. In particular, this study aims to develop a cultural tourism model for Chinese tourists based on the Balinese-Chinese cultural landscape. This study uses qualitative methods to obtain natural settings including tourism stakeholders, namely the local government, the tourism industry, and customary village people who have cultural heritage. Qualitative methods are also used to interpret the symbols of Chinese traditions, culture and history in Bali, which will be explained from the point of view of the function and meaning of cultural artifact symbols in the tourism space. The research locations chosen were Denpasar District (Chinatown City Tour), Gianyar Regency (Kang Ching Wei Dance in Bali marine park), and Bangli Regency (Ulun Danu Batur Temple).

KEY WORDS: CULTURAL TOURISM MODEL, CHINESE TOURISTS, BALI-CHINA CULTURAL LANDSCAPE.

INTRODUCTION

Bali Island is one of the popular tourist destinations for Chinese tourists. The number of Chinese tourist visits to Bali has also increased very rapidly. It is recorded that from 2013 to 2019 the number of Chinese tourist visits to Bali has increased by 19.3% per year[1] (Central Bureau of The number of Chinese tourist arrivals still dominates, but if seen from the level of expenditure it only reaches an average of US \$ 965[2]. This low expenditure does not have a significant effect on the economy of Bali[3].

The low expenditure of Chinese tourists is due to the payment system with virtual money and the use of the WeChat and Ali Pay applications [4] In fact, Mandarin tour guides tend to use tourists as money machines to cover the zero dollar tour package subsidies sold by travel agents and tour operators to Chinese tourists[5] [6] Research results which show that Chinese tourists have a fairly low interest in cultural tourism. Of the 188 Chinese tourist respondents who visited Bali, only 5.4% were interested in visiting historical and cultural destinations[7] Based on the urgency of the problem of Chinese tourists in Bali, this research needs to be done to get a special interest tourism model for Chinese tourists as a quality tourism model.

Literature Review And Hypotheses Development: Research on 104 Chinese tourists regarding tourism behavior. The results showed that Chinese tourists have an interest in shopping tourism in traditional souvenir centers on the recommendation of friends and relatives. This shows

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that local Balinese products still have the potential to be commodified as products that can be sold to Chinese tourists, given the interest of Chinese tourists to shop[8]. Chinese tourists have an interest in the following things. Of the 188 respondents, expressed their interest in the uniqueness of tradition (19.3%), spa and aromatherapy (13.0%), traditional arts (14.8%), Balinese culinary (13.0%), Balinese architecture (10.8 %), handicrafts (10.8%), religious and spiritual activities (7.6%), history and archeology (5.4%), rural life (1.3%).[9].

Based on the results of this study, cultural potential still has the opportunity to be developed as an alternative tourism for Chinese tourists related to the characteristics of Chinese tourists in Indonesia. This study found several characteristics of Chinese tourists in Indonesia. Most of them are between 25-44 years old and work as professionals, managers and employees. They like to come in groups with a stay period of about seven days. In addition, they chose star hotels as their top choice for accommodation. On average, they spent USD 1,018 during their visit to Indonesia. Most of them get information about Indonesian tourism and destinations from friends / family and social media. However, the number of Chinese tourists to Indonesia has more than doubled in the last four years. The high penetration of Chinese tourists occurs in Bali while massive growth is occurring in Manado[10]. Chinese tourists have a preference for visiting historical relics, such as Tanah Lot Temple, Penglipuran tourist village, Bedugul, Subak Tegalalang. Regarding culture, Chinese tourists also have a preference for watching Barong Dance, the Bali Arts Festival, and love the atmosphere of Nyepi, wearing traditional Balinese clothes for pre-wedding photos and liking traditional Balinese massage[11].

This also reinforces that cultural tourism has the potential to be developed as an alternative tourism for Chinese tourists. Motivation of Chinese tourists visiting Bali is to get benefits for their personal, social and organizational life related to hospitality, services and weather. The results of his research also found that Chinese tourists have the intention to visit again and the intention to recommend to their friends. This shows that Chinese tourists have the potential for loyalty to come back. This potential can be used as the basis for modeling alternative tourism for Chinese tourists[12]. Balinese people's perceptions of the behavior of Chinese tourists visiting Bali. The results showed that the Balinese people had doubts about the behavior of Chinese tourists related to sustainable tourism because people saw that Chinese tourists were practicing zero dollars and mass tourism activities that could damage the natural carrying capacity of Bali. This can be used as initial data in developing alternative tourism for Chinese tourists visiting Bali[13]. Regarding the potential of Balinese-Chinese culture as a basis for developing special interest tourism, research on traces of Balinese-Chinese culture. The identification results show that Bali-Chinese tangible and intangible culture has the potential to be developed as a special interest tourist destination for Chinese tourists[14].

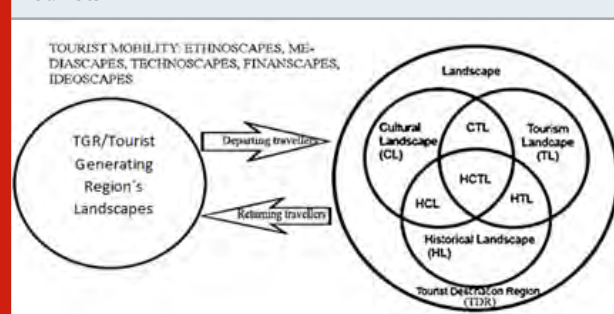
RESEARCH METHODOLOGY

Research on the Cultural Tourism Model for Chinese Tourists based on the Balinese-Chinese Cultural Landscape uses qualitative methods to reveal the socio-cultural meaning of a phenomenon[15] In line with the opinion of qualitative design takes a natural setting according to what is in the field[16]. For this reason, researchers are open and adapt to any phenomena that appear in the field during research. The phenomenon in this study is cultural tourism for Chinese tourists. Thus, this study focuses on Chinese tourists visiting Bali as research subjects. While the object of this research is the Balinese-Chinese cultural landscape.

RESULTS AND DISCUSSION

Historical Landscape (HL) and Cultural Landscape (CL) are the main resources for the development of cultural tourism. Tourism Landscape (TL) always manifests itself in a space containing natural, historical and cultural attractions [17]. The loss or extinction of the Historical Landscape and the Cultural Landscape which are in situ causes an inability to manage historical and cultural resources in a sustainable manner. This means that, if tourism management violates intrinsic and extrinsic values and characteristics of historical and cultural resources, not only will the area's attractiveness decrease, but also tourism itself will experience declination[18] In the end, the complexity of the relationship between the tourism landscape and the historical and cultural landscapes will lead to a point of tension between the poles of conservation and exploitation for economic interests (tourism function). The meeting between the Historical Landscape (HL), the Cultural Landscape (CL) and the Tourism Landscape (TL), can be described as the Landscape of the Regions of Origin of Tourists [19] and the Cultural Landscape of Bali[20].

Figure 1: Conceptual Model of Cultural Tourism for Chinese Tourists



CONCLUSION

Historical and Cultural Tourism Landscape Model (HCTL) can be used as principles in developing special interest tourism models. Special interest tourism is a tour conducted by tourists from the area of origin of tourists who wish to develop a particular interest towards

a tourist destination to visit sites or places related to certain subjects, such as Historical and Cultural Heritage Landscapes (HCTL).

Limitation and Study Forward: Further research needs to be done to make cultural tour packages for Chinese tourists by prioritizing the potentials owned in the china town area in Bali.

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Effect of Soy Isoflavones on the Performance of Cerebral Neurotransmitter Systems in Adult and Aged Male Rats

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ABSTRACT

The aim of this study was to investigate the effects of Soy isoflavone on the performance of neurotransmitter systems in adult and aged male rats. Methods: Twenty adult male Sprague-Dawley rats weighing 183.2- 184.2 g (6-8 months) and twenty aged male albino rats weighing 405.5- 429 g (12-16 months) divided to four groups (10 rats per group). as follow: G1: Adult control group (Adult-C) ; rats fed on basal diet; G2: Aged control group (Aged-C); rats fed on basal diet; G3: Adult Isoflavone group (Adult-ISO) rats fed on basal diet and received isoflavone (100 mg /day) ;G4: Aged Isoflavone group (Aged-ISO); rats fed on basal diet and received isoflavone (100 mg/day) dissolved in 10 ml of distilled water by oral gavage. At the end of experiment (four weeks) blood samples were collected for biochemical measurements. Result: Current evidence revealed that, soy isoflavone treated group showed enhancement in dopamine, serotonin, norepinephrine, nitric oxide, acetylcholine, glutamate and GABA whereas decrease in choline acetyl transferase. Conclusion: soy isoflavones improved the neurotransmitters and brain cells functionally and lead to improve the cognitive functions and memory.

INTRODUCTION

The nervous system requires seamless communication between numerous nerve cells to function effectively. Centrally, this necessitates endogenous neurotransmitter (NT) release; NTs attach to dedicated receptors on target neurones, altering their activity. NTs are therefore crucial biochemical compounds that govern behavioural and physiological properties within both central and peripheral nervous organisations (Moon et al., 2018). A NT acts as a chemical messenger that conveys information over a neurological synapse, e.g. neuromuscular junction; signals are transferred from the initial neurone to the

target. The latter may include another nerve, muscle or gland cell (Lodish et al., 2000).

NTs are produced by synaptic vesicles within the nerve axon terminals. They are discharged into the synaptic cleft and act on the relevant target cell receptors. The chemicals are manufactured from straightforward and numerous amino acid building blocks. The latter are easily accessed from food intake and require minimal modification for NT synthesis. The resulting NTs are key components in the facilitation of normal daily activities (Steven, 2005). They are also principle actors in several neurodegenerative pathologies, including Alzheimer's dementia, Parkinson's disease and epilepsy. Not all NTs have yet been fully characterised; the inventory is constantly expanding as further compounds are discovered (Chauhan et al., 2020).

In Asia, soy has been a customary part of the diet for many years. However, in western nations, it is much less popular, despite that fact that soy is a highly proteinaceous, fibrous food that also contains a range of phytochemicals. Henry-Vitac et al. (2010) have suggested soy and isoflavone consumption offer a number of

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advantages to well-being. The many phytochemicals present in soy include isoflavones, phytic acid, trypsin inhibitors and saponins (Anderson and Wolf, 1995). In particular, the beneficial properties of isoflavones have been the subject of interest (File et al., 2001).

A plethora of research has been performed to evaluate the possible positive impact of soy isoflavones on a range of pathologies associated with ageing. However, few studies have evaluated their effect on cognitive abilities. Different forms of nerve injury, including those arising from advancing years, may give rise to neurodegenerative conditions that are associated with impaired cognitive function. It has been shown that cognitive function can be enhanced in both humans and rats by soy isoflavones (Pan et al., 2000) although the exact mechanism of this effect has not yet been elucidated. Soy isoflavones have been demonstrated to exhibit oestrogenic properties; imitation of oestrogen within the central nervous system may underlie some of these observations (Pan and Clarkson, 1999), but may not represent the whole story.

MATERIAL AND METHODS

Soy isoflavone were obtained as natural product as tablets, each serving contains 100 mg of isoflavones (Daidzein 35 mg, Puerarin 33 mg, Genistein 27 mg , Glycitein 5 mg)

Chemicals: Kits of Dopamine, Serotonin, Glutamate, Norepinephrine, Gamma-aminobutyric Acid, Choline Acetyltransferase, Acetylcholine, and Nitric Oxide were obtained from Bioassay Technology Laboratory (Shanghai, China).

Experimental Animals: Twenty adult male albino rats weighing 183.2- 184.2 g (6-8 months) and twenty aged male albino rats weighing 405.5- 429 g (12-16 months) will be used in this study. Rats will be supplied from the Animal House Colony of King Fahd Medical Research

Centre, Jeddah. After the acclimatization period, Rats will be controlled with a 12 h light/dark cycle at King Fahd Medical Research Centre Animal Facility Breeding Colony. Rats will be housed with ad libitum access of water and standard laboratory diet. Experiment will be approved by the Ethical Committee of King Fahd Medical Research Centre. Jeddah, KSA.

Experimental Design: Forty male rats were randomly divided to four groups (10 rats per group). The groups were treated as follows:

GROUP I: Adult control group (Adult-C) ; rats fed on basal diet

GROUP II: Aged control group (Aged-C); rats fed on basal diet

Group III: Adult Isoflavone group (Adult-ISO) rats fed on basal diet and received isoflavone (100 mg /day) dissolved in 10 ml of distilled water by oral gavage.

GROUP IV: Aged Isoflavone group (Aged-ISO); rats fed on basal diet and received isoflavone (100 mg/day) dissolved in 10 ml of distilled water by oral gavage.

Sample Collection: At the end of four weeks (experimental period). The animals were starved for 12 hours prior to blood collection. Rats were sacrificed under ether anesthesia, then blood was collected through optic nerve puncture. Serum was separated by allowing blood samples left for 30 minutes at temperature of 25°C then centrifuged at 5000 r.p.m for 10 minutes, then divided into several aliquots and stored at -20C until analysis was performed.

Statistical Analysis: Data were statistically analyzed by comparing the values for different experimental groups with the values of individual normal ones. Results were expressed as mean + S.E. Significant differences among groups were analyzed using analysis of variance ONE-WAY ANOVA coupled with Statistical Package for the Social Science (SPSS) program. ANOVA at $p < 0.05$ was considered significant.

Table 1. Effect of different treatments on serum levels of Biogenic Catecholamine Neurotransmitters Dopamine and Norepinephrine.

Parameter	Control (C)		Isoflavone (ISO)	
	Adult (G1)	Aged (G2)	Adult (G3)	Aged (G4)
Dopamine (ng/mL)	1.53±0.95 ^{ac}	1.21±0.14 ^{bc}	3.06±0.24 ^{ad}	2.39±0.23 ^{bd}
Norepinephrine (ng/L)	207.4±8.2 ^a	169.5±12.1 ^{abc}	208.3±10.8 ^b	199.7±13.8 ^c

Results were represented as means ± SD, n=10, means bearing the same alphabets in the same row are significantly different at ($p \leq 0.05$)

RESULTS

Biochemical Findings: Table 1 shows the effects of isoflavone on serum levels of biogenic catecholamine neurotransmitters dopamine and norepinephrine of

experimental rats. Lower dopamine levels were recorded in aged control rats (Aged-C) when compared to adult control rats (Adult-C). On the other hand, the results of the present study showed significant ($p \leq 0.05$) higher levels of serum dopamine in adult isoflavone rats (Adult-

Iso) as compared with adult control one. An improvement in the levels of serum dopamine levels were observed in aged isoflavone treated rats (Aged-Iso) when compared to aged isoflavone group. No significant differences in serum norepinephrine levels were found among adult control, adult isoflavone, and aged isoflavone treated rats. Lower epinephrine levels were recorded in aged control group when compared to all other groups. Consumption of isoflavone has significant improvement ($P \leq 0.05$) on serum epinephrine in aged rats (Aged-Iso) as compared to aged control (Aged-C).

Table 2 shows the effects of isoflavone on serum levels of excitatory neurotransmitters glutamate (Glu) and acetyl choline (Ach) of experimental rats. No significant differences in serum Glu levels were found among adult

control, adult isoflavone, and aged isoflavone treated rats. Lower Glu levels were recorded in aged control group when compared to all other groups. Consumption of isoflavone has significant improvement ($P \leq 0.05$) on serum Glu in aged rats (Aged-Iso) as compared to aged control (Aged-C). Lower Ach levels were recorded in aged control rats (Aged-C) when compared to adult control rats (Adult-C). The results of the present study showed significant increase ($p \leq 0.05$) in Ach serum levels in adult isoflavone rats (Adult-Iso) as compared to adult control one. Supplementation of isoflavone resulted in significant increase in the levels of serum excitatory neurotransmitters acetylcholine in both adult and aged groups (Adult-Iso and Aged-Iso) when compared to control groups (Adult-C and Aged-C) respectively.

Table 2. Effect of different treatments on serum levels of Excitatory Neurotransmitters Glutamate (Glu) and Acetyl Choline (Ach).

Parameter	Control (C)		Isoflavone (ISO)	
	Adult G1))	Aged(G2)	Adult(G3)	Aged (G4)
Glutamate ($\mu\text{g/mL}$)	16.7 \pm 2.2a	12.8 \pm 1.6abc	17.5 \pm 2.0b	17.8 \pm 5.1c
Acetyl Choline ($\mu\text{g/L}$)	58.3 \pm 7.48ac	41.8 \pm 5.1bc	67.8 \pm 4.9ad	55.7 \pm 5.3bd

Results were represented as means \pm SD, n=10, means bearing the same alphabets in the same row are significantly different at ($p \leq 0.05$)

Table 3. Effect of different treatments on serum levels of Inhibitory Neurotransmitter Gamma Amino Butyric Acid (GABA) and Serotonin

Parameter	Control (C)		Isoflavone (ISO)	
	Adult G1))	Aged(G2)	Adult(G3)	Aged (G4)
Gama Amino Butyric Acid (nmol/L)	16.7 \pm 2.2a	12.8 \pm 1.6abc	17.5 \pm 2.0b	17.8 \pm 5.1c
Serotonin (ng/mL)	58.3 \pm 7.48ac	41.8 \pm 5.1bc	67.8 \pm 4.9ad	55.7 \pm 5.3bd

Results were represented as means \pm SD, n=10, means bearing the same alphabets in the same row are significantly different at ($p \leq 0.05$)

Table 3 shows the effects of isoflavone on serum levels of inhibitory neurotransmitter gamma amino butyric acid (GABA) and serotonin of experimental rats. Lower GABA and serotonin levels were recorded in aged control group when compared to all other groups. Consumption of isoflavone has significant improvement ($P \leq 0.05$) on serum GABA levels in aged rats (Aged-Iso) as compared to aged control (Aged-C).

No significant differences in serum choline acetyl transferase (ChAT) activity were found among adult

control, adult isoflavone, and aged isoflavone treated rats. Lower ChAT levels were recorded in aged control group when compared to all other groups (Figure 1). Consumption of isoflavone has significant improvement ($P \leq 0.05$) on serum ChAT in aged rats (Aged-Iso) as compared to aged control (Aged-C). Lower NO levels were recorded in aged control rats (Aged-C) when compared to adult control rats (Figure 2). Supplementation of isoflavone resulted in significant increase in the values of serum nitric oxide in aged rats (Aged-Iso) as compared to aged control rats.

Figure 1: Effect of different treatments on serum level of Choline Acetyl Transferase ($\mu\text{g/mL}$) in experimental rat groups. Adult-C: Control adult rat group; Aged-C: Control aged rat group; Adult-Iso: Adult rats received Isoflavone (100mg/ day); Aged-Iso: Aged rats received Isoflavone (100mg/ day).

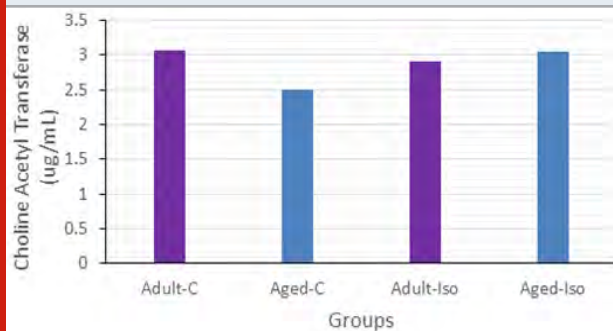
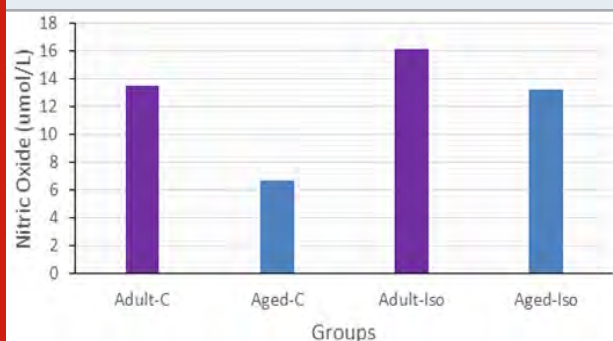


Figure 2: Effect of different treatments on serum level of Nitric Oxide ($\mu\text{mol/mL}$) in experimental rat groups. Adult-C: Control adult rat group; Aged-C: Control aged rat group; Adult-Iso: Adult rats received Isoflavone (100mg/ day); Aged-Iso: Aged rats received Isoflavone (100mg/ day).



DISCUSSION

The current research has shown that soy isoflavones impact the efficiency of NT systems in both adult and aged male rats. Alterations in cerebellar noradrenergic and serotonergic neurotransmission may have grave repercussions for the normal performance of the entire nervous system. Additionally, collaboration between intra-cerebral territories may be impaired. Serotonin (5-hydroxytryptamine (5-HT)) is known to influence mood; both stress and steroids have an impact on its neurotransmission (Bethea et al., 2000). This NT also acts as a presynaptic autoreceptor. It exhibits a forceful regulatory influence over serotonin neurone firing rates and consequently, on serotonin outflow within the forebrain (Lanfumeu and Hamon, 2000).

Numerous 5-HT_{1A} receptors are expressed on post-synaptic membranes throughout the brain, but they are particularly concentrated within the limbic system, notably the hippocampus, and cerebral cortex (Varnäs et

al., 2004). Serotonin influences the various growth stages of the cerebellum. It governs dendritic development, together with the creation and balancing of synaptic junctions (Suwa et al., 2014). The results from this work demonstrated enhanced serotonin levels in the adult treated group compared with the adult control cohort, i.e. 20.6 ng/mL and 13.7 ng/mL, respectively. In the aged group, a smaller rise was noted compared with the aged control group, i.e. 14.2 ng/mL compared with 9.1 ng/mL, respectively. Some researchers have proposed that augmented serotonin titres, e.g. through ingesting soy isoflavones, are related to a reduction in forebrain serotonin metabolism (Saied and Hassan, 2014).

In addition, cerebellar aberrations of serotonin homeostasis may predispose to symptomatology characteristic of some psychiatric pathologies (Ivanov et al., 2014). The NTs liberated at individual synapses largely dictates their role; the essential functional dichotomy is excitatory versus inhibitory synapses. Gamma-aminobutyric acid (GABA) is the principle inhibitory NT that participates in the majority of cerebral neuronal coding and processing. Its activity is mediated through ionic GABA_A receptors and G-protein coupled GABA_B receptors. Membrane potentials are impacted via the former; the latter governs synaptic and whole network flexibility over short and long periods of time (Inoue et al., 2013). In the current study, data indicated that GABA concentrations were diminished in the aged control rats compared with the adult control group. In contrast, GABA titres in the aged rats that received soy isoflavones were elevated compared with the aged controls. Therapy with soya isoflavones achieved an equilibrium between both inhibitory, i.e. serotonin and GABA, and excitatory, i.e. glutamate, NTs, thus offering a neuroprotective action (Bañuelos et al., 2014).

Glutamate is composed of several endogenous amino acids; learning and memory are strongly associated with its excitatory NT properties (Meldrum, 2000). No changes were seen in either of the two adult rat cohorts, i.e. Adult-C and Adult-Iso, or in the aged group that had isoflavone. However, the aged control group exhibited a diminished glutamate concentration in comparison. Thus soya isoflavone therapy enhances glutamate titres in older rats; these results are related to improved cognitive function (Sandini et al., 2019). This study suggests that ingestion of isoflavone markedly affects neurotransmission in the cerebellum, particularly in relation to the noradrenergic and serotonergic components. Serum epinephrine levels were enhanced following isoflavone administration in the elderly rats (Aged-Iso) compared to their controls (Aged-C). Norepinephrine (NE) titres were also elevated in the Aged-Iso cohort; this may indicate an unwanted side issue relating to the effect of these chemicals on emotions and life behaviour (Matusda et al., 2010).

NE functions as a central and peripheral NT, and as a hormone. It is associated with the 'fight or flight' reflex that occurs in response to potential threat; its effects are facilitated by a group of adrenoceptors (Bylund,

2016). One of its consequences is elevation of both systolic and diastolic systemic pressures. Dementia is a neurodegenerative pathology that is associated with gradual cognitive impairment. It is typically seen in adults over the age of 65 years; the prevalence of dementia is significant worldwide. The NT dopamine (DA) is a key component of the central reward pathway and in the control of movement. In the former, DA is manufactured within nerve cell bodies in the ventral tegmental territory, from where it is exuded into the nucleus accumbens and prefrontal cortex (Juárez et al., 2016). DA contributes to many cerebral functions including behaviour and cognition, motivation, sleep, dreaming, mood, attention, working memory and learning (Juárez et al., 2016).

In this study, DA concentrations were diminished in the aged control cohort compared with the adult control group. However, in rats treated with isoflavones, a marked rise in DA titres were noted in the adults compared to the aged group. Enhanced serum DA levels were also measured in the aged isoflavone-treated rats (Aged-Iso) as opposed to in the aged isoflavone group. It was presumed that the rise in DA may either potentiate its manufacture or diminish its breakdown; this was confirmed since isoflavone administration caused a decrease in monoamine oxidase levels. Given the oestrogenic properties of soya isoflavone, ingestion of genistein, a natural isoflavone phytoestrogen that occurs in soybeans, may lead to enhancement of amphetamine-triggered striatal DA release in rats of both sexes through an action equivalent to that of oestradiol (Ferguson et al., 2002).

Acetylcholine (ACh) is thought to be one of the most longstanding central and peripheral NTs that has been identified in animals. In the peripheral nervous system, ACh acts on designated receptors to control muscle function. Within the central nervous system, ACh contributes to the control of various behaviours. ACh is produced within neurones from its precursor, choline, a process mediated via choline acetyltransferase (ChAT) and acetyl coenzyme A (Strandwitz, 2018).

Results from the current study demonstrated that ACh titres in the adult treated group were elevated compared with those in the adult control group, i.e. 67.8 ug/mL and 58.3 ug/mL, respectively. Similar results were found in the aged rats, with the levels detected in the treated and control groups measured at 55.7 ug/mL and 41.8 ug/mL, respectively. It is recognized that soy isoflavone impacts the central cholinergic system, and consequently cognition, by inhibiting acetylcholinesterase (AChE) and thus diminishing ACh concentration (Yang et al., 2011).

Daidzein, an isoflavone, may play an essential part in ACh synthesis in the form of a ChAT activator (Heo et al., 2006). ChAT is crucial for ACh synthesis; it catalyses the acetyl group transfer to choline from acetyl-CoA. One of the findings noted in Alzheimer's disease is that there is a reduction in ChAT expression and function

(Kumar et al., 2007). It has been postulated that ChAT could act as a biomarker for the early recognition of this neurodegenerative condition and other types of dementia. Isoflavone gradients can bind to ChAT specifically; this may assist in screening the well-being of cholinergic neurones, thus offering a vital instrument to predict early outcomes in Alzheimer's disease (Kumar et al., 2017).

In the current research, isoflavone ingestion led to augmented serum ChAT titres in the aged rats (Aged-Iso) as opposed to their age-equivalent controls. Soy isoflavones have been identified both *in vitro* and *in vivo* as free radical quenching agents (Rimbach et al., 2003). These observations have led to the theory that isoflavones' antioxidant properties can impact the stability of compounds such as nitrous oxide (NO), an endothelium-derived vasoactive agent. This may trigger a fall in blood pressure, since NO has been described as a vasodilating NT (Okamura et al., 2002).

Furthermore, NT also functions as a synaptic retrograde NT, which regulates cerebral circulation and additionally contributes to intraneuronal signalling, encompassing neuronal metabolic pathways and development of dendritic spines (Picón-Pagès et al., 2019). Excitation of neurones leads to increased intracellular calcium; this occurs via N-type Ca^{2+} channels. Neuronal NO synthase is then triggered to manufacture NO; NO then initiates vascular dilatation mediated through a cyclic GMP-dependent pathway. Basal NO activity has been demonstrated to rise following brief soy isoflavone administration (Sobey et al., 2004). In this work, when contrasted with their respective control cohorts, both the adult and aged rats that received isoflavones exhibited elevated NO concentrations for four weeks.

In view of the above, the hypotensive actions of soy powder noted in this study may be associated with NO-potentiated vasodilatation. Marked elevation of serum NO titres were seen following isoflavone administration. These findings are in keeping with the results of Sobey et al. (2004). These authors showed that in male rats, a brief course of daidzen influenced cerebral arterial reactivity; this effect was a consequence of increased manufacture and release of NO, originating from vascular endothelium. Squadrito et al. (2002) reported that flow-mediated endothelium-dependent vasodilatation was augmented in normal postmenopausal females following six months of genistein administration. The proportion of serum NO to endothelin, a vasoconstricting agent, was elevated. The vasodilating effect of NO safeguards against the onset of hypertension and concomitant cardiovascular disease (Taddei et al., 2000). Oxidative stress is related to diminished NO levels; the latter is also linked with elevated superoxide anion formation. This can ameliorate the beneficial effects of NO, thus aggravating hypertension in humans and in experimental scenarios. It can be presumed that a rise in serum NO could be facilitated by the antioxidant influence of isoflavone in the aged isoflavone-treated cohort.

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Green Crime and the Latent Functions of Bio-Agriculture and Biotechnology

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ABSTRACT

The rampant proliferation of biotechnology into several aspects of our life from the past decade has led to augmentation of debates and discourses within various consumer goods and agricultural sector. The following paper rejuvenates a novel perspective of Biotechnology into the realm of the political economy of genetically modified food and grains. The following article subsequently looks into the discourse of political hegemony and dominance by the powerful corporate via powerful nations into the least powerful and poor countries for spreading the monopoly to dominate the global food markets. The article generates nodes on green crime, environmental conventions for the latent consequences of biotechnology.

KEY WORDS: BIOTECHNOLOGY, GREEN CRIME, HEGEMONY, POLITICAL ECONOMY.

INTRODUCTION

The concept of harm encompasses the realm of state-corporate crime taking into account the relationship of the harm with social, economic and political organs of our society and finally the relationships of harm with our society (Tombs, 2007) and (White, 2003). The proliferation of genetically modified organism into human society has long been remained contested for its optimism and pessimism. Optimism forfeits its revolutionary agenda of combating hunger across society and pessimism for its assemblance with corporate greed, polarizing hunger and governments, creating clouds authorities regimes of latent consequences. The debate looks into the illegal, unethical and harmful practices which keep agricultural biotechnology as a highly contested subject.

Hunger and starvation is something that haunts mankind for its existence. According to the report on food and agricultural organizations of the United Nations, 2004 millions of people suffer from malnutrition and starvation. The debate originates in the epistemological domains of opportunity versus aid, of which the greater agenda of combating the humanitarian crisis of hunger is to be seen with biotechnology's latent functions of upraising in commercial opportunity for another folk of people (Harle, 1978). A thin line anticipates the realm of risk and fear under the modesty of extension of relief policies, free trade and sustainable development. But little concentration islet upon the latent consequences of loss of biodiversity, economic hegemony and policies of world trade. Certain affluent countries of the west such as the United States, have forecasted the world supremacy and hegemony along with promoting GMO of the corporate under the veil of hunger (Mulaney, 2004).

Any instance of harm may be related to an act of nature or an anthropogenically induced harm which might lead to social harm at times. Law might acknowledge certain acts to be illegal but certain acts of legal activities also produce harm, which becomes the core of green criminology. This is why, the relationship of criminology and genetically modified food is found in the acknowledgement of

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criminological agendas for the reported harms and risks with inequalities in the social and political discourses that challenge the existent priorities of governing bodies (Walters, 2006). The article looks into the criminological debate within agricultural biotechnology through two instances of Zambia and India.

What Is Green Criminology?: The focus of green criminology is to pay profound attention to areas given minimal importance in social science, such as harms generated to the living and the non-living by anthropogenic activities. Environmental issues have played a major important role in today's time, wherein 2020 the situation of COVID 19 pandemic is revealed as nature does its homeostasis through its ways, where the connections came to halt because of the Sars-COV-2 virus, bringing everybody into isolation and the situation of reduction of pollution, fuel prices falling, less consumption of fuel in the factories and industries have led to less carbon emission. The instance of filling the ozone hole has also come into effect. The alarming conditions of the climate crisis, global are warming were the news of everyone's life. Now the factors of environmental degradation have been affecting the lives of living species because of human activities. Our main focus of green criminology is to look into the matter of anthropocentric acts which affects the living and the nonliving.

White-collar crime was coined by Sutherland (Sutherland, 1983), which referred to an organised crime committed by the affluent class (ibid). The term Green Crime was coined by Michel James Lynch in 1990 (White, 2013) which refers to offences committed against nature which juxtaposes the offences against the living and the nonliving elements of nature, leading to harming the environment as such, encompassing environmental laws and regulations. Importance of green criminology is to try to prognosticate and anticipate calamities from occurring, as certain paradoxes could imply harm and destruction to life forms and geographical changes of the earth. The core of the study in green criminology is Harms. In criminological terms, there are always different instances of how harm is taken into consideration. Two considerations are taken in considering harm. One is the strict legal procedural approach and the other is the socio-legal approach. (Tapan, 1947), (Green and Ward, 2000).

In the purview of the strict legal approach, the harm is defined in considering legal definitions that look into acts that are implied by law. The strict legal approach focuses on acts beyond the limits of laws which are beyond the limits of legal definitions generated by the state, but acts which are legal in accordance to law but still potent of producing harm or taking the living and the nonliving components of the environment into jeopardy (Situ and Emmons, 1999). Harm becomes importance in Sociological discourse because certain social practices are considered as normal acts but lead to more serious forms of harm, such as waste disposal, genetic engineering, clear-felling, poaching etc, these acts might not be

defined as criminal by nations but still pose a serious threat to the society and the ecosystem.

Between both the views taken in considering acts of criminality and harm, there is a thin line of invisible politics, which acts for negligible attention into the concrete manifestation of social inquiry, and obscuration of certain environmental damages which represents the culture of denial for environmentally unfriendly activities and consequences (Cohen, 1993). Greening of criminology becomes the need of the hour because environmental scholarship has been given less importance in criminology and other disciplines. The harmful impact on the humans, plants and animal species encompassing all the living and the nonliving forms in the earth should be given wide attention and take the socio-legal approach seriously, which applies to different ventures of concerning areas of theft of natural resources, dispossessing of the indigenous population from land and welfare, paradox of mono-cropping, contract farming leading to fading of farmers autonomy over seeds because of genetically modified seeds, food industry and agribusiness companies colonizing nature (Walters, 2006).

METHODOLOGY

Two case studies of India and Zambia are taken to justify the latent functions of biotechnology and to work accordingly. Secondary data from previously existing works of literature are used to have an outlook upon the case of India and Zambia respectively.

Objective: The main objective of the paper is to look into the latent consequences of Biotechnology

Interpretations

Case 1: In the article titled A biotechnology story: notes from India reflects an optimistic science that would beacon India on space, Atomic energy and green revolution, but also has foreshadowed a sudden loom on its dispossession. The social construction of biotechnology as the master of human sciences of food and sustainability suddenly became an iron caged rationality concept rather than a rational-legal authority, when issues of farmer suicides because of crop failure came to existence. Biotechnology predicted to be the backbone of the country but remained an imaginative entity refrained by the social discourse from documenting it. MS Swaminathan created a paradigm in itself, the father of the green revolution in India and had the notion of establishing a symbiotic social contract between society and science. The concept of sustainability became core to Swaminathan, where the upheaval of the Brundtland's newborn trajectory interacted three new dimensions for Swaminathan.

The dimensions of ecology, economics and equity were encompassed in the realm. His optimism was reflected through his proposal of the sustainable livelihood security Index in 1991. His concept of bio village also added to this. The concept aliens for pro-poor, pro-

women, and pro-nature, sustainable agriculture and rural development. This keeps the concept of sustainability alive because of the philosophy which undertakes development to the environmentally compatible, economically efficient and socially equitable.

The iron cage rationality of green revolution was realized by MS Swaminathan when the profit exploitation yielding was slowed down, lands losing its fertility because of usage of modern technological machines and fertilizers. The main catalyst for the rising green revolution was biotechnology. The fear among the Indian farmers on encountering biotechnology was represented by the Karnataka Rajya Ryota Sangha (KRRS) headed by Nanjindaswamy. The three turbulent events represented how farms did not have a good repo with biotechnology. The event of KFC (Kentucky Fried Chicken), the event of the international caravan, Attack on Monsanto field station conducting trials on BT cotton.

An incident of a farmer named Venkat Reddy negotiated between debt and death by selling his kidney to repay the loans that met with losses from purchasing seeds of no yielding capacity. Though this incident is not related to biotechnology, the farmers were not optimistic to trials on their lands as many were sharecroppers and had to negotiate between debts and death for profit and loss. Therefore protests took place against Monsanto field stations. This paradox has left hundreds of farmers into grief and agony as many leading to the tentacles of suicide by ending life as an escape mechanism to debts of the forcing moneylenders.

This situation juxtaposes the vulnerability of the world's poorest farmers. Protesters enchant the vision of Venkat Reddy's suicide into their protests, where if India embraces the new corporate high tech seeds, leading to more suicides and kidney sales shortly. The dialectics is seen through domination, where 700 million people are directly dependent on farming in a country like India. And this paves the way for infiltrating the agriculture, therefore conquering the agriculture leads to conquering the nation. And this platform sets the dice for the corporate houses like Monsanto. In the 21st century, the vision of direct domination is over, but the vision of indirect domination begins. Shiva, 1999 says that the benchmark for controlling nature is generated through the forces of creativity. The women folk were engaged in reproduction, on the contrary man were engaged in the process of production, where they monopolised creativity.

Case 2: The country of Zambia is a poor developing country landlocked on all sides by African countries like Mozambique, Malawi, Zimbabwe, Tanzania, Angola, Democratic Republic of Congo and Namibia. The country has a paradox of being rich in natural resources but still lives in a haunting reality of debts to external sources because of unemployment rates and low income. This paradox is added more to the plight because of never-ending social problems in the country such as HIV, poverty, lack of access to safe drinking water, electricity,

lack of health and hygiene facilities. Two of the important resources sets an optimistic notion for Zambia, the mining sector and the agriculture sector. The country comprises of more than 80,000 farmers (Simwanda, et al 2004). The farmers cultivate grains of two types, Cassava and Maize. Where cassava is encompassed into the northern Zambian society and Maize is encompassed into the southern Zambian society.

Society in Zambia is culturally rich in food habits; Zambia comes into the context of the study of green crime because of Zambia making headlines in various international platforms and media houses, the reason being that Zambian president refusing to accept GM food, referring to it as poison. The people of the country have supported the president on being a partisan towards the inequality of food and revolting against the notion altering the cultural practices and also the alteration of the food chain because of the conquest for penetration of genetic technology into the chain. The authorities of Zambia thinking of the ill effects of biotechnology in terms of polluting biodiversity and eventually creating a zone of economic dependence is perceived with research and study, which further juxtaposes unmilled US grain donations transported into Zambia for the pursuit of growing illegal GM crops (Nottingham, 2003).

Various forums criticized the Zambian government for inciting proliferation of hunger into the country and pulling other African countries like Ethiopia, Mozambique and Zimbabwe into hunger by opposing US grain donations. To retrospect on the claim, the Zambian authorities pulled over scientists and resources for travelling overseas with specific remit to verify the claim of the future of GM crops in Zambian soil and to comment on the government's adoption of the precautionary principle of rejection of GM grains. The fact-finding initiative concluded with results of uncertainty for the safety of the GM crops and hence it told the government to maintain the current stand by not accepting GM food, or else it could jeopardize the biodiversity and contamination of indigenous Zambian maize varieties. This episode brought Zambia into a series of criticism and being portrayed as anti genetic technology. But for Zambia, the main paradox is not with biodiversity per se but with GM donations. Zambia still uses Biotechnology that aims to reduce animal diseases and on ways that explores the benefits of medicines. The Dialectics of the opposition of GM is embedded into the opposition of the forces that pressurizes for accepting GM.

A riot took place in the southern part of Zambia where maize is grown because of immediate withdrawal of GM maize by the US despite Zambians clear opposition to Zambian foods. Accusations are on the US side by the Zambian agricultural minister for instigating riots to necessity the acceptance of GM maize (Jonathan, 2004). Apart from maize, the US and UK are keen on exporting GM cotton seeds for maximizing yield which is again opposed by Zambian authorities. The US leads to a notion that Zambian authorities are prosecuted

as criminals, because of Zambia not letting to accept GM maize and starving their population to death and for this, the Zambian authorities should be punished harshly because of the crime against humanity. But the Zambian authorities perceive this as a political economy of interests. The optimism of the US for the promotion of GM crops is questionable when cigarette companies like Philip Morris USA refuse to accept GM tobacco from international Growers (Philip Morris, USA 2004). Therefore this contradiction distinguishes the propagation for economic growth rather than humanitarian relief and poverty reduction.

The Need For Green Criminology: The paradox of domination for the proliferation of GM by powerful institutes subjugates poor nation through the exploitation of law and international relations for vested economic and political interests. GM food which instigates human and animal safety requires a notion of criminological intervention, setting for the legitimating of Green criminology as a subject matter with an interdisciplinary approach. The exploitation of the powerful also needs a criminological dimension where transnational green crimes study comes into being. These activities of man have accumulated environmental risks and environmental harm which has disturbed the balance in our ecosystem and keeping the living as well as the nonliving, including the humans itself in a state of risk. If this continues the humanity has in the past, present and in the future has to pay a price (Saxena, 2002).

This price comes in the form of destruction of a higher impact such as the Bhopal gas tragedy of India, Kuwaiti Oil fires, Love Canal, the Exxon Valdez disaster, Tokaimura Nuclear plant accident, Seveso Dioxin cloud, Minamata Disease, Three Mile Island accident etc. to mitigate and prevent such kind of crime the countries across the globe including India has come up with legislative and non-legal measures and to restrict the happenings of certain activities and indulgence in such activities are termed as offences, environmental crimes are there in the prescription of penalties and punishment for the involvement in the activities which harms the nature. This has led to the notion of crime to be revisited and a new corner of crime arrives which has to study the disturbing effects on the environment, including the living as well as the nonliving.

CONCLUSION

Crime is inevitable and is part of every society in our globe. No society possess free from crime and criminal activities. The volume of crime may differ from place to place. The definition of crime has certain legal and epistemological gaps. Certain jurists have defined crime in terms of sociological phenomena. Crime is an act which may be intentional or omission in violation of criminal law committed without any defence or justification and penalized by the law as felony or misdemeanour. Jurist Salmond has defined crime to be something which is deemed by law to be contributing

to some amount of harm to the society, such harm may victimize the society as a whole or victimize the individual as an immediate victim. Crime is legal harm, which is encompassed to not only the individual but also the society. Crime is something which depends on time and space. Jurisprudence also plays a role in terms of punishing criminals. The taxonomy of crime may change from place to place and society to society. The difference in state policies, subjects to differ from state to state which differs in terms of an activity for its identification to be termed as a criminal activity. An activity that might not be termed as a crime in the present may be termed as a crime in future owing to its depth and the perception of democratic structure.

The discourse of green criminology has been born from the habituation of environmental issues and criminology. Thus the whole theme of green crime is been adopted from outside the domain of conventional criminology to make such that the issues of environment are taken into it which is outside the criminological field concerning the pattern of greater environmental issues at reach. This leads to the extension of mainstream criminology to encompass the events and dynamics of the broader realm of crime signifying at a large scale global level. Enacting such an approach into the episteme of conventional criminology and thus generating a habitus to respond to environmental harm will emancipate the attributes of green crime.

The binding of nature in terms of human beings are related to the institutions of issues related to health, poverty, and the rights of the people and so on. This creates a dependency of the humans towards the establishment of the need accumulation from the environment. Humans from time immemorial have been dependent on the environment for his needs for accommodation, food, medicine, health and hygiene. Thus until and unless the vision of Biotechnology in terms of genetically modified crops is perceived without paradox or pessimism the notion of environmental harms and hazards would be embedded into the discourse and the debate on the political economy will continue to exist which will again set the platform for a green criminology subject matter.

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A Study on Engineering Properties of Reinforced and Unreinforced Soils

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ABSTRACT

Every year, there were many accidents occurring due to the geotechnical engineering failures such as embankment failures, foundation failures etc. And this count is increasing day by day. There will be many reasons causing these failures and at a time maximum of these were happened because of improper soil investigation. But in many cases even though soil investigation was done perfectly before the construction started, the failures happened. So, in cases like these, after pure investigation was done, we can use reinforcement and sort out those issues. Many people while constructing residential houses never opt these geosynthetic reinforcements due to their false beliefs. Geosynthetic reinforcements help us in making the soil suitable for our constructions. But the difficulty lies in selecting the apt reinforcement respective to that situation. So, when that time comes, one should be aware of all the types available and their properties. So, soil was tested when reinforced with Geotextile and their properties were keenly observed and noted. Results were compared with the normal soil and the difference was also noted. Although Geotextile reinforcement is the largest subcategory of the Geosynthetics, it was still under the research stage in India when compared to the developed countries. In this study, we introduced about Geotextiles, their types, functions, and properties, how they can be useful for Geotechnical constructions and laboratory test results were included which were conducted on Geotextile Reinforced Soil.

KEY WORDS: ENGINEERING PROPERTIES, GEOSYNTHETICS, GEOTEXTILES, REINFORCEMENT, SOIL INVESTIGATION.

INTRODUCTION

Geosynthetic reinforced soil became so popular for its wide range of application in the construction field such as pavement construction, embankments etc. Use of these geosynthetics helps in the enhancement of the Engineering properties and the bond strength due to the interlocking

nature of the soil particles. In tropical countries like India, locally available soil is being not used as it does not meet the requirement of the construction. But if the reinforcement is provided, this soil itself is good enough for the construction of any structure required. Here we have used Cohesionless Soils i.e. Sandy Soils. A thorough study on the Engineering Properties of the Reinforced and Unreinforced soils is conducted. This study presents the difference on usage of Geosynthetics.

Geo Textiles: Geotextiles are permeable fabrics which are a type of reinforcement used in the soil. These are a subcategory of GEOSYNTHETICS. In fact, these are the largest group of the geosynthetics in terms of volume and usage in Geotechnical Engineering. These geotextiles are also textile materials but the thing that separates these

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from the other textile materials like cotton is that these are not natural kind of textiles. These are artificially made from the materials like polypropylene or polyester. These are made from natural or man-made fibres. One more main advantage of the Geo textiles is that these are environment friendly and will have not any kind of adverse effect on mankind. In simple words, these are the permeable textile materials which can be used as reinforcement in soil, rock etc. These Geotextiles are more affective in soil erosion control. Geotextiles will have an ability to complete the functions like separation, filtration, reinforcement, sealing and drainage.

Functions of Geotextiles:

1.1 Separation: Geotextiles separate different kind of soil particles from combining.

1.2 Filtration: It is the function of Geotextile which allows the water to flow freely and minimize the soil loss.

1.3 Reinforcement: Inserting Geosynthetics into the soil mass to increase its strength and resist tensile forces is called as reinforcement.

1.4 Sealing: Geosynthetics minimizes the vertical flow of water into the structure there by protecting the structure.

1.5 Drainage: It is nothing but the ability of the non-woven geotextile whose structure allows the water to flow through its plane.

2. Types of Geotextiles:

Geotextiles are classified into three types. They are:

- **Woven Geotextile:** A fabric or synthetic material, which helps for the water movement along with the control of soil movement are called as Woven Geotextiles. These types of geotextiles generally help for the separation and filtration functions of the Geotextiles.
- **Non-Woven Geotextiles:** These types of geotextiles are helpful for filtration, drainage, and reinforcement Functions of geotextiles.
- **Knitted Geotextiles:** These are mainly and mostly used at the dams. When compared to the other two types of geotextiles, these are not that much developed and researches are still being conducted in this area.

III. Engineering Properties of Soil: There will be a large no of Engineering Properties for a soil. But here we have considered the Engineering parameters such as Permeability, Cohesion and Angle of Internal Friction.

Permeability: Permeability is the rate at which water pass through the soil under the action of hydraulic gradient.

Cohesion: The force which holds the molecules and the particles of soil together is called as the Cohesion.

Angle of Internal Friction: The angle between the normal and resultant forces just when the failure occurs is called as the Angle of Internal Friction. There are certain parameters that are required to get the mentioned Engineering Properties. They are

Relative Density: It is the ratio of a material to the reference material.

Particle Size Distribution: It's an index that indicates what size of particles are present in what proportions in the sample particle group to be measured.

IV. Laboratory Tests: Different Laboratory tests are carried out to find out the solution. Here is the list of Laboratory tests that are carried out:

1. Particle Size Distribution Analysis.
2. Relative Density of the Soil.
3. Constant Head Permeameter Test.
4. Direct Shear Test.

Note: All the mentioned tests are carried out both with and without introducing the Geotextiles as the reinforcement material.

RESULTS AND CALCULATIONS

1. Particle Size Distribution:

Table 1. Particle Size Distribution

Sieve Size	Mass of Soil Retained	% retained	%Cumulative retained	% finer
4.75	5	0.5	0.5	99.5
2.36	13	1.3	1.8	98.2
1.18	75	7.5	9.3	90.7
0.6	260	26	35.3	64.7
0.3	492	49.2	84.5	15.5
0.15	124	12.4	96.9	3.1
0.075	12	1.2	98.1	1.9
Pan	12	1.2	99.3	0.7

D₆₀= 0.495

D₃₀= 0.388

D₁₀= 0.233

C_u and C_c are 2.12 and 1.30, respectively.
Hence the Sand is Poorly Graded Sand (SP).

2. Relative Density:

2.1 Without Reinforcement:

e_{max}= 0.707127

$e_{min} = 0.285102$
 $e_{nat} = 0.545693$
 Therefore, Relative Density is 38.25%.
 Hence the Sand is Medium Dense Sand.

2.2 With Reinforcement:

$e_{max} = 0.691428$
 $e_{min} = 0.475315$
 $e_{nat} = 0.545693$
 Therefore, Relative Density is 67.43%.
 Hence the Sand is Dense Sand.

3. Permeability:

3.1 With Reinforcement:

Table 2. Permeability with reinforcement

CONSTANT HEAD PERMEAMETER TEST WITH REINFORCEMENT				
S.NO	Hydraulic Head (h)	Time Interval sec	Quantity of water collected (Q)	Coefficient of Permeability cm/sec
1	151.5	60	250	0.00444949
2	151.5	60	260	0.004627469
3	151.5	60	210	0.003737571
4	151.5	60	230	0.00409353
K= QL/Aht			0.004227015	
Length of the Specimen(L)		12.7		
Diameter of the Specimen		10		
Area of the Specimen(A)		78.5		

3.2 Without Reinforcement:

Table 3. Permeability without Reinforcement

CONSTANT HEAD PERMEAMETER TEST WITHOUT REINFORCEMENT				
S.NO	Hydraulic Head (h)	Time Interval sec	Quantity of water collected (Q)	Coefficient of Permeability cm/sec
1	151.5	60	630	0.011212714
2	151.5	60	490	0.008720999
3	151.5	60	560	0.009966857
4	151.5	60	530	0.009432918
$K = QL/Aht$			0.009833372	
Length of the Specimen(L)		12.7		
Diameter of the Specimen		10		
Area of the Specimen(A)		78.5		

Note: The Units of the length are cm and for Area cm².

4. Direct Shear Test

4.1 Without Reinforcement

Table 4. DS Without Reinforcement

Normal Stress kg/cm ²	Max Shear Stress Kg/cm ²
0.5	0.090558
1	0.139321
1.5	0.388087

$\Phi = 29.24$

$C = 0.69 \text{ kN/m}^2$

4.2 With Reinforcement

Table 5. DS with Reinforcement

Normal Stress kg/cm ²	Max Shear Stress Kg/cm ²
0.5	0.2020
1	0.2508
1.5	0.6200

$\Phi = 32.23$

$C = 0.80 \text{ kN/m}^2$

VI. Graphs And Figures

1. Particle Size Distribution Curve

Figure 1: Particle Size Distribution Curve

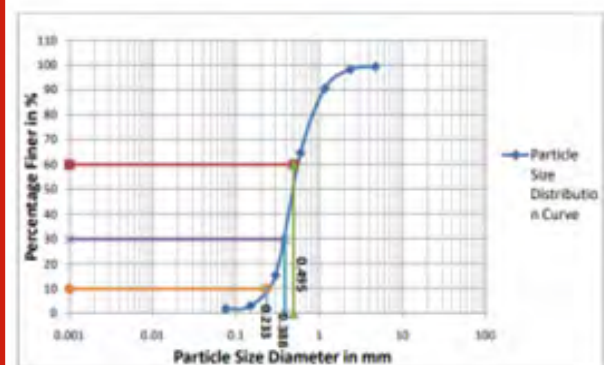


Figure 2: IS Sieves



2. Relative Density

Figure 3: Relative Density Equipment on Vibrating Table



Figure 4: Geotextile in the Relative Density Mould



3. Permeability:

Figure 5: Constant Head Permeameter



4. Direct Shear Test

Figure 6: Direct Shear Graph without Reinforcement

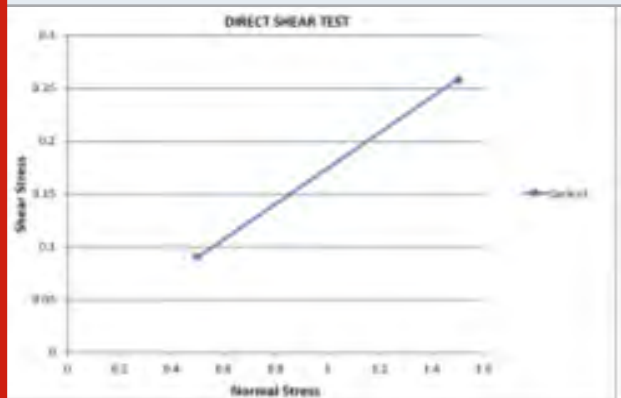


Figure 7: Direct Shear Graph with Reinforcement

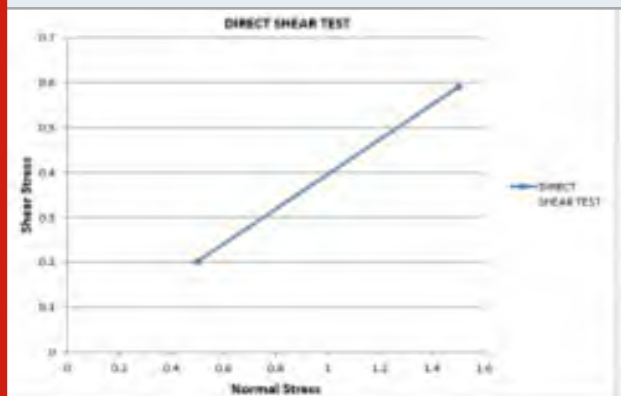


Figure 7a: Direct Shear Test Equipment



Figure 8: Shear box with Geotextile



CONCLUSION

1. In the Particle size distribution, we clearly got the type of soil as the Poorly Graded soil with the C_c value as 1.131 and C_u value as 2.447.
2. In Relative Density, When the reinforcement is not provided the soil is purely having Medium density i.e. Medium Dense Sand. But when the reinforcement is provided it shows a greater variation making the soil Dense Sand.
3. Constant Head Permeameter Test, the expected result came out i.e. the decrease in the Permeability. The induced geo textile membrane does not allow the water to pass through it, which will be very much useful.
4. In Direct Shear Test, when there is no reinforcement the value of Φ is comparatively less. But whereas when the reinforcement is introduced there is a rapid increase in the Angle of internal Friction i.e. Φ .

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Influence of Attitude on Technology, Perceived Benefits and Perceived Risks on Stakeholders' Attitude towards Outdoor Residual Spraying

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ABSTRACT

Objectives: The goal of this paper is to analyze the influence of attitude to technology, perceived benefits and perceived risks on stakeholders' attitude towards ORS. This method needs support from stakeholders so that its implementation does not cause any concern. **Design/Methodology/Approach:** In order to achieve the desired goal, questionnaires were built on the basis of a validated study. The questionnaires were distributed randomly on three hundred and ninety-nine adult respondents above 18 years old (scientists and the public who reside in the dengue hot-spot areas around the Klang Valley) from September 2016 to September 2017. The data that has been collected, is then analyzed using structural equation modeling with partial least squares (PLS) approach. **Results:** Perceived benefits was found to be the most important and strongest direct predictor of positive attitude to ORS. It also acted as mediator for the relationship between perceived risks and attitudes to technology with attitude to ORS. Perceived risks also served as a mediator for attitudes to technology. **Limitations:** The data collected only covers two groups of stakeholders. In fact, only three predictor factors were evaluated to determine the influence of attitudes on the ORS method as one of the control of dengue in Malaysia. **Future studies** may use various predictive factors in determining attitude towards other dengue control techniques. **Practical implications:** These findings can provide an insight into the social acceptance of ORS technology to combat dengue. **Originality/Value:** Authors confirm that this study and the findings are genuine and have not yet been released. The proposed structural model in this study serves as a basis for improving the decision-making process of ORS technology.

KEY WORDS: OUTDOOR RESIDUAL SPRAYING; ATTITUDE; PERCEIVED BENEFITS; PERCEIVED RISKS; ATTITUDE TOWARDS TECHNOLOGY.

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INTRODUCTION

The outdoor residual spraying (ORS) approach is an efficient insecticide-based control to reduce the population of Aedes (Lee et al., 2015). Rozilawati et al. (2005) demonstrated that this approach was successful in controlling the Aedes population, especially in areas where the density was high and preventive measures just could not be carried out. The findings of Ab. Hamid et al. (2019) have shown that ORS is a good approach to control dengue in the outdoor areas because it is a

successful method, if carried out correctly. The use of the ORS is durable and naturally resistant to rain (Lee et al., 2015) causing this insecticide to remain long on the surface of the sprayed wall to trap mosquitoes that rest on the sprayed area. Nevertheless, the efficacy of this ORS often relates to the characteristics of the wall surface, the geographical area, the rainfall distribution, the humidity and the intensity of the location.

Previous studies have claimed that residual spraying is successful in reducing the Aedes population, particularly in the densely populated areas in Malaysia (Ab. Hamid et al., 2020, 2019; Rozilawati et al., 2007; Rozilawati et al., 2005). Nonetheless, its implementation has been criticized for giving a "false sense of security" that decreases household participation in prevention activities (Reyes-Castro et al., 2017; Wijayanti et al., 2019). However, the implementation of ORS is one of the wise actions to control the Aedes population, but its implementation depends on social acceptance towards the approach. In fact, it is important to explore the aspects of people's views on technology and whether they feel there is a benefit or a risk in deciding their attitude towards this approach. This research is important in evaluating the need for this approach to control dengue through social acceptance and, then, designing effective policies such that its implementation does not have an effect on environmental health.

Research Conceptual Framework: The research conceptual framework was developed from the study of Amin and Hashim (2015), which was the first assessment in Malaysia that specifically explained the interrelated factors that influence stakeholders' attitudes towards the genetically modified mosquito (GMM). Their findings indicated perceived benefit was the most influential factor of attitudes towards GMM. However, Alhakimi and Slovic (1994) highlighted that perceived benefit and perceived risk were found to be inversely related, which when people tend to judge any technologies high in benefit, they considered low in risk, and vice versa. Therefore, this study also evaluate stakeholder's attitudes toward technology to predict that they perceived benefits or risks on ORS approach. In this study three factors (perceived benefits, perceived risks and attitudes to technology) were predicted to influence stakeholders' attitudes towards the ORS approach (see Figure 1). Six hypotheses were postulated for the relationships between the predictors nad attitude to ORS and among the factors:

Use Standard Hypothesis Statement As In My Past Papers.

H1: Perceived more benefits, they will have more positive attitudes towards the ORS approach.

H2: Perceived more risks, they will have fewer positive on attitudes towards the ORS approach.

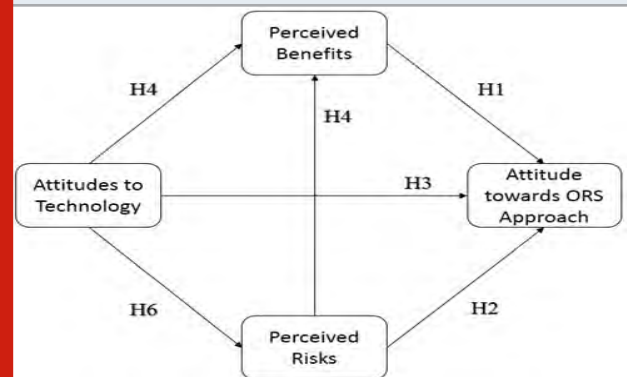
H3: Attitudes to technology have positive effect on attitude towards the ORS approach

H4: Perceived more risks, they will perceive fewer benefits associated with ORS approach.

H5: Attitudes to technology have positive effect on perceived benefits

H6: Attitudes to technology have negative effect on perceived risks

Figure 1: Research Conceptual Framework



Attitude is commonly described as a thought about something and predetermined views (Kaliyaperumal, 2004) which organizes the direction on their surroundings and guides how they react to it. Lian et al. (2014) proposed that an attitude is the internal behaviour of a person towards an external target and that it was the cause and preparation of a response. Domínguez-Valerio et al. (2019) highlighted that it is important to shape attitudes because it can affect an individual's final behaviour. There are five items that represent aspects of attitude discussed in this study:

ATO 1: This approach has to be scaled up.

ATO 2: This approach must have more financial support from government.

ATO 3: This approach allows a decrease in the fatalities.

ATO 4: This approach is required.

ATO 5: This approach is encouraged.

According to Amin & Hashim (2015), perceived benefits was the major significant predictor which influenced attitudes towards GMM. Perceived benefit refers to the user's perception of the beneficial effects of the use of a technology (Park et al., 2014) while perceived risk refers to its negative impacts (Aven & Renn, 2010). Perceived benefits and risks are highly complex and complicated to conceptualize on a stand-alone basis because these variables often have an inverse correlation (Hansen et al., 2003). Frewer (2017) found out that, when a person sees more benefits related to a technology, the perceived risks tend to be less which results higher acceptance of the technology (Amin et al., 2017). There are seven items that represent perceived benefit (PB) and seven items that represent perceived risk (PR), namely:

PB 1: A valuable approach that improves the quality of life.

PB 2: A valuable approach to Malaysian society.

PB 3: A valuable approach to prevent dengue fever.

PB 4: A valuable approach to the eradication of dengue.

PB 5: A valuable approach that is beneficial to the health

of me and my family.

PB 6: A valuable approach that benefits more people than it risks.

PB 7: All the risks of the approach will be dealt with in the future

PR 1: The possible unknown consequence of the approach

PR 2: Harmful impact over a long period of time

PR 3: A threat to future generations.

PR 4: Gives rise to unforeseen consequences.

PR 5: It becomes a major disaster for Malaysian society.

PR 6: Future risks to your health and the safety of your family.

PR 7: The adverse effects of the approach are harmful.

Attitudes to technology refer to the evaluation of an individual to accept any technology that also takes into account its negative effects on the environment. People who have a negative view of technology in general tend to perceive a specific application as more risky and have lower benefits (Amin & Hashim, 2015, Amin et al., 2017). There are six items that represent the attitudes to technology (ATT) discussed in this study, namely:

ATT1: Technology has made humans have less respect for nature.

ATT2: Technology has made humans more focused on profits.

ATT3: Technology has destroyed the value of humanity.

ATT4: Technology has made human beings limitless to the point of losing humanity.

ATT5: Technology has made humans threaten the balance of nature.

ATT6: Technology has made human beings a problem for urban life.

METHODOLOGY

The research data was collected through a validated questionnaire-based survey that focused on three hundred and ninety-nine adult respondents (aged 18 years and above) by a random sampling strategy from September 2016 to September 2017 in the Klang Valley. The Klang Valley was selected as the site of the research due to its having the highest recorded dengue cases in Malaysia, according to statistics released by the Ministry of Health, Malaysia. G*Power 3.1.9.2 software was used to assess the minimum sample size of the respondents with the statistical power of 0.80 (Faul et al., 2007), the effect size of 0.15 and significance level of less than 0.05. A sample size of two hundred and seventy-seven respondents is suggested for this research. Therefore, respondents were chosen from two groups of stakeholders, including a group of scientists (scholars, researchers and government officers) (n=202) who engaged in dengue prevention, and a group of the public (n=197) who were residing in dengue area hotspots in the Klang Valley. Based on empirical research published by Amin & Hashim (2015), a multidimensional questionnaire was developed to measure attitude towards ORS and its predictive factors.

All items for this survey were assessed using a 7-point Likert scale. The SPSS software version 23.0 was used to record the data. Analysis of the reliability and validity of the data and the association between predictor factors and attitude towards the ORS was carried out using SmartPLS-SEM software version 3.0.

ANALYSIS and Findings: Table 1 presents the demographic information of the three hundred and ninety-nine stakeholders sampled in the Klang Valley
>>>Insert Table 1

A. Analysis of the Measurement Model: Table 2 demonstrates the evaluation of the construct reliability and the convergent validity of the constructs in this research. The composite reliability (CR) values of 0.879 (Attitude towards ORS), 0.923 (Perceived Benefits), 0.938 (Perceived Risks) and 0.944 (Attitudes to Technology) demonstrated that these constructs have good internal consistency because the CR values were greater than 0.7 as suggested by Gefen et al. (2000). The factor loadings were greater than 0.5 and the average variance extracted (AVE) for each construct also reached a minimum threshold value of 0.5, which implies that the items loaded into the respective constructs contribute more than 50% of the variances of the construct (Hair et al., 2014). Analysis of the measurement model also evaluated the standardized root means square residual (SRMR) and the normed fit index (NFI). The SRMR value for the model was a perfect fit when the value was 0.066 (below 0.08) as proposed by Hu and Bentler (1998). The NFI value was 0.831 which is closer to 1, which defines perfect fit (Dijkstra & Henseler, 2015).

Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT) criterion analyses were measured to assess the discriminant validity (see Table 5). The findings stated that the value of the Fornell-Larcker Criterion in this study had a square root AVE value (diagonal attributes) that reached the total variance associated with the other variables. While the value of HTMT does not exceed 1, it means that all the value at the threshold of HTMT0.90 are distinctly different (Henseler et al., 2015).

>>>Insert Table 2

>>>Insert Table 3

B. Analysis of Path Coefficient: To analyze the significant path of the coefficient and validate the hypotheses that have been developed, the PLS-SEM bootstrapping procedure was used, using an observation data set of 5000 sample cases. Table 4 demonstrates the evaluation of the path coefficient analysis. For H1, the result indicated a positive relationship between perceived benefits and attitude towards ORS ($\beta=0.693$; $t=24.632$; $p<0.001$). In contrast, there was no significant association between perceived risks ($\beta=-0.049$; $t=0.997$) and attitudes to technology ($\beta=0.006$; $t=0.121$) with attitudes towards ORS, indicating no support for H2 and H3. However, there is an indirect relationship between perceived risks and attitude to ORS through the perceived benefits. Additionally, perceived risks had a significant negative relationship with perceived benefits ($\beta=-0.166$; $t=22.634$;

$p=0.004$), so H4 was supported. Attitudes to technology also have a positive influence on the perceived benefits ($\beta=0.175$; $t=3.139$; $p=0.001$), so H5 was supported.

Figure 2: PLS-SEM of Stakeholders' Attitude towards Outdoor Residual Spraying Approach

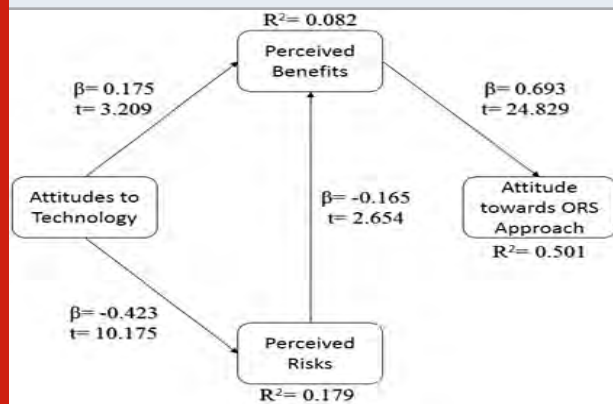


Table 1. Demographic Information

Demographic Variables		Frequency	Percent
Gender	Male	195	48.9%
	Female	204	51.1%
Types of Stakeholders	Scientist	197	49.4%
	Public	202	50.6%
Level of Education	Secondary/ Pre-University	44	11.0%
	Diploma	56	14.0%
	Degree	163	40.9%
	Master and PhD	136	34.1%
Age	28-28 years old	185	46.4%
	29-39 years old	132	33.1%
	Above 40 years old	78	19.5%

About H6, the results showed that there is a relationship of negative effects between attitudes to technology and perceived risks ($\beta=-0.423$; $t=10.114$; $p<0.001$). The finding also showed that perceived risks acted as a mediator factor for the relationship between attitudes to technology and perceived benefits. To prove the indirect effect of perceived risks as a mediator, the variance accounted for (VAF) assessment was conducted. The result obtained showed that the value of VAF exceeds 20% as suggested by Preacher & Hayes (2008) who explained that perceived risk acted as a mediator factor. The result indicated that, if the respondent was more technologically oriented, the risk of this approach would be ranked as being lower and would result in a higher perceived benefits of ORS.

>>>Insert Table 5

Table 2. Results of Measurement Model

Measurement Item	Loading	CR	AVE	Validity
Perceived Benefits		0.923	0.632	YES
PB1	0.768			
PB2	0.794			
PB3	0.837			
PB4	0.849			
PB5	0.798			
PB6	0.757			
PB7	0.755			
Perceived Risks		0.938	0.684	YES
PR1	0.683			
PR2	0.825			
PR3	0.848			
PR4	0.881			
PR5	0.835			
PR6	0.826			
PR7	0.876			
Attitudes to Technology		0.944	0.737	YES
ATT1	0.770			
ATT2	0.859			
ATT3	0.893			
ATT4	0.903			
ATT5	0.901			
ATT6	0.818			
Attitude towards ORS		0.879	0.594	YES
ATO1	0.729			
ATO2	0.693			
ATO3	0.726			
ATO4	0.829			
ATO5	0.862			

C. Analysis of the Structural Model: The analysis of the structural model also involves calculation for the coefficient determination (R^2) in which the well-fitting model must have R^2 values from zero to 1. The R^2 values ranged from 0.082 to 0.501, suggesting that the exogenous variables could explain 8.2% to 50.1% of the variance of the respective endogenous variables as suggested by Yap et al. (2018). The analysis also involved measuring for the effect size (f^2) on the impact value of the exogenous variables on the endogenous variables. Perceived benefit ($f^2=0.882$) has a large effect size on attitude towards the ORS approach, while the effect size of attitude to technology ($f^2=0.027$) and perceived risk ($f^2=0.024$) on perceived benefit was small. However, attitude to technology ($f^2=0.218$) has a medium effect size on the perceived risk. The analysis for the accuracy of the model predictions (Q^2) was also carried out. The Q^2 values for perceived benefit (0.050), perceived risk (0.120) and attitude towards the ORS approach (0.284) were completely accurate as they were higher than zero (Fornell, 1994).

Table 3. Fornell-Larcker and Htmt Criterion

Fornell-Larcker Criterion	ATO	ATT	PB	PR
Attitude towards ORS	0.77			
Attitudes to Technology	0.196	0.859		
Perceived Benefits	0.706	0.245	0.795	
Perceived Risks	-0.216	-0.423	-0.239	0.827
HTMT criterion	ATO	ATT	PB	PR
Attitude towards ORS				
Attitudes to Technology	0.232			
Perceived Benefits	0.79	0.259		
Perceived Risks	0.232	0.451	0.246	

Table 4. Path Co-Efficient Assessment

Direct Effect (β)	Standard Error	T Value	P Value	Decision
H1 0.693	0.028	24.829	0.000	Supported
H2 -0.049	0.049	0.981	0.163	Not Supported
H3 0.006	0.048	0.121	0.452	Not Supported
H4 -0.165	0.062	2.654	0.004	Supported
H5 0.175	0.055	3.209	0.001	Supported
H6 -0.423	0.042	10.175	0.000	Supported

DISCUSSION AND CONCLUSION

The contribution of this study is important in determining the social acceptance of stakeholders towards the ORS in the Klang Valley area which is known to have a very high case of dengue. First, this study has successfully developed a valid model of the factors that influence attitudes towards ORS (see Figure 2). Perceived benefits is the only factor that directly influences the attitude to ORS. This study is in line with the findings of Amin and Hashim (2015) who studied the influence of perceived benefits on attitude to GMM and Arham et al. (2020) who confirmed that the perceived benefits is a major factor in influencing attitudes towards Wolbachia-infected Aedes Mosquitoes in Klang Valley.

The study also found that perceived risks had an indirect relationship with the attitude towards ORS through perceived benefits. This explains that when the stakeholders judged ORS as having high risk, they will assess the method as possessing lower benefits, thus were less positive towards ORS. These findings differs from the study of Amin and Hashim (2015) who showed that there is no relationship between perceived risk and benefit.

Additionally, there is a positive relationship between attitudes to technology with perceived benefits and negative relationship with perceived risk. Amin and Hashim (2015) stated that attitudes towards technology (negative) have a positive relationship with perceived moral concerns. This study is in line with the study of Amin et. (2005) which showed that when respondents

have a negative tendency towards science and technology they will feel the risk and has a high level of moral concern. On the other hand in this study, although they have a negative tendency towards technology, they feel the benefits and less risk of ORS technology. It is possible that this technology does not pose any danger to environmental health. Arham et al. (2020) suggested that if they have a more positive view towards technology, they would have a positive attitude. It can be concluded that in order for the ORS method to be acceptable to the Malaysian stakeholders, the government and scientists need to increase public awareness on the benefits of ORS and proper safety measures be introduced to ensure environmental sustainability.

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Omani Renaissance in International Relations and Political Economy

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ABSTRACT

In the last century, though the Sultanate of Oman was seen as an undeveloped country in terms of economics, politics, international relations, and socio-cultural relations, actually, it had been one of the most developed countries in the Middle East previously. Perhaps, because of the existence of historical state experience in her DNAs, and His Majesty Sultan Qaboos' rational governance, Oman has developed and evolved visibly and started to compete with modern countries in the last fifty years. Today, Oman became the most democratic country among the Arabic Gulf countries, top-10 in the university graduation ratio in the world, top-8 in health development according to the WHO, and the safest country for the expatriates in the world. Oman had established a maritime empire in the 17th-19th centuries, but later it started to lose power by the British arrival to the region; then it started to follow isolationist policies in international relations because of new circumstances. After Sultan Qaboos came in power in 1970, first economic and transport, later socio-cultural and democratic developments brought Oman prominence in the Gulf. He pursued wise and balanced foreign affairs among its neighbors in the Gulf, Iran, and the West, and then started to be mediator and backchannel in the region reciprocally. This article shows how Oman succeeded a renaissance in society, politics, economics and international relations.

KEY WORDS: OMANI RENAISSANCE, OMANI CULTURE, OMAN'S POLITICAL ECONOMY, OMAN FOREIGN POLICY, MIDDLE EAST STUDIES.

INTRODUCTION

In the year 1970, the Oman Sultanate was a country having only a few primary schools, a single secondary school, and a few hospitals with only 3 kilometers of

asphalt roads. It was a country that was very isolated from the world under the 38 years' reign of Sultan Said bin Taimur, where even wearing sunglasses was forbidden. The Sultan had retreated to the Palace after an assassination attempt aimed at him. The doors of the city, which were surrounded by the walls and located on the seashore, were closed before it got dark. The Jebel-ul Akhdar War and the Dhofar uprising were taking place in the middle and the southern parts of the country for the second time. The economy of the country was totally closed to the outside world, and the natural resources of the country, petroleum, natural gas, and gold were remaining idle. Since there were no relations established with foreign countries, except Britain, the country was facing full isolation in its international relations.

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As the only son of the Sultan, Qaboos bin Said received the first part of his education in Salalah until the age of 16, and then completed his high school education at the Bury Saint Adams School in Britain. At the age of 20, he entered the Royal Military Academy at Sandhurst and completed his education there in 1962. Following his graduation, he was placed in the British military base in Germany, as a military officer with his Scottish Rifles (the Cameroonians). After these experiences, he studied the local governments in the UK, and then together with his close friend, Leslie Chauncy, he went on a world tour for 1.5 years and completed his education. It was the year 1966 when he came back to Oman after 10 years abroad. A new phase was starting in the life of Qaboos bin Said as he was kept in the Salalah Palace just after he arrived in the country. Qaboos went through Islamic education and took lessons of Oman's history during those years in the Palace.

On July 23, 1970, with the assistance of Britain, Qaboos made a bloodless coup d'état against his father. During the coup against him, Sultan Said shot one of the putschists and he shot himself in his foot by mistake. Sultan was captured by the British and sent to Bahrain for treatment. Later, he was put in confinement in a suite in the Dorchester Hotel, a hotel in London owned by Brunei, one of the most expensive hotels in the world at that time. He passed away there almost two years later.

:2. Creating A Nation: It is known that there are three ancient civilizations in the Arabian Peninsula: the civilization of Mecca and Medina, the Bahrain civilization and the civilization of Oman, which also covers today's United Arab Emirates. As distinct from the first two, Oman had established a powerful Maritime Empire between the 17th and 19th centuries, extending from Iran & Pakistan to Mozambique. The people of Oman, who were living along with ten different civilizations those days until the 19th century, called the Golden Age of Oman brought multiculturalism and tolerance to their socio-cultural life. From these days onwards, until today, Oman has achieved a multicultural characteristic, different from other people in the Peninsula, which resulted, with the passing of the years, in the development of tolerance in the country. In the first place, one could notice the civilized socio-cultural structure existing in the Omani Society. Arabs know each other very well than any other nations and each of the nations are given a nickname. The nickname of Omanis is "Madani" which means "civilized." Therefore, when Sultan Qaboos came to the power in 1970, the country did not have almost anything hard power but, as its biggest power resource, it has a "civilized" nation of 723.000 (World Bank, 2020) people (including foreigners), polite and honored, which once had established a maritime empire in recent history.

In contrast to other states of the Arab Peninsula, Oman is the only country that has experienced two civil wars. When Sultan Qaboos came to power in 1970, the country was still feeling the repercussions of the Jebel-Akhdar

War (1954; 1967-1967). Once Britain totally withdrew from the Gulf region (as did Oman as of 1978), the Soviet Union and China started to support the uprising in Dhofar, the most southern point of the country. Since the Sultan and Oman were considered as part of the capitalist block due to their close relations with Britain, the communist block was supporting the rebels with training, equipment, arms logistics, and paramilitary groups with the understanding that "my enemy's enemy is my friend".

Both Sultan Said and Sultan Qaboos were supported by the British in these wars. Rather than giving direct military and logistic support, with a very rational policy, Britain has chosen to bring soldiers from Jordan in the Jebel-Akhdar War and from Iran and Pakistan (especially from Baluchistan) in the Dhofar War. After the wars, these soldiers, who so desired, were given Omani citizenship on the condition that they relinquish their original passports. The people coming from the fallen Empire of Zanzibar were granted Omani citizenship. Later, in a new wave, those who came from India, Iran and Pakistan were also partially provided with citizenship. In 1971, the UAE seceded from Oman and established its own federation with the close assistance of Britain. In the remaining territory, the Sultan started to construct a new peaceful, multicultural and tolerant nation by following an equally distant policy (or close) to everybody.

As in all other Gulf countries, the state is the main job-provider in Oman as well. The quality and justice practiced by the state could be used as a means of equal distancing, which the state maintained for all tribes and origins. In Oman, it is possible to observe this equality in all public works and government posts established since 1970. In the Gulf region, tribes are the most important and powerful actors in socio-cultural life. The groups which had come to Oman at later stages, as above mentioned, also established their own tribes. If one looks at the state-nation profiles in the Gulf, it can be seen that the most ideal relationship between the state and the tribes is the one existing in Oman. This is one of the most important achievements of Sultan Qaboos.

Today, almost half of the population is made up of foreigners (2.2 million/4.6 million). Even though non-Muslims make up 15% of the total population, they also pray for the health and success of the Sultan. The most important factor beyond this situation is the welfare established by the Sultan and the "security for all" principle applied in the country. In 2019, Expat Insider announced Oman as being the most secure country for foreigners (Expat Insider, 2019). Oman was ranked as the 32nd country in terms of the general quality of life. Weather conditions affecting the whole country for 8 months over a year is the most significant factor in lowering the country's rating in this category. Upon his ascent to reign, the Sultan established a Consultative Council. He mingled freely among his people, sitting in a village square and listening to their problems. All these indicated, from the very beginning, that Oman would

have such a state-people relationship that it would be very different from what was present in other countries in the region.

Except for the last period of his reign, during which he suffered a serious illness, Sultan Qaboos used to organize regular tours visiting all the provinces in the country together with a few clerks accompanying him. In these tours, the Sultan used to get the views and petitions of the local people and, accordingly, he was determining the new areas of interests and necessities, and, if necessary, he was giving “to-do lists” (Oman MOFA, 2020) for the regions to his ministers. Every Friday, people were gathering along the way leading to the Palace, and sometimes they were submitting their wishes and grievances to him and sometimes, he was receiving their greetings and distributing plenty of gifts and money to the people surrounding him.

3. Building The Country And The Economy From Scratch:

In 1970, Oman was still stricken by poverty though the first oil reservoirs had been discovered in Oman back in 1962. Petroleum had for the first time been drilled out in Yiba in 1967 (and two years later in Nith and Faoud). Sultan Qaboos came to power in a war environment where there were no roads, electricity (and hence no A/C), water, etc. The Sultan, who had lived abroad for the last ten years, was aware of Europe’s dependence on oil and he knew that he could develop and reconstruct his country only with the help of the money coming from oil (Petro-dollars). PDO (Petroleum Development Oman) had been established in 1967 during the reign of his father. The partners of the company and their shares were as follows: Shell: 85%; Compagnie Francaise des Petroles: 10% and Partex 5%. The state of Oman did not have any share of the oil existing in the country. Just after two months following his ascendance to power, the new Sultan visited the company. He renewed all the agreements made with the drilling companies. He had 75 km of pipelines laid for the oil reservoirs that had been newly discovered.

In 1974, the Oman State participated in PDO with a share of 25%. In 1979, the share of the state was increased to 60%. Oman succeeded in having Shell, Compagnie Francaise des Petroles and Partex to accept company shares of 34%, 4%, and 2% respectively. Today PDO still keeps the same partnership structure. The oil production, which was 281,000 barrels a day, increased to 972,000 barrels as of today (Hellenic, 2019). The total length of pipelines laid down for oil production is 35,600 km while this number is 4,230 for natural gas production. Today Oman is at the 21st place in the world in terms of the production of crude oil and at the 14th place in terms of its exportation. The country occupies 26th place in the world in terms of the production of natural gas and 20th place in terms of its exportation.

Sultan Qaboos’ perspective on oil partnership was based on an analytical logic based on a “win-win” understanding. Although Oman had oil reservoirs, it did not have the technology to extract it, and it had to

do business with one or more of the 7 sisters (Exxon, Shell, BP, Mobil, Texaco, Gulf, and Chevron) who would extract this oil. As a matter of fact, in his speech in 1995, he described the relations with the private sector in a very positive manner. Emphasizing the benefits of free enterprise and competition in his speech, he said that the private sector was the backbone of all modern economies and that Islam “recognized and respected private property and called individuals to work” (CIA Factbook, 2020). During the years of the country’s foundation, the private sector was almost non-existent and lacked high industry and technology. The same was true for the state. Sultan Qaboos, whose aim was to establish a real country and state with the money that would come from oil, achieved this purpose through agreements that he made. Unlike the royal families of other countries, he did not happen to be an extravagant ruler. Especially the petro-dollars coming from PDO were used for the enhancing of the welfare of the whole country. Today, the country has 500,000 telephone lines, 5 television channels, 2.5 million internet users (an average of 3 internet connections to a house), 13 airports, and 65,000 km of modern asphalt roads.

Today, 99.1% of Oman has access to electricity. It is possible to find electricity, water, and roads even in a hamlet with a population of 30 people, located in the most remote corner of the country. In 1970, there were two electric generators in Oman, one serving a small part of Muscat and the other serving the Sultan’s palace in Salalah. Today, more than 20 billion kWh of electricity is produced in the country (US Energy Data Center, 2020). While a limited number of doctors were using candlelight in surgeries in 1970, today Oman ranks seventh in the world in electricity production. Unlike all Gulf countries, there is no single village or hamlet in Oman without electricity as of the year 2020. One should also bear in mind that, while there is a limited number of villages in Qatar, most of the country in the UAE consists of plains and sand. Therefore, road construction in these two countries is very easy and low cost. However, Oman has a very difficult topography with mountainous and deep canyons, and road construction costs are 9 times higher than those in the UAE are. Despite this fact, asphalt roads are paved in all settlements throughout its wide territory.

In short, years ago the country achieved the “inter-connectivity”, which is considered one of the most important achievements for a country. The country was able to catch up visibly to the 21st century modernity under the reign of Sultan Qaboos. Therefore, unlike in other Arab countries, the Sultan was named “the father of the nation”, which is the highest title of respect that could be given to a person in the Gulf region, and it was possible to hear this title even in Friday sermons.

No country in the modern world can compete internationally without first establishing a modern air transport system. Bait al-Falaj Airport, which was first built as a runway in the countryside for military purposes in 1929 in Oman was expanded in the 1960s. Being aware of the serious problems of this inadequate

facility in 1970, Sultan Qaboos started the construction of Seeb Airport, which is today called Muscat International Airport. Opened in 1973, the new Airport hosted 87,000 passengers by the end of the first year (Oman Airports, 2020) The second-largest airport in the country was established in Salalah, which has become the main artery of the country's rapidly growing business and tourism industry. Today, Oman Airlines operates direct flights to 13 airports in the country, including the airports of Salalah, Khasab, Duqm, and other airports located near the major oil facilities.

Before 1970, in addition to other shortcomings in the country, the people of Oman were also feeling the absence of adequate communication infrastructure. Just one week after he came to power in 1970, Sultan Qaboos issued his first decree to correct this situation and ordered the foundation of the Oman Radio. First, broadcasting started from a small station in Bait el-Falaj near Muscat and the second station in Salalah the following year. Three other private radio stations were added in 2007. In 1974, the first state television station had started broadcasting from Muscat just like the radio stations. Today, five television stations, under state and private ownership, are broadcasting from Muscat. In 2020, 96 percent of the Oman households have television sets; there are 315,000 telephone lines and more than 5.6 million mobile phones connected to the network.

Despite invitations since its foundation, modern Oman has always refused to join OPEC. This preference freed Oman in its petro-politics to which it is highly dependent, freed it from quota restrictions, and kept its country development at a sustainable level by opening space for the execution of an individual foreign economic policy. This enabled it to carry out its exports even during the periods of constraints on oil production. In fact, as will be mentioned later, Oman avoids the membership of many international organizations. For example, it has a position against NATO's Gulf Partnership Initiative and Istanbul Cooperation Initiative (ICI), it opposes the transformation of the Gulf Cooperation Organization (GCC) into a Gulf Union (GU), and it is not a member of the Red Crescent. It could be claimed that the geopolitical position of Oman (it is located between Saudi Arabia and Iran) the influence of different cultures over the politics and the fact that Oman is a small state has been the main factor behind its staying outside all these organizations. However, it also cannot be denied that the choice of remaining outside OPEC has provided additional income to the country.

For almost 50 years, Sultan Qaboos has attempted to develop policies to encourage the development of economic activities outside the scope of the oil business. To that end, the Oman Investment and Export Promotion Center was established. Its purpose has been to create a basis for production and exportation. In this framework, steel, cement, ceramics, marbles, fiber optic, and electric cables, packaging materials, fertilizers, perfumes, and the fishery industry were selected as target sectors. The share of tourism among the promoted sectors was 8%. Even

though quite a large amount of money has been spent for this purpose up to now, the biggest problem faced by the Omani economy is the lack of diversification and dependence on oil income.

When the previous century is reviewed, there are mainly four sources of income for the people in Oman: Fishery, agriculture in a limited number of products, sea commerce/shipping, and frankincense. When the Sultan came to power, he introduced new laws, decrees, and incentives to support agriculture and the fishery sector. There were large-scale agricultural lands in Batinah and Dhofar, which had continuously been used for centuries. A wide variety of products are grown in large farms in areas surrounding Nizwa and Jebel-Akhdar.

Today Oman continues to produce certain agricultural products, such as bananas, coconuts, green lemons (lime), tomatoes, potatoes, onions, date palms, pomegranates, and roses, in large quantities. Similar to the tea terraces in the Black Sea Region, terraced rose gardens in Jebel-Akhdar, the second-highest mountain in the Arabian Peninsula, are natural areas worth viewing. In 2009, the government initiated the "Million Date Palm Project" in most of the country and started providing new subsidies. With oil prices rising as a result of the 2008 Global Economic Crisis and the 2011 Arab Spring, petrodollars flew to the country in such a great volume that had never been seen before. This money was spent to open new horizons in Oman, especially in agriculture. The government imported new modern machines and irrigation systems to increase farmers' productivity. Besides, funds were allocated, and arrangements were made for the protection and development of traditional conduits (Falaj system).

One of the most important services provided by Sultan Qaboos is the measures that he took to meet the water demand, which is the main problem of all countries in the region. The most important topographic advantage compared to other Gulf countries is the existence of the two highest mountains of the Arabian Peninsula in Oman. Because of the precipitation received there, rivers, though in limited numbers, are formed in this geography, and water resources became available. Since the soil does not absorb water, in the past the water used to flow into the sea. To prevent this situation, 43 reservoir dams with a total storage capacity of 93.5 million cubic meters (Oman Water Society, 2020), some of them under the ground and some on the surface have been built in the country over the past 50 years (DIAM, 2020). Surveys are still underway for the construction of dams in four different cities.

Also to the dams, the government has sought to create a source of drinking water by desalination, the world's most expensive water supply technique, to reduce dependence on scarce groundwater. All desalination plants are built by foreign investment companies and today they are still in operation. DIAM, the largest water producer, purchases the water produced by these facilities through the Oman Energy and Water Supply (OEWP)

and manages the supply, storage, and distribution of the water to the Oman population. After these measures, no shortage of drinking water has been experienced in Oman for the last 40 years. Ports are known as vessels or channels for the foreign trade of a country. This is true also for Oman, which has a strategic position over the Strait of Hormuz and is historically known as Sinbad's country. Ports have been of great importance for Oman with its rich maritime history. However, when the Sultan came to power, these ports were far from being modern and had a rather ineffectual situation.

The Omani Renaissance, which began in 1970, not only resurrected many old ports along 1,100 miles of coastline but also built new facilities and ports to maintain competitiveness in the modern global market. Port Sultan Qaboos is the lifeblood of the country's economy in the Muttrah region. It is believed that the government's decision to divert all commercial import and export operations to Sohar will also revive the historic role of this important port. It was possible to complete the construction of Sohar Port, which started in 1999, with an enormous cost of \$26 billion. The port handles more than one million tons of sea freight each week and about 3,500 ships per year (Sohar Port and Free Zone, 2020) Salalah, which is located at an equal distance between the Indian Peninsula and the Red Sea, also provides a strategic location to Oman as a global transfer point. In fact, there is a much more important project in Oman than these: building the largest port and "hub" of the Middle East.

The Duqm Port, which overlooks the Arabian Sea and the Indian Ocean beyond, located on the southeast coast of the Sultanate of Oman, has recently been completed as a port above world standards with its long dock walls and wide basin. The port was built by the Chinese Government using the build-operate-transfer model. Together with the \$18 billion that has been spent so far, the port is estimated to cost about \$40 billion with the completion of connecting routes and other details. China has recently begun opening the China-Pakistan Economic Corridor (CPEC) by land to expand into the Middle East. In addition, for the sea leg of this corridor, it is stated that Oman-Duqm link will be used. China's undertaking the construction of the port is often associated with this issue.

4. Education and Health: In the first years of Sultan Qaboos' rule, there were different political groups in the country. After strengthening the political stability, the Sultan made the political system more inclusive through legislative arrangements. He then turned his attention to raising the standard of living, and in that sense, he focused particularly on education and health. In fact, large-scale reforms in Omani society were developed "top-down" rather than bottom-up. Moreover, the first two "legs" of these reforms took place in the education and health sectors.

In 1970, there were only three primary schools in Oman with nine hundred students. The primary school

(Sayddiah school), which was opened in 1929, was open only to boys and was a state-funded institution. Later, two more schools were opened in Muttrah and Salalah. In addition, there were Qur'an courses in many neighborhoods. There were also some international schools in the capital, especially for the children of foreigners. In the first year of the Omani Renaissance, the government completed the construction of 16 schools where 7,000 students could study; and by 1972, this number had reached forty-five schools with 15,000 student enrollments (Nasser, 2019). During this period, many teachers were mostly brought from abroad. In the last 50 years, 471 private schools have been established in Oman, 40 of which are international schools (Oman Ministry of Education, 2020). Immigrants from various countries including Britain, America, India, Australia, and Pakistan have established educational institutions that cater to the different communities living in Oman. From the very first years, Sultan Qaboos also supported foreign language education. The presence of women in the education sector is particularly striking.

In 2018, female students accounted for most of the graduate-level students (with 68 percent), while their graduation rates exceeded those of men (Oman Ministry of Higher Education, 2020). Currently, there are 54 universities (and their equivalent) in Oman, both public and private. Meanwhile, considering that its population is 4.6 million including foreigners, it should be noted that this ratio has surpassed many Western countries. Of these, 19 are private colleges and 7 are private universities. In the country, full scholarships are offered to 7,000 promising young people both at home and abroad. Sultan Qaboos University consists of nine faculties, including Arts and Social Sciences, Education, Economics and Political Science, Nursing, Law, Medicine and Health Sciences, Physical Sciences, Agriculture and Marine Sciences, and Engineering. The university, which has approximately 17,000 students and 1,000 academicians from 113 different countries, ranks 379th (QS Ranking 2020) in the world (Tuzlukova, Inguva, Sancheti, 2019).

In 1970, nobody would be expecting that a 29-year-old young man, about whom no one knew, would lead such a transformation as the Sultan of Oman. Nevertheless, Sultan Qaboos transformed the country substantially by fulfilling more than he promised, particularly in the fields of health and education. When Sultan Qaboos ascended to the throne, health services in Oman were virtually nonexistent. Very limited levels and numbers of health services were provided primarily by the British and then largely by the American missionaries. One of the biggest obstacles to healthcare in Oman at the time was the lack of electricity. After the establishment of a large Power Plant in Riyam Bay in 1961 and the discovery of oil in commercial quantities in 1964, a new twenty-bed hospital was opened in the capital, built by the national oil company Petroleum Development Oman (PDO), but it was not open to the public, serving only the company's employees and their families (26) Again, in the pre-1970

period, the infant mortality rate was very high, and the average life expectancy was 49.6 years (UN, 2019)

Today, almost everything has changed in Oman. After major breakthroughs in healthcare, the average life expectancy in Oman has risen to 79.4 years in 2020. Oman today has a total of 66 full-fledged public and private hospitals, equipped with state-of-the-art medical technology. While nine of the public hospitals are directly managed by the Ministry of Health, five are owned by Sultan Qaboos University, and the others are operated by the Armed Forces, the Royal Oman Police and other government institutions (WHO, 2019). Today, the total number of health centers, outpatient clinics, small local hospitals, and pharmacies across the country exceeds 226,000 in total (WHO, 2019). The World Health Organization (WHO), which has provided technical support to Oman since 1974, recognized Oman as one of the top 8 countries in the world in 2000 for the modernization of healthcare systems. Again, in 2016, the WHO awarded a certificate of appreciation to Oman's Ministry of Health for the successful health policies of the government. In less than two generations, infant and child mortality rates have decreased significantly due to improvements in healthcare. In Oman, the infant mortality rate has decreased to one-tenth of the official level in two decades, and again the mortality rate under five years of age has decreased fourteen-fold. Today, health services in Oman are provided almost free of charge to all citizens. (WHO, 2019).

5. Judiciary and Law: In the 1970s, Oman did not have a state with a structure that had institutions. It was such a structure in which the law was not adapted to the modern state system. The cases were conducted in accordance with the principles of Islamic law in matters involving personal, civil, and criminal offenses. Sultan Qaboos, who spent 20 years of his rule on the economic development of the country, began to make reforms in the field of law starting from the 1990s. The transformation of state institutions into today's modern state and the establishment of ministries, government, and the legal system took place in the 1990s. Over time, Sultan Qaboos gradually transformed the entire legal system into an institutionalized one and, with a comprehensive codification in 1996, the current state of the judicial system in the country emerged. Today Omani law is mainly in the form of a mixture of Sharia law and Anglo-Saxon law.

The Ministry of Justice was created for the first time in 1994. Appointments to all judicial positions are made by the Sultan. Today, the main legal institutions are made up of the Law Courts and the Supreme Judicial Council, which supervises their functioning. The legislature consists of the 'Primary' law, called the 'Royal Decree', and the 'Secondary' law enacted by ministries per the legislation. Sharia courts hear personal cases and those related to family law, while Administrative Courts deal with public/institutional cases. In addition, the powers of, military courts, and the military commissions established for emergency cases are determined by the Constitution.

The Constitutional Court also has the power to make a ruling on the compatibility of the courts' rulings with the Constitution when necessary. "Commercial Courts" were established in 1997, including 6 main central Commercial Courts and 45 Regional ones. In 1999, the Courts of Appeal began to function. In short, looking at the legal and judicial system of Oman, it is possible to find a highly developed and modern system and institutionalization in Oman.

6. Renaissance in the System of State and Government:

From the moment Sultan Qaboos came to power in 1970, he aimed to establish a participatory system of governance, including all elements of Omani society, which had not been seen in the country until then. As early as the beginning of the 1970s, he formed the Council of Ministers, by appointing its members to equally reflect all regions of Oman, particularly its tribal, ethnic, and regional groups. This balanced political distribution was the first and most important political step for the new Sultan to be loved and respected throughout the country. A few years later, in 1981, he established the State Consultative Council [SCC] (Al-Majlis Al-Istishari lil-Dawla), one of the most important steps of democratization in politics. Three years later, in 1984, the Council held its first session with its 45 members. The Sultan was no longer taking decisions without exchanging ideas with the State Consultative Council, which was made up of experts in their field in the country.

In 1990, as the twentieth anniversary of his coming to power was celebrated, Sultan Qaboos announced that he would replace the State Consultative Council with the Consultative Council (Majlis Al-Shura) endowed with broader competencies. From a historical point of view, the establishment of this institution was a turning point in Oman's modern political history and was the first step in a political plan designed to transition to a parliamentary system of government and an electoral system. This was because, while the State Consultative Council came to the administration by appointment, the Consultative Council, which was established then, would come to power by-elections. Following these decisions and parliamentary developments, Oman began to draw attention as the most democratic state among all Gulf States and to be cited as an example of "political evolution" for the countries of the region. The reaction from the public was quite positive because the people wanted to participate in politics and administration as well. The sheiks (tribal leaders), the governors (the state's authorized representative in the city), village elders, women, and men were ready to elect the lower house, which would govern them. The Sultan would often appear among the people, listen to their problems, and talk to them.

The Basic Statute of the State, the cornerstone of Oman's legal system, though its name is different, is essentially the country's first written constitution and was first introduced to the public in 1995 on the twenty-fifth anniversary of Sultan Qaboos' accession to the throne.

This written constitution is a novelty that puts Oman ahead of other Gulf States. In fact, the political change and transformation in Oman brings the British revolution to mind rather than the French revolution. According to the newly adopted Constitution, the system of government of the Sultanate is permanent; his Majesty assumes a dual role as both the head of state and prime minister. The Sultan, who presides over a Council of Ministers that helps, advises, and enforces national policies, is also the Commander-in-chief of the Armed Forces and is tasked with enforcing national policies, promulgating laws, and appointing judges. The Sultan officially represents all three ministries: Ministry of Foreign Affairs, Ministry of Economy and Ministry of Defense.

Oman's Constitution offers more comprehensive human rights than any other Gulf country, including personal freedoms and civil rights. "It prohibits discrimination based on gender, origin, color, language, religion, sect, residence, or social status." It addresses the social duties governing the relationship between citizen and state and, more importantly, prioritizes the rule of law, including equality before the law, the principle of "presumption of innocence" and the right to legal representation. Although Islam is recognized as the state religion of Oman, it grants the believers of other religions the freedom to worship and perform their other religious duties. The main rule is based on respecting Omani traditions. In Oman, the foundation of the government is based on law, and, officially, the law/legal system can exercise its jurisdiction over everyone. With the last amendment to the Constitution made in 2011, today the Parliament of Oman is endowed with supervisory powers in the legislature and the executive. According to Article 58 of the Royal Decree (99/2011), the Parliament of Oman (officially called the Council of Oman) consists of the Council of State (Majlis-i Dawla-upper house) and the Consultative Council (Majlis al-Shura-lower house).

The Council of State (Majlis-i Dawla-upper house), consisting of 83 members, who are at least 40 years old, is an advisory body with financial and administrative independence. It contributes to the review of issues coming to parliament prepares work for the implementation of national development plans and helps to find appropriate solutions to issues raised in Parliament. Its members are appointed by the Sultan for 4 years. In these appointments, it is seen that the Sultan appoints the experts in their field almost every time. In short, "the job is always given to qualified people" in the Council of State. For example, if an expert is needed in Islamic banking or a person is needed for the Council of State to improve the country's economy, it has become customary for the Sultan to appoint a highly regarded expert in the country, the best professor in the field. In order to be officially elected to the Council of State, it is necessary to be in one of the following categories: former ministers, undersecretaries of a ministry or their counterparts, ex-ambassadors, ex-senior judges, retired senior officers, those who are known for their competence and experience in the field of science, art and culture,

professors of universities, colleges, higher institutes, spiritual leaders, business people, and people who have done great service to the nation.

The main duties of the Council of State can be summarized as follows: (MOFA, 1995) preparing drafts and proposing them to Parliament, directing them to the government for review, sending them back to Parliament after the draft is reviewed by the lower house, approving or amending the draft laws referred to by the lower house and sending them to the Sultan for approval, discussing the country's annual budget with the recommendations of the lower house and sending it back to the Council of Ministers, if necessary.

The members of the Consultative Council (Majlis al-Shura), which is the lower house of the parliament and which consists of 86 members take office with general elections held every 4 years. The Consultative Council is formed by representatives from 61 provinces in 11 regions in Oman, who take office by-election. If a province has a population of less than 30,000, a maximum of 1 representative can be elected to the Consultative Council and a maximum of 2 representatives can be elected if it has more population. Since there are no political parties in Oman, all candidates run as independent candidates. Thus, it is much easier to understand not only the political but also the socio-cultural tendencies of the people. For example, in the last election, a female candidate, who was not wearing the hijab, entered parliament for the first time, especially with the support of university women. In order to be a candidate for the Consultative Council, it is required to be at least 30 years old and have an associate degree from a 2-year college, and each candidate has the right to be re-elected without limitation.

The Consultative Council, the most important factor and institution that makes the Omani political system more democratic than any other Gulf country has been given extensive powers with the latest regulations in 2015. The most important of these are: to discuss and amend the draft laws prepared by the Council of Ministers and to present them to the Council of State, to discuss and advise on development plans and projects prepared by the Council of Ministers and on the annual budget of the state, and to present them to the Council of State, to express opinion on the government's draft laws and to evaluate the outcome of their findings, and to discuss the government's assessments and economic and social decisions. With the signature of at least 15 members of the Consultative Assembly, an investigation can be opened about any minister or a notice of parliamentary question may be given about his/her actions. It has the authority to report the results of the investigation directly to the Sultan. This authorization stands out as a rare one in the Gulf and even in many democratic government systems with parliamentary immunity. Ministers are obliged to submit an annual report to the Consultative Council during the implementation phase of the projects. The Consultative Council also has the right to call ministers and ask for clarification on this report.

The Council of Ministers is appointed by the Sultan from among those elected, and the Sultan sometimes presides over the sessions of the Council of Ministers, and when he is not present at the session, the Prime Minister is the president of the Council of Ministers. Decisions are taken by secret ballot and an absolute majority of votes. As mentioned earlier, the powers of the Parliament of Oman have been extended gradually by the Sultan since 1996. With the latest powers granted in 2011, the Omani Parliament has become the largest and most democratic Parliament in the Gulf, along with Kuwait. The elected Consultative Council has the right to bring every issue to the parliament and vote for a draft law. If the draft law passed by the Consultative Council is passed by the Council of State, which is the upper house, by most votes, it becomes a law with the approval of the Sultan. This mandate and legislative power in the Parliament make Oman stand out as the most democratic parliamentary and political system among the other states in the Arabian Peninsula.

With the Electoral Law enacted in 2003, all men and women over the age of 21 have been given the right to participate in all political processes of the state, including elections. In fact, women in Oman have not been given the right to vote and to be elected because of a feminist demand, as in Europe. As with many reforms in Oman, it is a reformist decision formed because of the consultations of Sultan Qaboos with the Consultative Council. In fact, considering what Sultan Qaboos has done over the last 30 years, it is worth noting that the Sultan has set an example to other Gulf countries in terms of defending women's rights and prioritizing their role in national development. Immediately after the "education for all" campaign that started in the 1990s,

Sultan Qaboos began appointing women to important government positions, then to embassies, the Council of State and finally to the Council of Ministers. In fact, the Permanent Representative of Oman to the United Nations, which had been one of the top embassy positions for many years, and the Director of the Diplomacy Institute, the top vocational training school in the Ministry of Foreign Affairs were women with Ph.D. degrees. It should be noted that the university graduation rate in Oman is as high as 85%, and 96 of the top 100 students graduated are female. While emphasizing the role of women in the development of the country is not easy in traditionalist structures, this has been achieved in recent decades in Oman, especially under the leadership of the Sultan. It is also a fact that in Oman, where 46% of the population is under the age of 19, the trends followed by youth is an issue that must be addressed both politically and socio-culturally.

CONCLUSION

Considering the last fifty years, Oman went through a important transformation, the whole country has been established starting nearly from zero and has been able to access modernity convenient to the requirements of the 21st century. Even though petro-dollars seem to be,

the most important reason explaining how the country reached out during this stage, in fact, the successful and reformist government of Sultan Qaboos was behind these reforms. After Sultan Qaboos came to power, the country entered a serious transformation process and reached its present developed status. In addition to this developed status, reforms made on political, cultural, and social rights also transformed the country seriously. The present Oman renaissance did not occur in a revolutionary manner as in France but evolutionarily like in Britain or the last periods of the Ottoman Empire. The most important role in this development has been played by the quality statesmen, the proceeds of multinational companies, and, of course, and the personal skills of Sultan Qaboos. Compared to other Gulf countries, the Omani government avoids waste and focuses only on the growth and infrastructural development of the country.

Holding the smallest economy in the Gulf after Bahrain, Oman settled the 2011 events by providing 50.000 new jobs to the public. Hence, it has been understood that the problem in Oman was not political but economic and today this problem has been resolved largely. Nowadays, Oman is placed at the 28th rank on the global level concerning its gross domestic product per capita amounting to 48,500 dollars and its nation lives in wealth and can allocate more time to individual activities outside working hours compared to developed Western societies. The fact that a country, that used to go into caves to cool off 50 years ago, reached this level of welfare today is considered a big success in every aspect and the Sultan Qaboos, who is the architect of this success, is commemorated with respect.

The new Sultan Haitham bin Tariq Al-Said came to power as a name that has been in politics for years and was behind the scenes in the Oman-2040 Vision, one of the most important projects of the country. With this aspect, Sultan Haitham can be evaluated as the name that knows the best for the country and that would shape the future vision most successfully. The most important challenge that Oman would face in the next decade is to be able to diversify its economy to prevent that it is influenced by sudden fluctuations in oil prices. Despite five-year plans, unfortunately, Oman has not been able to diversify its economy as required partly due to the climate, partly due to the carelessness of multinational companies, partly due to the red tape, and partly due to the multiple conditions required in the subsidies given to local companies. This would be the most important focal point of the new government in the coming term.

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A Study On Investor's Attitude and Perception in Hassan District Towards Mutual Funds as an Investment Option

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ABSTRACT

Among various financial instruments which are based on capital markets mutual funds have evolved as a predominant investment instruments from two decades in India .But being a poor financially literate country the general population of India's majorly the tier two cities towns and village level are still not able to perceive the basic ideology of mutual fund instrument where the concept was designed to mitigate market risk by a collective approach utilizing a professional service for fund management to achieve pre determined objective of capital appreciation. Now mutual fund domain has witnessed innovation in terms of funds as well as service areas in our country. So a research is designed to investigate the perception and the attitude of investors in Hassan city, this approach can reveal the ideas of people towards fund selection ,way of investment and also their risk appetite .This research tries to bring out facts which can be useful to fund houses to understand investors psychology in emerging areas.

KEY WORDS: MUTUAL FUNDS, PERCEPTION, ATTITUDE, HASSAN.

INTRODUCTION

India has witnessed a total collection of fixed deposits into various banks amounting to rupees 6 lakh crores as on august 2020 which means the people of India are still traditional investors who rely on traditional investment. Mutual fund as a concept was introduced in 1963 by the government through unit trust of India, later many other government bodies introduced their own funds namely state bank group, Punjab national bank group etc. The real phenomenal changes occurred with security exchange board and The Association of Mutual Funds in India which came into existence in 90's decade. With these watch dogs in place people slowly started believing

and took courage to investment into emerging products like shares, scripts and mutual funds, bonds mainly.

After early 2000 decade Indian MF sector has seen an operational increase of fund house coming into India to operate seeing the potential market lying which was untapped. Today India has 44 fund houses with 2500 mutual fund scheme operating in various segments of capital market to exchange trade funds. Recently many product innovations is witnessed like thematic funds, health care funds and speciality funds which are aligned according to risk interest of the potential investors. What is a mutual fund is a question rarely understood by the commons in India, to define its a collective investment tool designed to give opportunities to retail or individual investor to put his small savings to large investments into a fund which is managed by a professional fund manager with domain knowledge and expertise, all these are well defined and regulated by the specified government bodies with laws and regulations. The retail investors can invest with limited knowledge into funds with objective of dividend returns or capital appreciation in long term horizon to meet his life financial goals.

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The mutual fund is well integrated product managed by a fund house and the investment is given as units to the retail or institutional investors which are based on capital markets and also updated daily in terms of information sharing. The investments collected by fund houses are called assets under management which are deployed into various markets to generate returns. India as on September 2020 has 27,74,146 crores. The AUM of the Indian MF Industry has grown from 6.57 trillion as on September 30, 2010 to 26.86 trillion as on September 30, 2020 about 4 fold increases in a span of 10 years. India mutual fund investment according to the cities are categorized as two parts namely T15 which includes top 15 cities of India which nearly contribute around 65% of mutual business and the other is B15 means beyond 15 cities majorly the small cities ,towns, tier two cities come under this umbrella. Here it's witnessed the remaining contribution of 35% towards mutual fund folios. From this it's evident that there is wide dispersion of investment awareness and perception towards mutual fund concept in India.

Objectives of Research

- To study the investors' attitude towards Mutual Fund concept
- To study how investor perceive mutual fund as a investment option
- To analyze the investors economic and social profile and orientation towards Mutual Funds.
- To study any bias or misconception towards mutual fund concept.

Design of Research: This research is done on descriptive approach supporting the data collected where analytical approach is used to analyze factors effecting decision making, which is controlled by their perception and attitude towards mutual fund concept. For the study purpose Hassan city has been considered which comes under b15 category.

Data Collection Methodology: The data which is required for the study is obtained by a structured questionnaire which consists of total 21 questions based on demographic factors and investment oriented elements. Secondary data were assimilated through AMFI websites and economic forums and news papers articles dedicated towards mutual fund industry.

Sampling Plan

Target Population: Hassan
 Sampling Unit: Individual investors of Hassan city and District
 Method of sampling: convenient sampling and Random Sampling
 Sample size: 100

Inference Of Research Question –

When the sample population were asked about the various investment avenues which are easily available for investment. Mainly seven instruments were selected

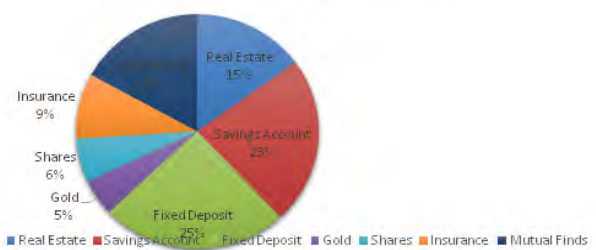
for the study based on market research. The population showed a strong inclination towards traditional products like fixed deposits, saving accounts where funds are kept for liquidity purpose. This question has proved banking products have more appeal and very popular among tier two cities. Real estate is also seen as invested but due to huge investment required initially its not a options for many, gold is seen as a investment by very less as it's just a ornamentally value and cultural boundary mask it as resell option when the prices fluctuate. Market based investment is the least where directly investment into shares as an investment is seen very less. Insurance which is also a savings tool is not so popular reveals the study as many does not like to invest into insurance due to varied reason like long term, less returns and many have not understood the concept of economic value of human life in terms of uncertainties. Lastly the mutual fund has evolved and slowly it has Opicked up the pace as many are showing inclination towards this concept as investment option to many.

what is the preferred investment segments do you prefer the most while investing your savings ?

Preferred segment of Investment

Real Estate	15%
Savings Account	23%
Fixed Deposit	25%
Gold	5%
Shares	6%
Insurance	9%
Mutual Finds	17%

Preferred Segment of Investment



Which criterion affects your choice of investment the most?

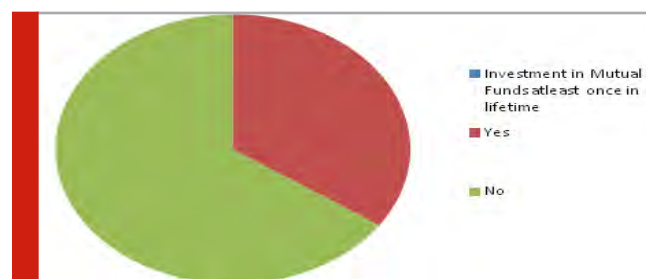
Criteria that affects the investment options

Risk	10
Return	35
Safety of principal	40
Liquidity of Investment	15



When the question of parking their funds which are earned hard way the sample population were asked which criteria they look and give the most important factor in considering an investment tool, the twin factor of safety of the amount invested as well as the return were considered as the most priority. Whereas liquidity and the risk also are considered while investments as future anticipation of uncertainties for health expenditure, planned life goals etc were opined out.

Have u invested into mutual fund at least once in life time?	
Investment in Mutual Funds atleast once in lifetime	
Yes	38
No	72



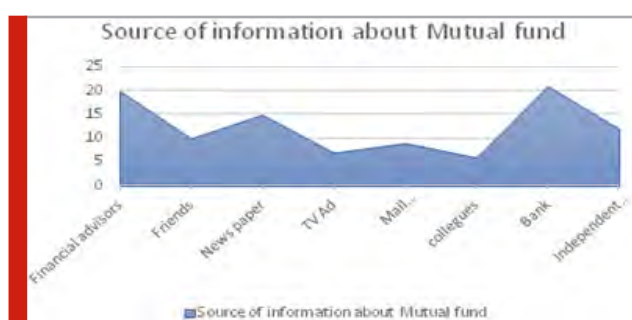
when the people were asked whether they have invested into mutual fund at least once in their life span as the idea behind the question the rationality was the mutual fund was in existence from almost three decades in India so people would had encountered this concept in one way or the other, the finding revealed that nearly 72 of the population have never invested into mutual fund concept ever.

Are you aware or heard of concept of mutual fund?	
Awareness about Mutual Fund concept	
Yes	60
No	40



when the target were asked in any way they have heard about the concept of mutual fund or are they aware about the mutual funds in India, the research revealed that nearly 60% of people had come across the word mutual funds and they were aware of the concept. Whereas the remaining population had not heard about the mutual funds at all.

How did you come to know about mutual funds concept?	
Source of information about Mutual fund	
Financial advisors	20
Friends	10
News paper	15
TV Ad	7
Mail Advertisement and social media	9
colleagues	6
Bank	21
Independent online research	12



When 60% of the population accepted that they are aware of mutual fund, the research tried to find out from which sources they are aware about this and which channel is giving a reach to people in making education towards investing into mutual funds. The most important channels were banks and independent financial advisor were spreading the concept following which news paper advisement also played a prominent role. Lastly people also search about the concept on their own to explore and understand .lastly friends and colleagues also play role in spreading awareness to see and consider mutual fund as an avenue to invest in era. Even social media and mail marketing has its own weight age as an awareness tool.

What are the reasons for not investing into mutual funds?

Reasons for not investing in Mutual Fund

Not aware	35%
Aware but no reasons	40%
aware but scared due to market dynamics	25%

Reasons for not investing in Mutual Fund



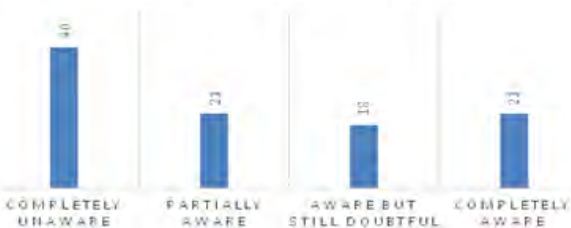
When population was asked the question about why they have not invested into mutual funds nearly 35% said there are totally unaware about the concept in any way nor they have a idea of it ,the second interesting fact is a segment of people are aware but for unknown reason they have not considered mutual fund as investment option at all among their portfolio, also one segment says that their aware but they are pessimist towards this as its linked with market in terms of investment and also returns based on market movements.

Are u aware that mutual fund is also investment option for investment?

Awareness about MF as an investment avenue

Completely unaware	40
partially aware	21
aware but still doubtful	18
completely aware	21

AWARENESS ABOUT MF AS AN INVESTMENT AVENUE



When the research tried to find out in which level can people be categorised in terms of awareness about mutual fund or if we want to where do people stand in awareness arena about mutual fund option nearly 40% are completely ignorant of concept, secondly nearly 21% are partially aware about the concept as in earlier

question its proved how various channels are playing a strong role in spreading awareness, there in one more very interesting segment which draws our attention that is people are aware but still doubtful on various elements involved in mutual fund in total. But nearly 21% of the population are completely understood the entire concept of mutual fund which is good sign of acceptance of this concept in a developing economy like India.

What the factors which have influenced you to invest into mutual fund as an investment?

Features of mutual funds that influences investment behaviour

moderate return with less risk	21
high return with high risk	23
diversification of funds	25
Tax savings	11
Long term savings tool	20

Features of mutual funds that influences investment behaviour

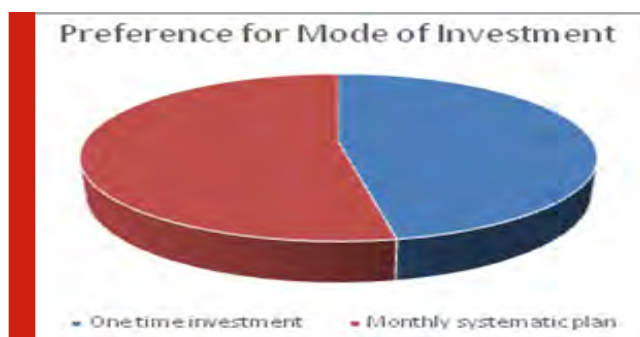


When asked the population what made them to invest into mutual fund the investigation revealed people feel when invested into balance fund it can generate moderate returns with less risk element, where as other segment felt investing into diversified equity and mid cap based fund and equity funds can generate higher returns with high risky if u have a risk appetite. whereas the how mutual fund works in terms of funds getting invested into various segments and also fund is not investing into a single equity component as all funds have a border horizon of investment as investment has a portfolios of debt ,bonds and equity holdings. The population also felt is can be invested for tax saving as few funds as generating tax savings under section 80 c as equity linked savings schemes are eligible for tax saving and recognised by government. Few people are also revealed the mutual fund can become a long term investment for investment to achieve life milestones in pre designated time like children education, retirement planning etc.

What is your convenient mode to invest into mutual funds?

Preference for Mode of Investment

One time investment	47
Monthly systematic plan	53

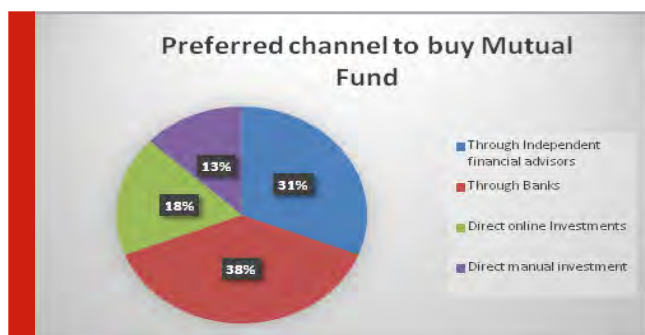


The investor population when asked how do they prefer to invest into mutual's funds which mode is convenient to them to invest without hurting their financial planning majority of them revealed systematic investment plan is preferred. As it gives the option to invest a specified amount on regular time like monthly on a specified date. Here a small amount can be invested regularly monthly to build a big corpus spread over a long period of time. The other population group revealed that they prefer to invest lump sum amount as and when they have a cash flow which can be invested into new fund offer or going on funds based on fund growth.

There are various channels to invest into mutual funds, among these which channel do you feel comfortable to transact with and get services?

Preferred channel to buy Mutual Fund

Through Independent financial advisors	31
Through Banks	38
Direct online Investments	18
Direct manual investment	13



When the population was asked about the various channels which do sales and also service management of mutual fund investors, many of them preferred the banking channels as an easy way to transact and also get serviced because as banks are all ready into financial service and would have handled the clients portfolios earlier with history of relationship. Secondly people also prefer personal attention through independent financial advisor who give a personal touch to service required. The emerging channel such as online investment where the investors are searching about mutual funds on their own and also invest through the fund house website

directly is also seen as a strong emerging channel. But there are very few people who go in search of mutual fund office in their respective places and invest voluntarily are very scarce.

Are you satisfied with the concept of mutual funds in terms of their fund performance and also the services given by the fund houses towards investors?

Overall satisfaction as a mutual fund investor

Satisfied	74
Not satisfied	26



When the people who have invested into mutual funds and have stayed invested were asked about the question on how was the fund performance of the funds selected by them for investment or been advised to invest it generated a very positive response as nearly 74% of the people told they are overall satisfied with the fund performance and also the various services given by the companies like investors knowledge enhancements, investors communications, fund switches, additional investment such as top ups and also the redemption services given are good and are meeting the expectations of the investors. A small group were not satisfied with mutual funds due to bad selection of mutual fund schemes and also they complained of changing regulation which makes investment into mutual fund a more tedious task.

Findings of the Research

- During the research it was found that evidently the mutual fund concept is not new to people but still in spite of so many fund houses and schemes launched still the awareness is very low which is an opportunity way ahead for growth of sector.
- People thinking is still aligned to traditional approach towards investment
- People can open to concepts and risk to return concept also has a weightage in gauging investment options.
- People with small income also have invested through systematic investment plan which is good way to accelerate the attitude of savings among economic population.
- People have not invested into mutual funds due to unknown reasons which is consumers black box which has to be tapped to make the concept a

knowledge version for its penetration among the ignorance segment.

- Online mode of investment where the client studies and chooses plans suitable for his needs are emerging on a positive note.

Suggestions

- Mutual fund companies have to open small branches of their own in tier 2 cities and town level, where the reach can be done through investor education programmes. In the village level the gram panchayat meetings can be made knowledge sharing and discussion forum to spread the concept as during the study it was mainly concluded that lack of awareness and also aware but not completely was found this requires a knowledge approach to spread the concept and tap the rural masses who can be benefited by this investment options.
- As banks are seen as a strong financial service provider by the population more emphasis with bank ties and distribution of mutual funds through banks can do a drastic change in tier 2 cities and village level, as people's confidence with banks can be capitalized to approach and educate.
- Even post offices can be seen a future service and sales point in the most remote areas to reach the population as postal departments already have savings schemes and postal insurance can be utilized and product bundling can be made to spread the concept.
- Online investors awareness has to conducted as to tap the educated and young earning population who can be educated at a young age and be given opportunity to invest for long time and reap the benefits of mutual fund schemes in order to achieve the financial milestones in a planned phases.
- People have also revealed a strong likely towards government owned mutual fund schemes during the study which indicate that government's banks and financial institutions have ample opportunities to venture into mutual fund business and build on peoples trust in turn contribute to the circular flow of economic cycle.

CONCLUSION

The study as revealed that mutual fund concept is still in a nascent stage of its growth cycle as people are unaware of these and mainly in tier -2 cities there is ignorance at large, also people are half educated about the concept. It's the failure of mutual fund companies on these fronts of not exploring these areas .Few people have shown a keen interest in concept which clearly concludes that still people have to educated, marketing or sales concept cannot be applied to this financial instruments as it's a knowledge game .people to have understand then invest because it's a long term engagement between the clients and fund houses. Banks can be a major game changer if they venture into mutual fund business and penetrated properly to the rural markets where the next investment play ground can be set to make a fair play of investment acquisition and giving back a fair returns to the population can create a balanced economy to drive India towards developed nation's league.

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Optimization, Production, Purification and Characterization of Anti-Cancer Enzyme L-Asparaginase From Marine *Sarocladium kiliense*

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ABSTRACT

L-Asparaginase is an anti-cancer enzyme used in the treatment of acute lymphoblastic leukemia(ALL). Most of the ALL cases occur in children at the age of 0-14 years. L-Asparaginase is responsible for the hydrolysis of L-Asparagine into L-Asparatic acid and ammonia. Present work discusses about the Optimization, production, purification and characterization of L-Asparaginase enzyme from marine *Sarocladium* species. The L-Asparaginase obtained by several purification steps like crude enzyme, ammonium sulphate precipitation, dialysis and fast protein liquid chromatography (FPLC). The enzyme was characterized by effect of different temperatures, PH, substrate concentrations, metal ions, inhibitors, stability of purified enzyme in human serum, SDS-PAGE analysis and enzyme kinetics.

KEY WORDS: L-ASPARAGINASE, PRODUCTION, PURIFICATION, SAROCLADIUM SPECIES AND CHARACTERIZATION.

INTRODUCTION

The effects of fastidious environmental conditions on marine and terrestrial micro flora differ from each other. The marine microorganisms should be able to stay alive and cultivate in water environment with low nutrition, high salinity and high stress in the sea (Sahu et al., 2007). Marine microorganisms are taxonomically varied genetically single and largely unknown (Manivasagan et al., 2013). A large variety of diseases and medical problems perform a challenging risk to human. Cancer is the king of maladies and most severe challenge encounter by biomedical scientists. The treatments and therapies are varying with different types of cancers. But, the cancer biologists constantly upgrade the anti tumor compounds for therapy (Sivagurunathan et al., 2012). Various

biological resources like plants and microbes having anti cancer property. It can be assured that a focused approach and combined attempts would definitely accelerate the development of new antitumor drugs to be exposed with improved efficiency (Bhatnagar et al., 2010).

In recent years enzymes gain a better importance in clinical research. L-Asparaginase is one of them which is broadly distributed in environment (Pieters et al., 2011). The L-asparaginase enzyme (L-asparagine amidohydrolase, E.C.3.5.1.1) is an amidase group enzyme, used for the conversion of L-asparagine to L-aspartic acid and ammonia (Alizera et al., 2011). The bacterial L-asparaginase treatment of leukemia, causes allergic reactions (Shah et al., 2010). Therefore, the innovation of a new L- asparaginase immunologically dissimilar from that of bacteria has been greatly desired. It has been examined that eukaryotic microorganisms like yeast and filamentous fungi (Nagarethinam et al., 2012).

Purification of the enzyme is an significant step for categorization of physical and biological properties. For its effective therapeutic use of any substrate; it must be free of any contaminants and impurities. The purification strategy mainly involved in cost and yield of a product is

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influenced by a number of sequential steps (Tundisi et al., 2017). Purification processing of biomolecules obtain from fermentation broths is common in biotechnology. Chromatographic techniques are widely used as high performance purification steps in biology. Each enzyme requires specific strategy for the purification of individual enzyme (Balasubramanian et al., 2012).

Determination of physicochemical properties of purified enzyme is essential to access the potential of the L-Asparaginase to be used as a therapeutic drug. It is deliberated by pH, temperature and constancy of enzyme in human serum, effect of metal ions, substrate concentration and molecular weight determination (Kumar et al., 2011). The above characteristics are useful in analyzing optimal conditions for the maximum enzyme activity in purified enzyme. However, due to continuous and complete research, compare to land-based natural compounds, water-based natural compounds have become a more promising source, not only for industrial and commercial applications, but also a pharmacological view (Venkata Siva Lakshmi et al., 2015).

MATERIAL AND METHODS

Source: Two marine deep water samples from a depth of 10cm were collected at Shangamugam and Backwaters of Veli Beach in Kerala state, with a view to isolate effective L-Asparaginase producing microorganisms, as these areas have not been explored formerly in this direction.

Microbial inoculum preparation for optimization: The two microbial strains isolated BKJM1 and BKJM2, were used for optimization studies further. The isolates were maintained on Glycerol Asparagine agar slants at 4-8 °C and sub-cultured once in a month. Spore suspension using 5ml sterile water containing 0.1% triton X was prepared from slant with spores. The count of spores was adjusted to 5×10^6 spores/ml by dilution. Ten percentage of spore suspension was added in Erlenmeyer's flask containing Glycerol Asparagine broth. The flasks were kept on rotary shaker and agitated at 150 rpm for 72 h. at 28°C. After incubation, the cell mass was divided by centrifuging at 1500 rpm for 15 min and washed twofold with sterilized water and suspended in 10 ml of water.

Influence of carbon source: In order to choose the most appropriate carbon substrate for maximum yield of enzyme activity, experiments were conducted with different carbon sources. Effect of five different carbon sources on L-Asparaginase activity was assayed at room temperature after 72 hrs with two monosaccharides glucose and fructose and three disaccharides maltose, lactose and sucrose at 0.1% concentration respectively. Tubes without any carbon source serve as control (Barnes et al., 1977).

Role of nitrogen source on asparaginase activity: The ability of the isolate to use different nitrogen sources was studied. Each nitrogen source is incorporated into the medium at 0.1% level. The conical flasks were inoculated and incubated at 37°C. Results were recorded after 3

days. The growth on each source was compared with that on the un-supplemented basal medium. The significance of three natural nitrogen sources yeast extract, beef extract and peptone and inorganic nitrogen ammonium sulphate was evaluated on asparaginase activity at room temperature with optimized carbon source and control was maintained without any supplementation (Gunasekharan et al., 1995).

Impact of incubation period on asparaginase activity: Glycerol asparagine agar medium is supplemented with suitable carbon and nitrogen co substrates and incubated under different time intervals 24-120 hrs. Without any carbon and nitrogen sources serve as a control in this study. OD values were taken for the enzyme activity every 24 hrs time interval at 450 nm to determine its effect on enzyme activity (Prakasam et al., 2007).

Effect of sodium chloride tolerance on L-asparaginase enzyme production: The ability of certain types of microorganisms to tolerate and to adapt to high concentrations of sodium chloride is well known. This adaptability is particularly marked in organisms found in marine water and salt lake mud. For the determination of sodium chloride tolerance, glycerol asparagine agar medium was supplemented with graded amounts of sodium chloride (1, 4, 7, 10 and 13%). The above medium was inoculated with suspension of the organism. After incubation for 24 h, the maximum salt concentration supporting growth was recorded (Pridham et al., 1956).

Effect of temperature on L-asparaginase enzyme production: The effect of temperature on L-asparaginase production was studied by cultivating the BKJM2 at different temperatures ranging from 20, 30, 37, 40, 50 and 60°C and incubated for 72 hrs (Frank et al., 1997).

Effect of pH on L-asparaginase enzyme production: The effect of pH on L-asparaginase production was studied by cultivating the BKJM2 at different pH ranging from 4, 5, 6, 7, 8 and 9 and all the contents were incubated at 37°C for 72 hrs (Manna et al., 1995).

Production profile of L-Asparaginase by submerged fermentation: After achieving optimized conditions of nutritional parameters and physico chemical characters, enzyme production was carried out in submerged fermentation mode. Submerged fermentation was carried out with the active isolates using 250 ml Erlenmeyer flasks. One hundred ml of glycerol asparagine agar medium was inoculated with 1 ml of three day old culture suspension in each flask. Inoculated flasks were incubated at 30°C for 5 days on rotary shaker incubator with 250rpm speed. After incubation, fermentation broth was centrifuged at 10,000 rpm for 20 mins. Supernatant obtained was used as crude enzyme preparation. Samples were withdrawn periodically every day for determination of L-asparaginase activity (Maladkar et al., 1993). Enzyme activity was denoted as Units/ml. One unit of L-asparaginase activity is defined as the amount of enzyme required to produce one micromole per min under the conditions of the assay.

Purification of L-Asparaginase

1. Ammonium sulphate precipitation: Crude extract filtrate was precipitated by adding ammonium sulfate with constant stirring until 80% saturation and incubated overnight at 4 °C to assure that the precipitation had come to completion. The precipitate was separated by centrifugation at 8000rpm for 30 min at 4 °C. The protein precipitate was resuspended in 50mM Tris-HCl buffer (pH 8.5) and dialyzed against same buffer (Rowly and Wriston, 1951).

2. Purification by Sephadex G-75 column chromatography:

The chromatographic purification steps were performed in a fast protein liquid chromatography (GE Healthcare, Uppsala, Sweden) with a flow rate of 1 ml/min, temperature of 20 °C and volume fraction of 0.5 ml. The elution of protein was estimated by measuring the absorbance at 280 nm. The dialyzed enzyme was filtered through a 0.45 µm membrane filter (Millipore, Billerica, MA, USA) and loaded on to a Sephadex G-75 1 ml column (GE Healthcare, Uppsala, Sweden) that was pre-equilibrated with 10 mmol/L Tris-HCl (pH 7.0). The bound enzyme was eluted with the KCl gradient 1.0 mol/L, in the same buffer. Fractions containing L-asparaginase activity were pooled, dialyzed against distilled water and concentrated by lyophilisation (Ohnuma et al., 1967).

3. Estimation of protein: Protein was estimated by Lowry method (Lowry et al., 1951). The protein reacts with the Folin Ciocalteu reagent to give a colored complex. The color formed is due to the reaction of alkaline copper with protein as in the Biuret reaction and the reduction of the phosphomolybdate by tyrosine and tryptophan present in the protein. The intensity of the color depends on the amount of these aromatic amino acids and thus varies with different proteins.

Characterization of purified L-Asparaginase enzyme activity: The purified L-asparaginase was used for characterization and evaluation of antitumour activity of the enzyme. The characterization is organized for the activity of enzyme in different pH and temperature, substrate concentration, metal ions, inhibitors, surfactants, stability of enzyme in human serum, molecular weight determination and determination of enzyme kinetics followed by evaluation of antitumor activity of the enzyme.

1. Effect of temperature on enzyme activity: The effect of temperature on the activity of L-asparaginase was determined according to the method of Frank et al, (1977). In order to determine the effect of temperature on purified L-asparaginase, the enzyme activity was studied at different temperatures ranging from 20°C to 60°C, the enzyme activity was determined under standard assay conditions.

2. Effect of pH on enzyme activity: To determine the effect of pH on purified L-asparaginase, 0.1 ml of the enzyme solution was mixed with 50 mM Tris-HCL buffer of different pH from 4 to 9. The optimum pH for

L-asparaginase activity studied by the method of Imada et al., (1973).

3 Effect of substrate concentration on enzyme activity:

To assess the activity of L-Asparaginase, different substrate concentrations ranging from 0.1mM - 0.6 mM were selected. The substrate was prepared in 50 mM Tris-HCL buffer at pH 8.4. The enzyme (0.1ml) was mixed with substrate and incubated for 10 min at room temperature and enzyme activity was determined (Distasio et al., 1976).

4 Stability of purified enzyme in human serum:

For determination of stability of purified L-asparaginase, the human blood was collected and allowed to clot for 2 hrs at room temperature. The blood was centrifuged at 10,000 rpm for 10 mins and then serum was collected, incubated at 50°C for 10 mins to get inactive serum. Enzyme solution (0.1 ml) was added to 0.1ml of inactive human serum. This mixture was incubated at 37°C from 24-96 hrs (Dange and Peshwe, 2006).

5 Determination of molecular weight of the purified enzyme:

Molecular weight of purified L-asparaginase enzyme was determined by SDS-PAGE analysis (Laemmli, 1970). Protein samples (prepared in Laemmli buffer followed by boiling at 95°C for 5 minutes) were separated on 12% mini SDS-PAGE gels (Mini-protein II dual slab Cell, bio-rad).

6. Effect of various metal ions, surfactants and inhibitors:

Purified enzyme has been pre incubated with different metal ions like Hg^{2+} , Fe^{2+} , Mg^{2+} and Ca^{2+} at 5mM concentration (Manna et al, 1995). Surfactants such as SDS, Tween 80 were applied at a concentration of 1mM (Janaina et al., 2006). Whereas inhibitors namely EDTA and 2-Mercaptoethanol at 0.1mM (Moorthy et al, 2010) respectively. Enzyme activity has been estimated. Activity of the enzyme without any addition serves as control.

7. Determination of enzyme kinetics:

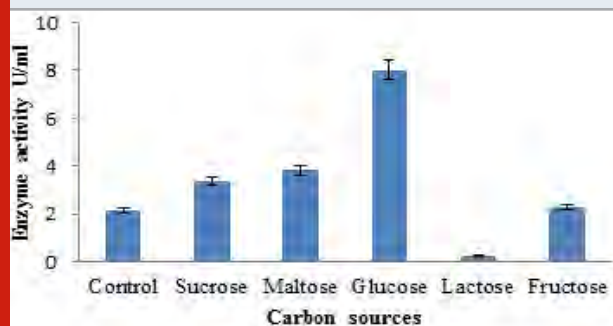
The kinetic parameters K_m and V_{max} of purified enzyme was calculated by the method of Lineweaver and Burk plot method with different concentrations (0.1-0.6mM) of the substrate, L-asparagine dissolved in 50mM tris HCL buffer (pH 8.0). Enzyme activity has been assayed by measuring hydrolysis of substrate under standard assay conditions (Lineweaver and Burk, 1934).

RESULTS

Various stages of optimization for L-Asparaginase production

Effect of carbon sources: Among the five different carbon sources (Sucrose, maltose, glucose, lactose and fructose) tested. Highest L-Asparaginase activity (8.04 U/ml) is produced by BKJM2 in the medium containing glucose as the carbon source and lowest enzyme activity (0.24 U/ml) was reported in the medium containing lactose as carbon source. The values are represented in fig 16.

Figure 1: L-Asparaginase activity in different carbon sources



Values are expressed in the mean \pm SD of three independent readings which differ significantly at $p \leq 0.05$.

Effect of nitrogen sources: Impact of different nitrogen sources (yeast extract, beef extract, peptone and ammonium sulphate) provided maximum L-Asparaginase activity of 5.03 U/ml produced by BKJM2 in the medium containing peptone as the nitrogen source and least enzyme activity (1.32 U/ml) was noticed in yeast extract as the nitrogen source, almost equal to that of control fig 17.

Figure 2: L-Asparaginase activity in different nitrogen sources

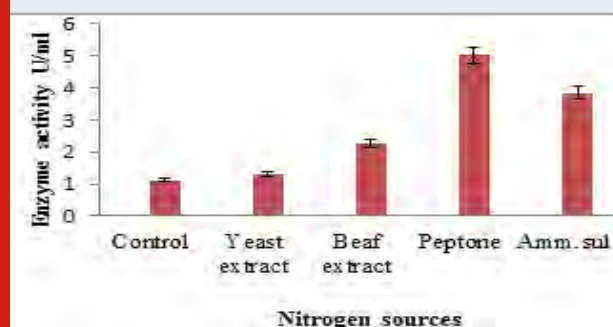
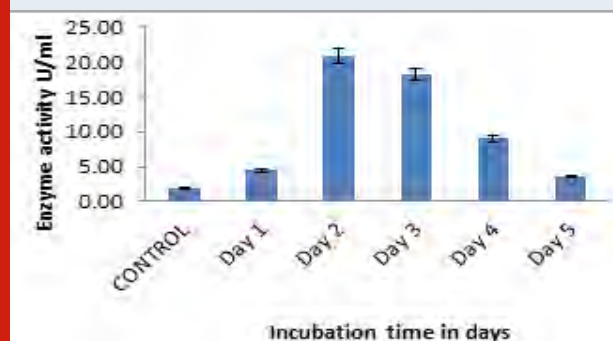


Figure 3: Effect of incubation time on enzyme production



Values are expressed in the mean \pm SD of three independent readings which differ significantly at $p \leq 0.05$.

Effect of incubation time on enzyme production:

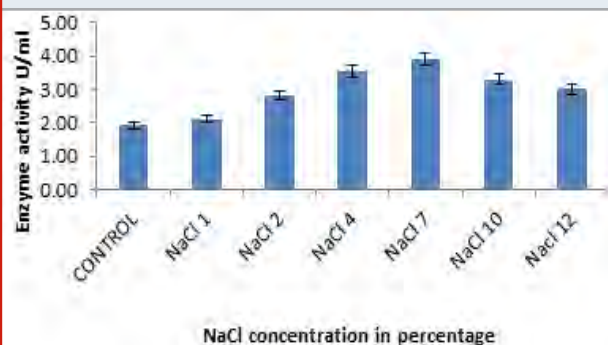
Influence of incubation time (1-5 days) on enzyme activity was tested. The highest activity (20.80 U/ml) is observed at 2nd day of incubation and the enzyme activity was declined to 3.60 U/ml at fifth day of incubation. Values are notified in fig 18.

Values are expressed in the mean \pm SD of three independent readings which are different significantly at $p \leq 0.05$.

Effect of NaCl concentration on enzyme production:

Effect of different NaCl concentrations (1%, 2%, 4%, 7%, 10% and 12%) on enzyme activity was tested. The increased activity (3.90 U/ml) was observed at 7% concentration of NaCl (Fig 19).

Figure 4: Effect of NaCl concentration on enzyme production

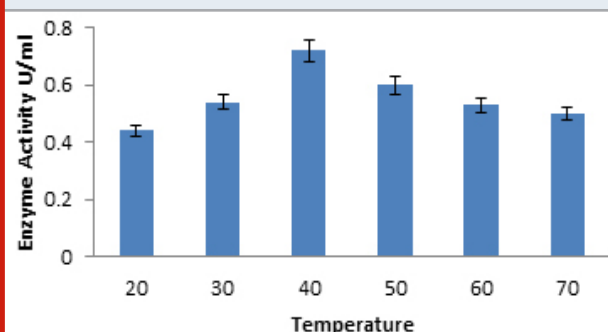


Values are expressed in the mean \pm SD of three independent readings which are different significantly at $p \leq 0.05$.

Effect of temperature on L-asparaginase production:

Influence of temperature ranging from 20 to 70°C was studied on enzyme activity of BKJM2. The highest activity (0.73 U/ml) is observed at 40°C of incubation temperature and the enzyme activity was declined with increasing temperature ranges (Fig 20).

Figure 5: Effect of temperature on L-asparaginase production



Values are expressed in the mean \pm SD of three independent readings which are different significantly at $p \leq 0.05$.

Effect of pH on L-asparaginase production: Impact of pH was determined at a range of 4 to 9. The highest activity (0.38U/ml) is observed at the neutral pH 7 (Fig 21). Increasing trend was noticed from acidic pH 4 to the neutral range 7. Enzyme activity was declined (0.07 U/ml) as the pH is increased from 7 to 9.

Figure 6: Effect of pH on L-asparaginase production

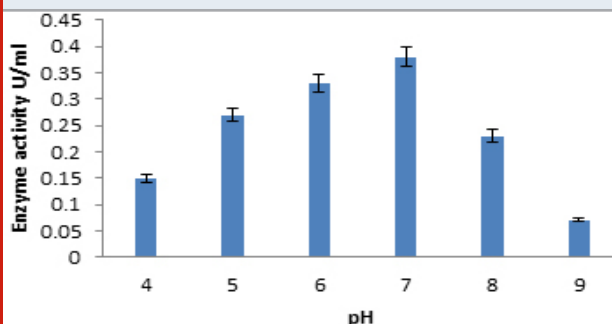


Table 1. Summary of optimal conditions for enzyme production

S.No	Sarocladium kiliense	Enzyme activity U/ml
1	Carbon sources	8.02 in glucose
2	Nitrogen sources	5.03 in peptone
3	Incubation time	20.80 in 48 hrs

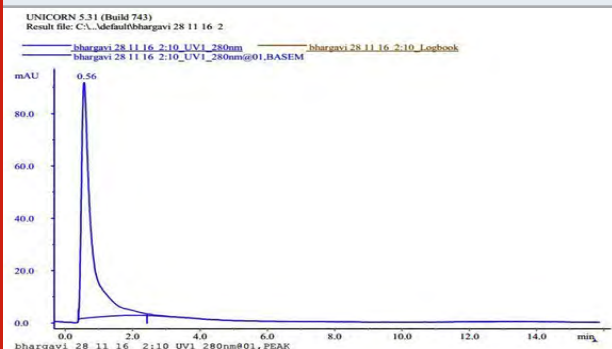
Values are expressed in the mean \pm SD of three independent readings which are different significantly at $p \leq 0.05$.

6 L-Asparaginase activity in submerged fermentation (smf): Optimization of nutritional conditions like carbon, nitrogen sources and incubation time is done in submerged fermentation for L-Asparaginase enzyme activity (20.80 U/ml). The enzyme activity was illustrated in table 13, for BKJM2.

Table 2. Purification profile of L-Asparaginase enzyme produced by BKJM2

Sample	Enzyme activity (U/ml) Mean \pm SD	Protein (mg/ml) Mean \pm SD	Specific activity (U/mg) Mean \pm SD	Purification fold Mean \pm SD	% of yield Mean \pm SD
Crude	366 \pm 2	0.507 \pm 0.006	791.8 \pm 1.80	1 \pm 0	100 \pm 0
Ammonium sulfate	356.3 \pm 1.52	0.42 \pm 0.002	845.3 \pm 1.52	1.15 \pm 0.01	95 \pm 1
Dialysed	291.1 \pm 1.89	0.31 \pm 0.001	503.1 \pm 1.85	0.07 \pm 0.01	78.8 \pm 0.77
Sephadex G-75	93.7 \pm 0.25	0.183 \pm 0.003	919 \pm 2	1.24 \pm 0.03	24.8 \pm 0.73

Figure 7: FPLC analysis of L-Asparaginase enzyme



No	Ret min	Area mAU*min	Height mAU
1	0.56	31.1446	90.598

Total number of detected peaks = 158
 Total area = 32.0620 mAU*min
 Area in evaluated peaks = 31.1446 mAU*min
 Ratio peak area / total area = 0.971386
 Total peak width = 2.04 min
 Calculated from : bhargavi 28 11 16 2:10_UV1_280nm
 Baseline : bhargavi 28 11 16 2:10_UV1_280nm@01, BASEM
 Peak rejection on:
 Maximum number of peaks: 20

Purification of L-asparaginase enzyme: The purification of L-Asparaginase was carried out in three steps at 4°C. In purification process the crude extract was affected

by ammonium sulfate precipitation (80%) followed by dialysis. Further the dialysed sample was applied to gel filtration chromatography. The chromatography column was packed with Sephadex G-75 which is connected to fast protein liquid chromatography (FPLC) apparatus and fractions were collected at flow rate of 1ml/min. The chromatogram of L-Asparaginase was shown in Fig 1. At 0.56 mins retention time, highest peak area and protein concentration (0.18 mg/ml) was observed. Formation of single peak in the chromatogram indicate purity of the sample achieved by FPLC. The purification profile of the L-Asparaginase enzyme was tabulated in Table 1.

Characterization of purified L-Asparaginase enzyme

Effect of temperature on enzyme activity: Effect of different temperature ranging from 200C to 60°C was tested on the L-Asparaginase enzyme activity. As per the results shown in fig 2, a bell shaped curve was obtained. The maximum enzyme activity (0.73 U/ml) was noticed at 37°C. The activity decreased dramatically when the temperature is above 40°C.

Effect of pH on enzyme activity: The influence of pH ranging from 4 to 9 was studied on enzyme activity and the results were incorporated in fig 3. The highest enzyme activity (0.39U/ml) was observed at pH 7 and

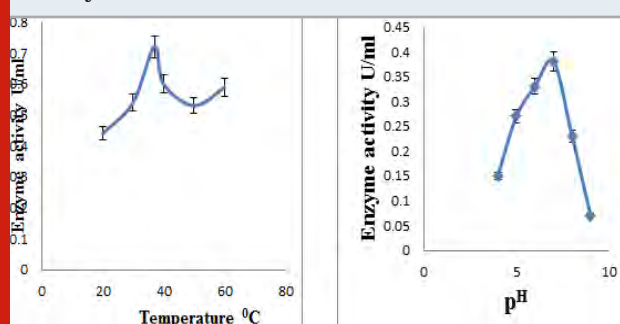
then enzyme activity was decreased to pH 9. As per the above results the enzyme is active at neutral pH.

Effect of different substrate concentrations on enzyme activity: The impact of substrate concentration from 0.1 mM to 0.6 mM on enzyme activity was illustrated in fig 4. The enzyme shows profound activity 1.39 U/ml at a substrate concentration of 0.2mM. The enzyme exhibited a typical bell shaped profile covering a broad temperature range. Enzyme activity is 0.99 U/ml at a substrate concentration of 0.3 mM and dramatically decreased to 0.72 U/ml in presence of 0.4 mM substrate concentration and then increased to 1.29 U/ml at 0.5 mM.

Effect of different metal ions, inhibitors and surfactants: Various metal ions, inhibitors and surfactants are used for the determination of L-Asparaginase enzyme activity produced by *Sarocladium kiliense*. The highest enzyme activity (2.34 U/ml) was noted with Fe²⁺ ions and Mg²⁺ ions show reduced activity. (0.20 U/ml). The inhibitor EDTA displayed 0.24 U/ml and surfactants SDS, Tween-80 reveal 0.42 U/ml and 0.24 U/ml of enzyme activity (Fig. 5).

Stability of purified L-Asparaginase enzyme in human serum: The enzyme was incubated in human serum at 24 hrs to 96 hrs. The enzyme is relatively stable in this physiological fluid. Maximum activity (0.28 U/ml) was reported at 48 hrs of incubation. The results were incorporated in fig 6. This also indicates that the components of human serum are not much inhibitory towards the enzyme because the enzyme retained its activity even after 96 hrs of incubation.

Figure 8&9: Effect of temperature & pH on L-Asparaginase activity



Molecular identification of purified L-Asparaginase enzyme by SDS-PAGE: The active fractions having maximum L-Asparaginase enzyme activity collected from gel filtration chromatography was analyzed through SDS-PAGE analysis. As shown in fig 7 a single band of purified L-asparaginase that coincides with 66KDa in the protein marker was observed.

Kinetic studies of L-Asparaginase enzyme: The K_m and V_{max} of L-Asparaginase enzyme purified from *Sarocladium kiliense* were determined by using various concentration of L-asparagine. The values of K_m and V_{max} were 0.025 mM and 0.30 $\mu\text{mol/ml/min}$ respectively,

which is lower than the K_m value (0.0598mM) of L-asparaginase purified from *Streptomyces radiopugnans* MS1. The purified L-asparaginase exhibits stronger affinity towards its natural substrate L-asparagine, a positive property to be useful towards the treatment of tumors. The K_m and V_{max} values of BKJM2 was represented in fig 8.

Figure 10 & 11: Effect of substrate concentration & metal ions on L-Asparaginase activity

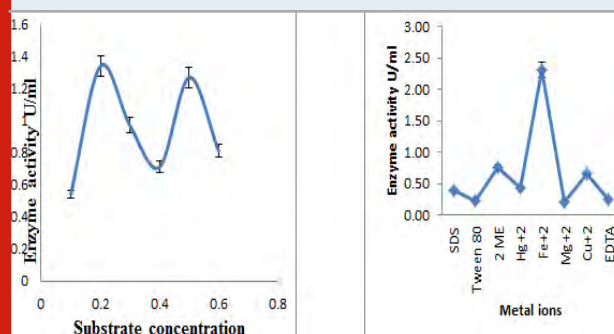
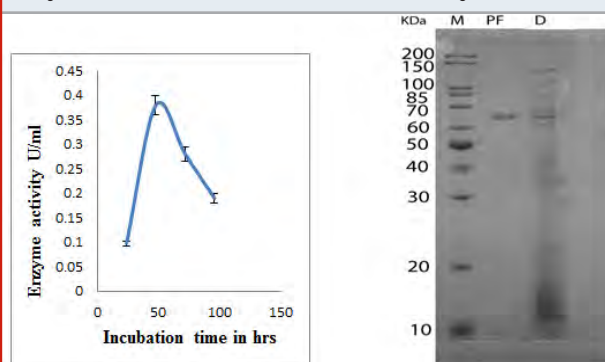


Figure 12 & 13: Effect of incubation time on L-Asparaginase activity & Molecular identification of L-Asparaginase enzyme (M= Marker, PF= Purified, D= Dialysed)



DISCUSSION

In addition to the soil environment L-Asparaginase production is also observed in many of the marine microorganisms (Sindhwad and Desai, 2015). Marine microorganisms are more advantageous as they have more anti-cancer activity through several mechanisms with fewer side effects to human (Lindequist, 2016). The marine environment is very rich source of potent drugs having broad spectrum anti-tumor property against solid tumors such as Sarcomas and breast cancer (Se-Kwon Kim, 2014). Moreover the saline nature at sea water is chemically closer to human blood plasma. This contributes to the selective toxicity effect. When BKJM2 was grown on 3 different medias such as starch casein agar, glucose asparagine agar and glycerol asparagine agar maximum growth was observed in glycerol asparagine agar medium. Hence fermentative studies were carried out only with glycerol asparagines agar medium. In order to obtain significant yield of enzyme,

optimization of carbon, nitrogen, incubation time, NaCl concentration, temperature & pH was performed.

Figure 14: Kinetic studies of L-Asparaginase

From the above graph $K_m/V_{max} = 0.0795$

$$Y = 0.0795x + 3.3038 \quad K_m = (V_{max}) (K_m/V_{max})$$

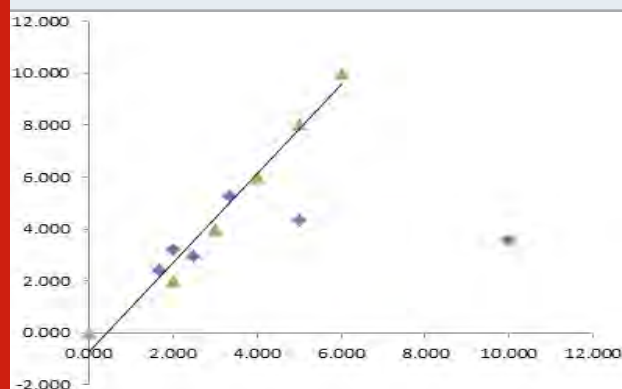
In Y-intercept, 3.3038 is equal to $1/V_{max}$ $K_m = (0.302681) (0.0795)$

Therefore

$$V_{max} = 1/3.3038$$

$$K_m = 0.025 \text{ mM}$$

$$V_{max} = 0.302681 \text{ } \mu\text{mol/ml/min}$$



Different carbon sources such as sucrose, maltose, glucose, lactose and fructose were amended to the fermentation medium and results were noted. Glucose monosaccharide showed highest enzyme activity 8.04 U/ml followed by maltose 3.84 U/ml and sucrose 3.36 U/ml. Coinciding with present research findings Mohamad Maharoop Raja et al., (2016), obtained profound increase in enzyme activity 1.58 U/mg in the medium containing glucose as the carbon source in *Micromonospora*. Similar results were also noticed by Farag et al., (2015) with *Aspergillus terreus*. Influence of 3 organic nitrogen sources such as yeast extract, peptone and beef extract as well as one inorganic nitrogen source ammonium sulfate on L-Asparaginase enzyme activity was evaluated and the experimental values were represented. The prominent increase in enzyme activity (5.04 U/ml) in glycerol asparagines agar medium incorporated with 0.1% peptone was notified. In accordance with our experimental results highest yield of L-Asparaginase activity 1.76 U/ml is found in the medium containing peptone as nitrogen source at a concentration of 0.2% by actinomycetes member *Streptomyces ginsengisoli* (Neelima et al., 2014).

Effect of NaCl concentration on L-asparaginase production was also studied by different researchers. The production was inversely related with increasing concentration of NaCl and found to be maximum (19.85 IU/ml) at 0.5% concentration in marine *Bacillus* sps (Pallavi and Amrutha, 2015). In the present study, 7% of NaCl concentration exhibited more enzymatic activity with 3.90 U/ml was observed in BKJM2. The effect of temperature and pH on enzyme production is one of the most important parameter. With the increase in temperature the enzyme production was decreased. In

the present study the BKJM2 shows 0.73 U/ml of enzyme activity in between 30°C–40°C. In contrast to this Wakil et al., (2015), reported 3.3 U/ml of enzyme activity at 45°C in *Bacillus circulans*. pH also showed marked variation on asparaginase enzyme production. In the present study pH 7 influenced the highest production of asparaginase. Kavitha and Vijayalakshmi tested different ranges from 2 to 10 for the fermentative production of L-asparaginase from *Streptomyces tendae*. They also reported that pH 7 is the optimum for L-asparaginase production.

Incubation period is one of the most critical parameter in solid state and submerged fermentation. With the increase in incubation period enzyme activity was also enhanced up to 3 days of incubation, due to the availability of substrate. The crude enzyme was analyzed for its activity by submerged fermentation using marine fungi BKJM2. Modified glycerol asparagines agar medium is chosen as the production medium. About 20.62 U/ml of enzyme activity has been obtained. Similarly Kavitha and Vijaya lakshmi (2010), used modified ISP-5 broth medium for submerged production of L-Asparaginase. About 4.27 U/mg of cell dry weight has been produced with strain *Streptomyces collinus*. The partial purification of L-Asparaginase crude preparation was affected by ammonium sulfate and showed that most of enzyme activity was preserved in the precipitate. The crude enzyme sample is subjected to purification by 80% ammonium sulfate fractionation. This first step of purification lowered the enzyme activity (368–356 U/ml).

Similarly the protein concentration is declined from 0.5 to 0.4 mg/ml. With reference to the specific activity increment was observed. The activity has been enhanced from the initial value 721–847 U/mg. The purification fold is raised 1.17 in the first purification step. Coinciding with first two values, % of yield has been declined to 96%. The temperature optimum of L-Asparaginase from *Aspergillus terreus* KLS2 has shown accelerated enzyme activity at same temperature of 37°C. The enzyme is active at a wide range of temperature from 30–75°C. Influence of pH on L-Asparaginase activity was assessed at different pH ranging from 4–9 and enzyme activity (0.38 U/ml) is more prominent at neutral pH 7.

From the graphical representation L-Asparaginase showed the maximum value (0.99 U/ml) at 0.03 M concentration. The activity slowly declined from 0.3–0.6. Related to this Kamala kumari, (2013) denoted that the enzyme activity was enhanced to the maximum extent (5.96 U/ml) till 0.07 M substrate concentration in *Streptomyces* isolated from sea sediments of Tamilnadu. Among the four metal ions tested iron has maximum effect on the enzyme activity 2.34 U/ml, Mg+2 had minimum influence on L-Asparaginase followed by Hg+2 and Cu+2. With regard to the different inhibitors employed, 2-mepcapto ethanol possesses comparatively more activity (0.78 U/ml) than that of EDTA (0.24 U/ml). The two surfactants namely SDS and Tween-80 also affected the enzyme activity. The enzyme activity was

0.42, 0.24 in the two surfactants tested. Similar data was obtained by Kaliwal and Hosamani (2011).

Furthermore the stability of purified enzyme on human serum was evaluated at different time intervals. The enzyme activity is expressed in U/ml. The enzyme activity is least (0.0098 U/ml) at 24hrs of incubation and reached to the highest level 0.39 U/ml at 48hrs. Many of the experimental reports indicate molecular weight of L-Asparaginase from 32-150 KDa Archana Rani and Raja Rao (2015) using 12% resolving gel and 4% stacking gel. In the present report SDS-PAGE analysis of purified L-Asparaginase enzyme found the molecular weight to be 66 KDa from marine filamentous fungi. It was found that the purified L-Asparaginase is highly specific for L-Asparagine and the K_m values (0.025 mM) of BKJM2 is lower than K_m value of recombinant E-Coli L-Asparaginase which shows 5.54×10^{-3} by the method of Lineweaver Burk plot. The low K_m value for the L-Asparaginase isolated in the present study was important in therapeutic rezime (Anil kumar and Savitha, 2015). Because of its low K_m value, L-Asparagine has been reported to dose fewer problems during the course of anti tumor therapy.

CONCLUSION

L-asparaginase from microbial source is of great interest owing to its significance in pharmaceutical and food industries. Therefore, in the present study, Further confirmation of L-Asparaginase activity was accomplished by Imada et al assay method. The yield was 14.62 U/ml in *Lactobacillus salivarius* and 18.9 U/ml in *Sarocladium kiliense*. The potent isolates were subjected to optimization studies by submerged fermentation. Optimization of production parameters such as carbon, nitrogen, incubation period, NaCl concentration, temperature and pH was performed. Glycerol asparagine agar medium is found favorable for optimum enzyme activity. Hence remaining fermentation parameters were conducted using the same media. As per the experimental data 3.76 fold enhancement of enzyme yield was found with glucose as the carbon source compare to control. The optimized nitrogen sources (0.1%) were peptone with an activity of 5.03 U/ml which is approximately five times higher than that of control. Maximum increase in the enzyme activity is seen on second day of incubation period. The activity was exaggerated several times higher in comparison with control. Overall the enzyme activity for BKJM1 is 14.62U/ml at the end of submerged fermentation.

Approximatly 33 fold improvement in the activity was noticed in sun flower oil cake than without any substrate in solid state fermentation. An attempt is made to purify L-asparaginase from *Sarocladium* spices and its physical and chemical characteristics were studied. For purification of L-Asparaginase, ammonium sulfate fractionation was found to be highly effective rather than other precipitation agents. Gel filtration chromatography using Sephadex G-75 column further purified L-Asparaginase. Finally overall recovery of 25.4% of yield, 1.27 fold of

purification and a homogeneous form of L-Asparaginase with specific activity of 990 U/mg was achieved. Studies on physical conditions, which influence the performance of purified L-Asparaginase revealed that the purified L-Asparaginase was active over a broad range of pH (6-8) and temperature (30-400C). The enzyme is stable at neutral pH. The maximum L-Asparaginase activity was obtained at pH 7, temperature 370C and is quit specific for its natural substrate L-Asparagine.

The apparent K_m value for L-Asparaginase was 0.025 mM. Protein profiling by SDS PAGE confirmed the molecular weight of L-Asparaginase to be 66 KDa. Studies on effect of different metal ions, inhibitors and surfactants on the performance of purified L-Asparaginase revealed that several metal ions are detrimental to the enzymatic activity except Fe^{2+} and Cu^{2+} . The enzyme is sensitive to the surfactants (Tween-80) and inhibitor (EDTA). The enzyme showed stability in human serum to the maximum of 48 hrs incubation. At 0.3 mM substrate concentration the enzyme activity was increased followed by a declining trend.

Conflict of Interest: Conflict of Interest declared none.

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The Live Weir Innovation at Chi River Watershed, Chaiphum Province, Thailand

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ABSTRACT

The drought crisis and a long period of low rain affect many areas of Thailand. Chaiphum Province is another area that has been widely affected. The provincial governor has declared the drought areas in 16 districts, resulting in efficient water management and integration in many sectors, especially the educational institutions that must be the source of academy, research and innovations in solving problems for local communities. The university has responded to the royal policy consistent with the strategy in local development by using knowledge and innovation to be partnership for developing the local. Therefore, this research aimed to construct the live weirs from the community participation in the watershed areas, and to establish the awareness in conservation of natural resources and the rules of the live weirs for the community. This research was the participatory action research. The results found that the live weirs help to strengthen economy, society and environment of the community. The results showed that in terms of the economy, it supports the implementation of the sufficiency economy philosophy together with organizing the activities for living, creating careers and generating income for the households. As for the society, it encourages people to love, have unity and participate in public activities; and creates awareness in the rehabilitation of natural resources and environment. In terms of the environment, it has also been rehabilitated. The live weirs help slow the water flowing. So, water is absorbed and replenished at the watershed. This helps balance the ecosystem and restore biodiversity to the environment. As for other aspects, the university is recognized by communities and organizations from academic services and local development. This creates a good image of Rajabhat University which is in accordance with the intention of the University of local development

KEY WORDS: INNOVATION, LIVE WEIR, WATERSHED

INTRODUCTION

The global climate change crisis has affected the quality of life and the well-being of the world population. The water crisis is the risk that the world has to face in the 21st century. Also, 80% of the world population is at

risk of water security, including flooding and severe drought crisis (International Educational, Scientific and Cultural Organization: searched online on January 18, 2020). For Thailand, there was severe drought crisis in 2019. The government announced the drought crisis areas in 20 provinces (Daily News Newspaper, January 18, 2020). Regarding the topography of Chaiphum Province, it consists of forests and mountains up to 50% of the provincial area. So, it is an important source of watersheds in the northeastern region, such as the Chi River, the Chuen River, the Phrom River, the Lam Sa Phong River, the Lam Patao River and many other streams. However, from the analysis of spatial demand, it has been found that the demand of water resources is the first priority since most people are engaged in agriculture such as planting rice, cassava, sugarcane,

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corn, large chili, vegetables and fruits. The demand of water for agriculture and consumption is approximately 1,400 million cubic meters.

But, the water storage capacity of the major dams and reservoirs such as Chulabhorn Dam, Lampa Town Dam and Huai Kum Reservoir is only 340 million cubic meters, and 310 million cubic meters are from natural water resources. So, there is a lack of 750 million cubic meters of water for living and occupations (Chaiyaphum Provincial Office, 2018). Due to the drought and a long period of low rain, there is severe shortage of water for consumption and occupations in Chaiyaphum Province. There is also the shortage of raw water for tap water production in many areas. In addition, the surface water sources become dry and cannot be used as a source of water for people's consumption. For these reasons, the related agencies have alleviated the suffering of people by distributing water for consumption. The government has also allocated the budget to help those affected by the drought (Chaiyaphum Province, 2020). The provincial governor of Chaiyaphum Province has declared 16 districts as the drought disaster areas (National News Bureau of Thailand, retrieved from <http://thainews.prd.go.th> on August 7, 2019).

The management or stabilization of the water system, including supply of drinking water, management of rain-fed agricultural areas, management of water resources in the rain-fed agricultural areas, conservation of watersheds, flood prevention, solving waste water problems and development of small water resources projects and solar water pumping projects must cover all dimensions: economic, social and environmental dimensions (Office of the National Water Resources, 2020). Since Chaiyaphum Province is the source of the Chi River and the Chuen River that flow through many provinces in the northeast. The stabilization of water security must cover all systems, including the rehabilitation of watersheds, increasing of watershed areas and establishment of cooperation among all sectors in constructing the water management system. Chaiyaphum Province has recovered 3,100 rai of the watershed areas from the intruders (Tat Ton National Park, 2019). For the conservation and restoration of the watershed areas, it has been collaborated with all sectors to increase the forest area by reforestation in 1,700 rai and building 113 live weirs on Lo-yai Forest, which is the area of the Chi River watershed and its branches (Chaiyaphum Provincial Office, 2020).

According to the situations mentioned above, Chaiyaphum Rajabhat University has operated under the strategy of Rajabhat University on local development and academic services for local communities in order to develop Area Based Community Collaboration Chaiyaphum Model in 6 areas, consisting of education, occupation, society, culture, health and environment. There were 4 target areas in 2019 fiscal year, namely Mueang District, Khon Sawan District, Khon San District and Phakdi Chumphon District. Building a live weir is an activity that supports the development in many aspects, including

environmental, economic, social and cultural aspects because the construction process helps to drive the participation of the people in sharing ideas, planning and having cooperation. Also, once the process is complete, the people in the area have water for consumption and agriculture. There is stability. The society is pleasant and the environment is beautiful in accordance with the goals of the city of happiness. In addition, it is also a place for students in various fields to learn and practice in the creation of live weirs and understand the process of working with other people and have experiences from the living classroom in the local community.

Research Objectives: To construct the live weirs from the community participation in the watershed areas, and to establish the awareness in conservation of natural resources and the rules of the live weirs for the community

RESEARCH METHODOLOGY

Constructing a live weir is to integrate knowledge and innovation with local wisdom to solve the water shortage problem in the dry season and help slow down the water flowing during the rainy season. It is the restoration of the ecology and environment of forests and rivers in the community. People in the community must have knowledge and understanding of natural resources for sustainability. The operation is divided into 6 stages.

1. Creating knowledge and understanding: At this stage, the community members have to acknowledge the problems together in order to find out the solutions and raise awareness in participating in the operation. The experts or "the teachers of weir construction" help raise awareness in the community.
2. Survey of areas and material preparation: It is the survey and the selection of the areas suitable for building weirs in the river. The community, the leaders, the teachers of weir construction and Rajabhat University prepare and provide sufficient materials in the area for construction.
3. Operational planning: It is a systematic working process preparing people and labor to work appropriately.
4. Operating procedure: It is the stage of mobilizing all sectors to participate in the construction.
5. Creating community rules or weir maintenance regulations: In order for the community to own and use the weirs sustainably, the regulations must be established with the consultants from Rajabhat University and the teachers of weir construction.
6. Selecting the committee: In this stage, the representatives from the community in the form of a committee are needed for coordinating with relevant agencies.

The research results

The Feature of Live weir

1.The live weir concept: A live weir is another innovation that arises from the thinking process and local wisdom, leading to the construction of the weir to slow down the

water by raising the water level to a certain level and allowing it to flow through the weir crest or penetrating through to the bottom at all times. This principle will cause circulation and fill the air for the river, so the water flows like living water. The water in the live weir is not rotten like that of in the concrete weir or general weir. In addition, aquatic animals can pass through the water. This results in open ecological restoration caused by the flow of water that sweeps various nutrients and debris onto the front of the weir and the surrounding area. For these reasons, there is an abundance of living things, such as shrimp, shellfish, crabs, fish and various aquatic plants. It is also the natural breeding area of plants and animals. It is the replenishment of the ecosystem that has returned to balance with a variety of lives, including people's lives, animals' lives and various plants that support the river ecosystem back to the stream of life. It is the true natural river with the wisdom and philosophy of life.

The development projects that do not study the true impacts and concern about ecosystem, especially the water source ecosystem, inevitably have long-term disadvantages that are difficult to fix. Sometimes, the development projects starting by using money or budget do not cause sustainability. Instead, they cause weaknesses and destroy the confidence that is the traditional wisdom until the environment and the way of life of many people are affected. For example, the river dredging project is like speeding up the flow rate of water until the upstream or the upstream forest cannot absorb water or the ability to absorb water from the source is reduced, so, the water is rapidly runoff and there is flooding in the rainy season because the delay system is destroyed. It also results in drought and dryness in various rivers during the dry season. This problem is seriously increasing day by day. Some of these phenomena are due to the lack of understanding in the ecosystem and the environment.

Constructing a live weir is, therefore, the way of water management that uses the wisdom by slowing down the flow of water so that water can be contained throughout the year. Constructing a live weir is obtained from a simple idea that is to use mechanisms to delay the flow of water by using materials from the local area and nature to create a stream that does not dry out and constantly replenish water. For this reason, it causes fertility and restoration of the environment and the climate conducive to the living things to return to balance and biodiversity. The most important thing in constructing a live weir is having the knowledge about nature. That is, understanding soil, water and forest, as well as various organisms in nature that systematically sustain or are related to each other is needed.

Or, simply speaking, it is "understanding of the nature and sympathizing with the ecosystem". Foreign materials such as cement, steel and nails are not used for construction, but natural materials such as bamboo, sand and rope are used instead. This is the main part for

building a live weir. Another important part is the spirit of the villagers or the community that must be given to the live weir construction. It is the attachment to the weir. They have to work together in constructing the weir. They also have to realize the benefits from the weir and understand the purposes of the construction and the goals that they have to live life with the weir until the support system with endless reliance is created.

2. the live weir components: consist of (1) the body of the weir will block the water and allow the water to flow through it at the same time. (In the area with great flood, the body of the weir should be longer than the width). (2) the ecological stairs at the front and the back of the weir will help the fish and aquatic animals to travel across and can reduce the impact of water on the weir. (3) the elephant ears (the boards cut to a right angle to fit into corners) help to hold and strengthen the weir and the planting of banyan or local trees so that the banyan roots can replace the bamboos on the elephant ears and help better hold the weir structure. And (4) the triangular parts prevent water shock and support the elephant ears and ecological stairs.

3. the live weir materials: the purpose of building a live weir to encourage the participation of the people in the community who realize the problems and the benefits together. Therefore, in providing the materials for construction, there is a request on the cooperation to support the materials in the area, including bamboos, fertilizer sacks for filling sand and ropes. It focuses on the minimum use of foreign materials. The materials for building a live weir are as follows. (1) Sand: calculated from width x length x height. (2) Sack: based on the sand ratio: the sack = 1: 40. (3) Nylon rope number 5: calculated from the length of the weir x 10 (kilograms). (4) Straw rope: based on the ratio of straw: sack (1: 20 pieces). And (5) Bamboo: based on the size of the body of the weir (not including other components). For example, if the body of the weir is 3 x 1.5 x 2.9 meters, 250 - 300 bamboos are needed. If the body of the weir is 3.3 x 3.6 x 4.8 meters, 350 - 400 bamboos are required.

The live weir impacts: For the live weir construction under the local development strategies by implementing the royal policy into practice, Chaiyaphum Rajabhat University followed up and evaluated the results after the completion of the construction. The interviews with people in 5 villages having the live weir construction were administered. The details are presented as following:

1. Economy: the community economy is supported according to the sufficiency economy philosophy. Farmers can produce food and it is the source of the family income since there is enough water for doing agriculture, planning crops and raising animals and fisheries.

- Paddy field, corn, vegetables and fruits.
- Raising poultry and cattle.
- Tilapia culture in floating cages.

2. Society: the community members love each other and have unity, and careers. They accept social rules more, realize the common good, have awareness in preserving natural resources and create collaboration tradition and culture in the community.

- Maintaining the weir together.
- Allocating water use according to the community rules.
- Using mutual sustenance from the river under the community rules.
- Weir-merit making tradition.

3. Environment: the river is fertile. The community ecosystem is maintained. The upstream forests have been absorbed. The watersheds are abundant. The soil has better water holding capacity. There is biodiversity along the river which is the source of food for people.

- Fish and natural aquatic animals.
- Vegetables along the waterfront.
- Forest, trees and shades along the waterfront become the habitats and breeding areas of aquatic animals.

4.Others: Chaoyaphum Rajabhat University has been accepted by the community, resulting in being the academic resource. It also leads to the creation of the academic cooperation network. It is the training area for students, which can respond to the national development strategy and the strategy of Chaoyaphum Province for being the city of happiness.

Picture 1: Workshop on knowledge transfer, preparation of living weir construction, creating understanding and participation of people in the community and organizing the community forum for construction the living weir for people in the community.



CONCLUSION AND DISCUSSION

The live weir construction project of Chaoyaphum Rajabhat University under the local development strategy is an integrated activity from many sectors. The government, the private sector and the public sector have brainstormed for knowledge and local wisdom to create the community innovation in solving problems in accordance with the sufficiency economy philosophy and consistent with the provincial development strategy and the mission of Chaoyaphum Rajabhat University, especially Area Based Community Collaboration Chaoyaphum Model (ABC-6D), which can improve the

quality of life of people in terms of economy, society and environment leading to sustainability.

It is also a model for natural resource management through the participation process of every sector. Consistent with the research of Pamornrat Sutum (2019) the study is a qualitative research consisting of in- depth-interview, focus group discussion and in-field workshop about the Nam Rad Forest - Ma Loh Canal located at Baan Tamniab and Yan Yao sub - districts. Term of “Nam Rad” means water spreading throughout the head watershed forest, so it named “Nam Rad Forest” after the physical appearance of the highland forest surrounded by massive mountains with abundant tropical rainforests absorbing water which resulted in enough natural water flowing throughout the year.

Picture 2: The living weir construction activity by the community participation, the village headmen, the government organizations, Sub-district Administrative Organization and Chaoyaphum Rajabhat University.



The water was the surface water spreading around the forest area as the source of many watersheds including Ma Loh Canal that has nourished the two sub - districts. The head watershed forest - Ma Loh Canal had changed dramatically from 50 years ago; then the ecosystem abounded with plant varieties, animal species and

medicinal plants. The Ma Loh Canal was the clean water source for communities' consumption and farming. Currently, the head watershed forest - Ma Loh Canal is encroached and destroyed. Forest area and biodiversity are decreased; MaLoh Canal's water condition is dirty, turbid and shallow and is used for refuse and waste disposal. Water ecosystem balance is disturbed; the number of plant varieties and aquatic animals reduced and some species have become extinct. Communities recognized the value of Nam Rad Forest - Ma Loh Canals they relied on for living in the past. Currently, both physical environment and biodiversity have been changed and affected people in communities' way of life.

Picture 2: Workshop on knowledge transfer, the preparation of the living weir maintenance regulations and creating understanding and participation of people in the community.



Communities have defined the future as “beautiful canal, clear water and abundant forest”, designed a management instruction by emphasizing creating conscious mind for conservation and restoration and obtained resources co-management of communities in practices defining the network and establishing rules of resources utilization for sustainability. As the same way of research results of Rattana Krainara (2019) found that the lessons learned of this study from the water management by Life dam at Ban Na Not Village, Kampang Sao Sub-district, Muang District, Nakhon Si Thammarat Province aimed to investigate the community context leading to water management by Life dam and to visualize the knowledge of water management by Life dam based on geography, nature, and community culture. The research collected data by participant observation, in-depth interviews, and focus group sessions.

The research findings revealed that the villagers at Ban Na Not Village changed from the subsistence production to commercial production affecting agricultural water management. Furthermore, the government water management could not reach the community. As a result, the community sought the self-reliant water management by studying the problems, solving them, until becoming Life dam. Life dam was the creation of new knowledge based on local wisdom. In the application of Life dam under the context of different ecological communities,

the community needed to study water system, water map, community water course, and community resources. Through self-reliance, Life dam was valuable and instrumental in environment and community dimensions as well as the negotiation tool with the government.

This research constructs the weirs that improve the absorption efficiency of watersheds and the good ecosystem restoring abundance to nature, the nearby communities have water for living and farmers have sufficient water sources for agriculture. The recovery and conservation of water and forest resources are operated systematically under the community rules or the weir maintenance regulations. It also is able to create love, unity and participation in activities to make strong society and culture which was source of learning and practice for students to expose real experiences. Live weir construction activity is beneficial to the community. It allows the community to have water for consumption, especially for agriculture. So, the economy of the community is strengthened. Therefore, Chaiyaphum Rajabhat University should continue and expand this activity to other areas by creating cooperation with the province, and the agencies in the areas in an integration form in order to cover in all areas. This will be directly and indirectly beneficial to the local community sustainably.

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Cr(VI) Removal from Industrial Wastewater using Immobilized Algae

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ABSTRACT

Industrial effluent with heavy metals is a threat to the species in the aquatic environment. It will be the boon if the effluent are free from heavy metals before discharged to these environment. Removal of these heavy metals would make the aquatic world free of pollution. The present research work describes the absorption of heavy metals Cr (VI) from industrial wastewater by immobilization of *Spirulina platensis* in sodium alginate beads. Biosorption is the phenomenon followed in this work for removal of heavy metals. The effects of pH, adsorbent dose, initial concentration and bead depth on the adsorption of chromium by the biomass were studied. The optimum removal percentage of Cr (VI) was observed at pH 2 for with algae and pH 6 for without algae. For optimum conditions the removal efficiency of synthetic chromium was observed to be 78% and 95% with and without algae respectively. Removal efficiency of 82% was found for industrial effluent of triton valves using algae as biosorbent. Hence for the removal of chromium wastewater *Spirulina platensis* proved to be an efficient biosorbent.

KEY WORDS: WASTEWATER, BIOSORPTION, CHROMIUM, SPIRULINA PLATENSI, BEADS.

INTRODUCTION

Environmental pollution is a very serious threat in the current circumstances. Appreciable amounts of both inorganic and organic chemicals and its byproducts are present in industrial effluents (Werle 2014 & Sharmila A 2020). Major source for heavy metal pollutions are rapid industrialization and urbanization (Prathap Kumar 2009). Industries like electroplating, tanning etc., are major source of effluents with metals which accumulate in aquatic animals and ecosystem through food chain causing health hazards (Hazrat Ali 2014). Accumulation of heavy metals in plants and soils is due to persistent

of heavy metals in nature (Raja Rajeswari T. et al.,) Chromium rank among the priority metals because of high degree of toxicity which affects public health significantly Paul B and Sonia Aslam 2017). Highly toxic carcinogen is chromium.

In humans effects like DNA mutations, nausea, nasal and skin irritation, lung carcinoma are observed. In the environment, chromium persist in two oxidation states: Cr(III) and Cr(VI). Trivalent chromium is less toxic than hexavalent Chromium. The hexavalent chromium comes under the group "A" which is having carcinogen and mutagenic properties. To meet the National Regulatory standards chromium must be removed before discharging the effluent to natural water bodies which helps in minimizing health hazard. To remove heavy metals many conventional methods are employed. Adsorption is most preferred and widely used method because of its cost, simple design and operation and insensitivity to toxic substances. For heavy metal removal biological remediation processes are very effective method. One best sustainable treatment for the treatment of industrial

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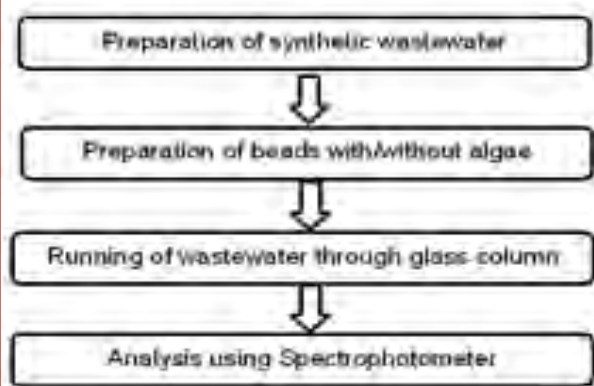
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wastewater would be use of algae. Hence an attempt has been made to study the efficiency of algae in the removal of chromium.

MATERIALS AND METHODS

The algae species *Spirulina platensis* of Domain -Bacteria, Phylum- Cyanobacteria and Genus- *Spirulina* was culture in the laboratory.

Figure 1: Flow chart of methodology



2.1 Preparation of synthetic wastewater: Preparation of Stock Chromium solution includes dissolving 2.484 g of potassium di chromate ($K_2Cr_2O_7$) in 1L of distilled water. Take 10mL of stock chromium solution and make it up to 1000mL to make it as standard chromium solution. Di phenyl carbozide solution is prepared by taking 1g of Di phenyl carbozide in 200mL of distilled water. 1:1 sulphuric acid is prepared by adding 100 mL of sulphuric acid in 100 mL distilled water.

2.2 Preparation of beads with and without algae: Beads are prepared by using sodium alginate powder. 3g of Sodium alginate powder is weighed and dissolved in 100 mL of distilled water and it is stirred thoroughly for uniform mixing of alginate with distilled water. Alginate solution is kept in refrigerator for about 30 minutes. Then the semi liquid alginate solution is drawn into syringe. Calcium chloride solution is prepared by weighing 2g of $CaCl_2$ and dissolved in 100 mL of distilled water. The alginate solution taken in syringe is dripped into $CaCl_2$ solution drop wise and it is left overnight. Thus the alginate beads are prepared which is as shown in flow chart (Figure 1). Same procedure is followed for the preparation of beads for known dosage of algae.

2.3 Treatment of synthetic wastewater through glass column: The synthetic chromium solution prepared with the optimum conditions are taken into beaker, with the help of peristaltic pump the solution is let to flow through the beads in the glass column. Constant rate of flow is maintained. Constant head is maintained by controlling inlet and outlet flow. The solution coming out from the glass column is collected at equal time intervals.

2.4 Analysis using Spectrophotometer: The collected sample is taken into Nessler's tube (50mL) and the reagents are added. To analyse the chromium solution in spectrophotometer 2.5 mL of 1:1 sulfuric acid is added and is left for 10 min for the reactions to take place and 2 mL of Di phenyl carbozide solution is added the solution turns pink in color. The spectrophotometer is calibrated with blank solution and the wavelength is set to 540nm. Once the instrument is calibrated the solution is analysed.

RESULTS AND DISCUSSION

This deals with the results obtained for various conditions using sodium alginate beads with and without algae. It also includes the results of industrial wastewater for optimum conditions.

3.1 Beads without algae: Initial pH range from 2 to 7 was changed to study the effect of pH. The Cr(VI) concentration of 3mg/L, bed depth 10cm and contact time of (8, 16, 24) minutes were maintained. Figures 2-7 indicates the relation between the contact time and initial pH of the solution. Figure 2 shows the relation between pH and removal efficiency of Cr(VI). Maximum Cr(VI) removal efficiency of 64% was observed at pH 2. At pH 6, Cr(VI) removal efficiency was about 53%. At low pH value biosorbent is positively charged due to protonation. Electrostatic attraction occurs due to dichromate ions as anion.

Figure 2: Contact time (min) v/s Removal efficiency of Cr(VI) for pH 2

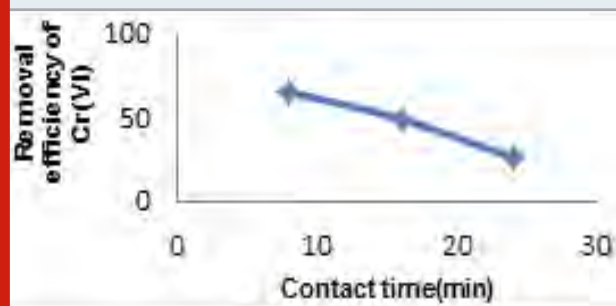


Figure 3: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 3

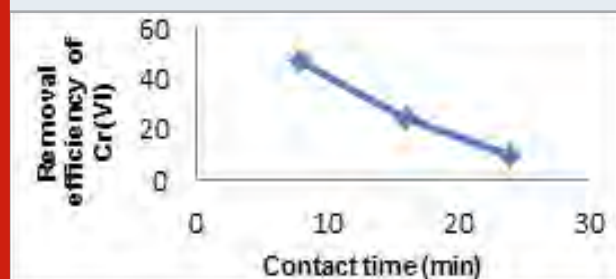


Figure 4: Contact time (min) v/s Removal efficiency of Cr(VI) for pH 4



Figure 5: Contact time (min) v/s Removal efficiency of Cr(VI) for pH 5

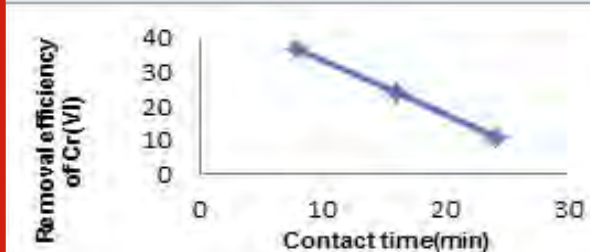
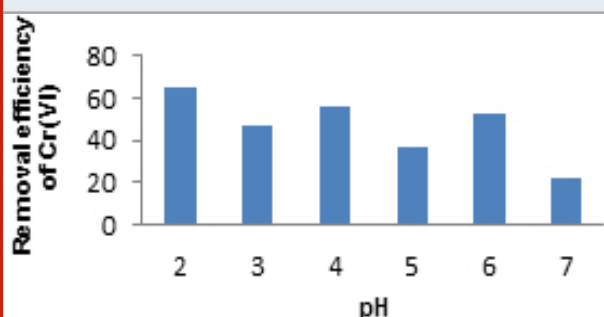


Figure 6: Contact time (min) v/s Removal efficiency of Cr(VI) for pH 7



Figure 7: pH v/s Removal efficiency of Cr(VI)



3.2 Effect of initial Cr(VI) concentration: The effect was observed with maintaining pH of the solution to 2, contact time 8, 16 & 24 minutes and bed depth of 10cm along with varying Cr(VI) concentration and results were presented in Figures 8-11. Maximum removal of Cr(VI) was observed in Cr(VI) concentration of 1.5 mg/L of about 78%. With the varying concentration of Cr(VI)

from 1mg/L to 5mg/L, adsorption increased. Two factors responsible for adsorption efficiency are positive force due to lower concentration of Cr(VI) which enhances the adsorption process and increase in binding sites for greater number of Cr(VI) absorption. Binding sites saturation was observed which led to gradual decline in removal percentage of Cr(VI).

Figure 8: Contact time (min) v/s Removal efficiency of Cr(VI) concentration of 1.5 mg/L

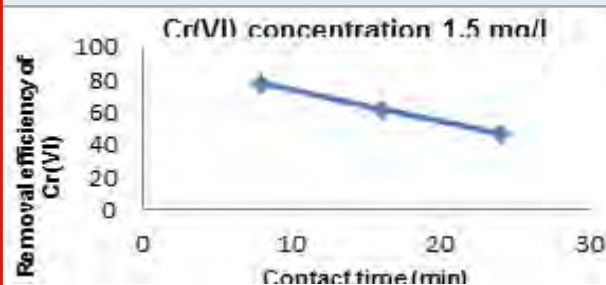


Figure 9: Contact time(min) v/s Removal efficiency of Cr(VI) concentration 5mg/L

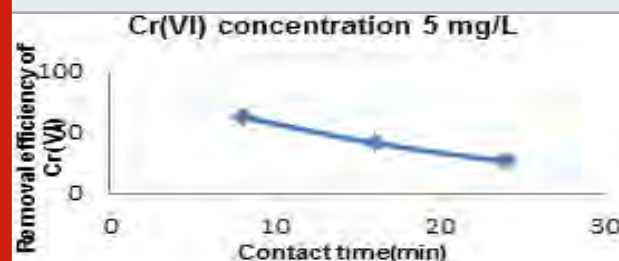


Figure 10: Contact time (min) v/s removal efficiency of Cr(VI) concentration of 3 mg/L

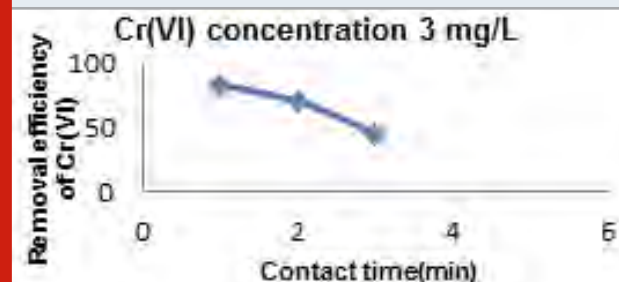
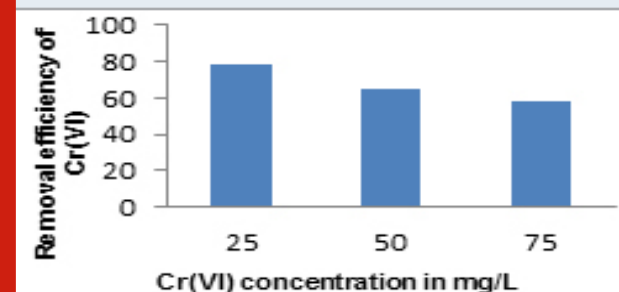


Figure 11: Concentration of Cr(VI) v/s Removal efficiency of Cr(VI)



3.3 Effect of bed depth: The Cr(VI) solution passed through column having varying bed depth of 5cm and 10cm. The pH was maintained to the optimum pH of 2 and 1.5mg/L concentration of Cr(VI) was maintained. Removal efficiency of Cr(VI) is shown in Figures 12-14. The study was carried for varying bed depth of 5 cm and 10 cm. It was observed that, increase in bed depth showed maximum removal efficiency of chromium (95%). This is because of more number of sites available for adsorption.

Figure 12: Contact time(min)v/s Removal efficiency of Cr(VI) for bed depth of 5 cm

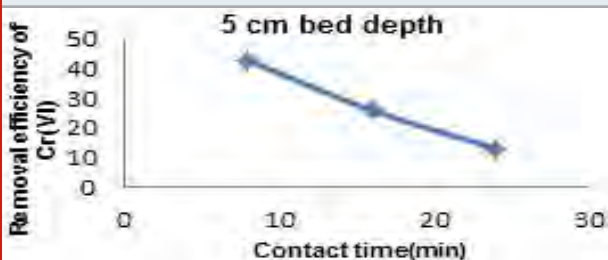


Figure 13: Contact time(min) v/s Removal efficiency of Cr(VI) for bed depth of 10cm

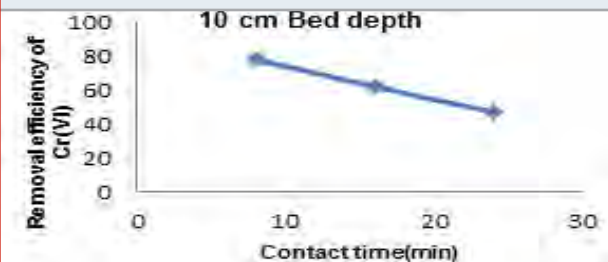


Figure 14: Bed depth in cm v/s Removal efficiency of Cr(VI)

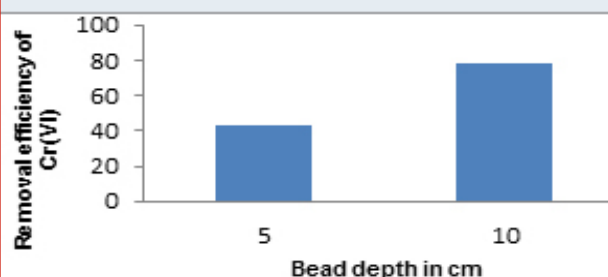


Figure 15: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 2



Figure 16: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 3

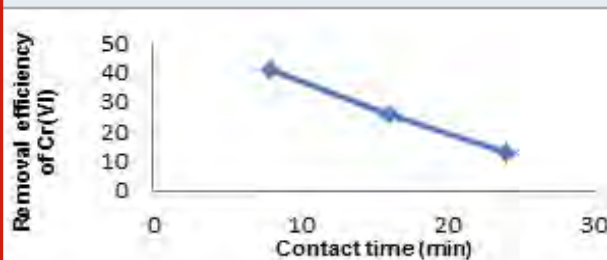


Figure 17: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 6



Figure 18: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 7



Figure 19: Contact time(min) v/s Removal efficiency of Cr(VI) for pH 9



3.4 Beads with algae

3.4.1 Effect of pH: The pH of 2, 3, 6, 7 & 9 was preferred to know the effect of biosorption of Cr(VI). 3mg/L of Cr(VI), biosorbent dosage of 20mL, contact time was varied from 8, 16, 24 minutes and bed depth of 10 cm was maintained. The maximum removal efficiency of different pH is as shown in Figures 15-20. The Figure 19 showed increases in metals ions adsorption with

increase in pH from 2 to 6. Cell wall protonation affects biosorption while preparation of algae at acidic pH. With increase in pH this effect becomes minimum. At pH 6 maximum adsorption was obtained. Initially interaction will be with phosphate and carboxylate groups of the cell wall component.

Figure 20: pH v/s Removal efficiency of Cr(VI)

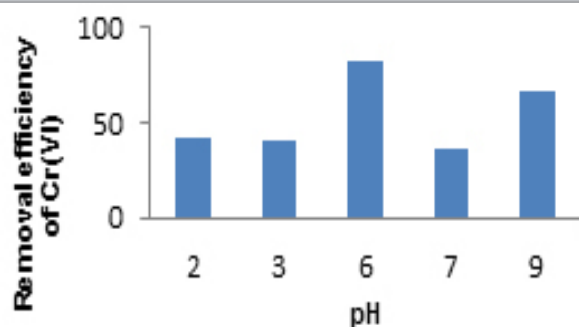


Figure 21: Contact time(min) v/s removal efficiency of Cr(VI) 1.5 mg/L

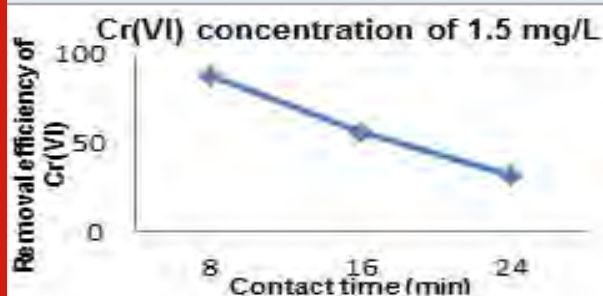


Figure 1: Conceptual Model of Cultural Tourism for Chinese Tourists

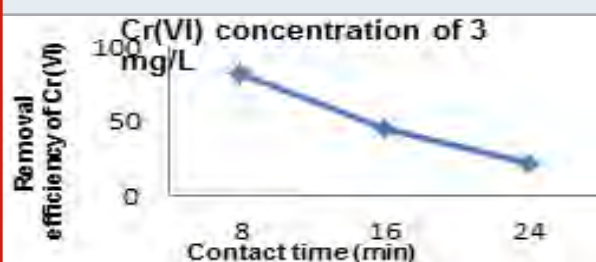
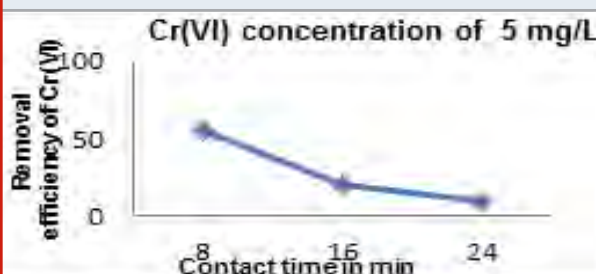


Figure 23: Contact time(min) v/s Removal efficiency of Cr(VI) concentration 5 mg/L



3.4.2 Effects of Concentration of Cr(VI): At the start Cr(VI) concentration varied from 1.5 mg/L to 5 mg/L with pH of the solution to 2, contact time 8, 16, 24 minutes, spirulina dosage of 20mg/L, and bed depth of 10cm. The results were presented in Figures 21-23.

3.4.3 Effect of bed depth: In this study, the Cr(VI) solution was passed through the column having varying bed depth of 5cm and 10cm. The optimum pH of 2, initial Cr(VI) concentration of was maintained to 1.5mg/L, spirulina dosage of 20mg/L and contact time 8, 16 & 24 minutes were maintained. The efficiency of Cr(VI) after removal is as shown in Figures 24-26.

Figure 24: Contact time(min) v/s Removal of Cr(VI) for bed depth of 5 cm

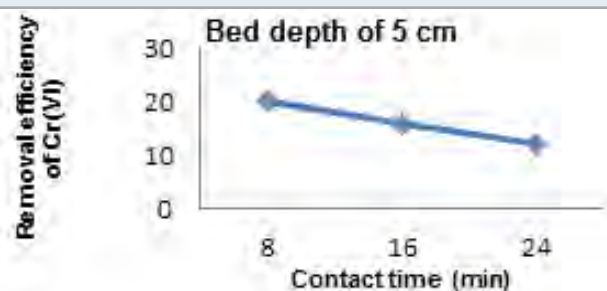


Figure 25: Contact time(min) v/s Removal efficiency of Cr(VI) for bed depth of 10 cm

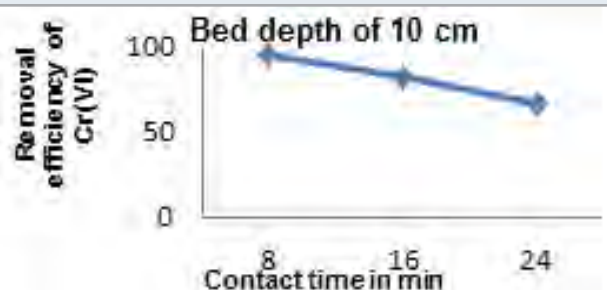
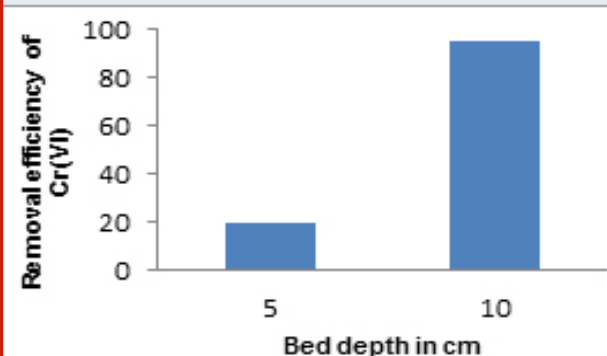


Figure 26: Bed depth in cm v/s Removal efficiency of Cr(VI)



3.4.4 Effect of biosorbent dosage: Spirulina platensis dosage was varied in 20mL, 40mL and 60mL to 3 w/v sodium alginate solution. It was observed that beyond

20mg/L the beads formed were not perfect and solution did not mixed well. The sodium alginate solution becomes very viscous and beads formation through the syringe becomes difficult. Biosorption of metal ions increased with dosage of 60 mL biosorbent to sodium alginate solution. The increase is probably attributed to the surface area available for the sorption of metals.

3.5 Characterization of algal beads using SEM: To study the surface morphologies of the biosorbent Scanning Electron Microscopy (SEM) is preferred. SEM images of alginate beads exposed to chromium ions for different magnification are presented in Figure 27- 30. SEM images indicates that unexposed beads are uniform and smooth surface and exposed beads showed relatively dynamic and rough surface. Images clearly shows the ability of *Spirulina platensis* biomass to adsorb and remove chromium ions from the solution. Biomass wall with fragile, irregular surface with bright spots observed after accumulation of Cr(VI).

3.6 Chromium removal for Industrial wastewater: The Industrial effluent of Triton valves having initial Cr(VI) concentration of 3.7 mg/L was passed through the column having bed depth of 10cm, optimum pH of 6, *Spirulina* dosage of 20mg/L and contact time 8,16 & 24 minutes were maintained. The result showed maximum removal efficiency of 82%. This proved that the algae is one of the effective method for the chromium removal from industrial wastewater.

Figure 27: SEM image of Sodium alginate beads before treatment (1mm)



CONCLUSION

The study shows that the *Spirulina platensis* as a algal biosorbent can be used as an alternative technique for removal of Cr(VI) from industrial wastewater. Based on the study, following conclusions were drawn.

- The optimum condition obtained for the maximum removal efficiency of Cr(VI) for synthetic wastewater without using algae was found to be pH 2, bed depth of 10 cm with 1.5 mg/L concentration of Cr(VI)
- The efficiency of Cr(VI) removal for synthetic wastewater without using algae for optimum condition was found to be 78%
- The optimum condition obtained for the maximum

Figure 28: SEM images of Sodium alginate beads before and after treatment (500µm)

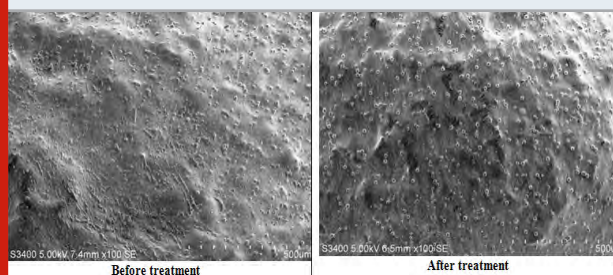


Figure 29: Sodium alginate beads images using SEM before and after treatment (100µm)

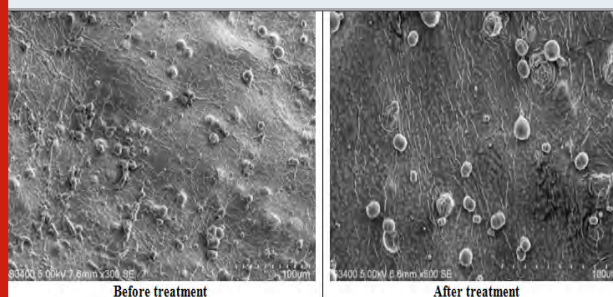
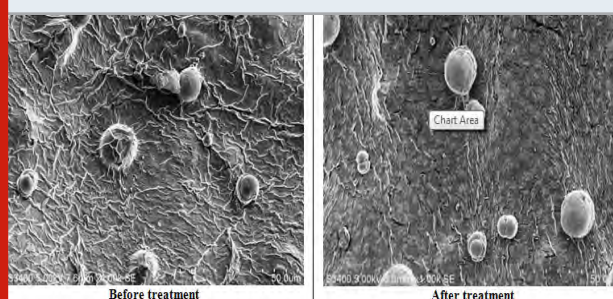


Figure 30: Sodium alginate beads images using SEM before and after treatment (50µm)



removal efficiency of Cr(VI) for synthetic wastewater with algae was found to be pH 6, bed depth of 10 cm for Cr(VI) concentration of 1.5 mg/L

- For optimum condition 95% Cr(VI) removal was observed without using algae
- After passing through beads, the fragile and irregular surface with appearance of bright spots in Scanning Electron Microscopy (SEM) images showed biosorption of chromium was effective through immobilized *Spirulina Plantensis*
- Maximum removal efficiency of 82% was observed for Industrial effluent for optimum condition with algae.
- Immobilized *Spirulina platensis* can be used as eco-friendly technique for Cr(VI) removal from industrial wastewater

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Use Of Photovoltaic Systems in Buildings – Sample Design on the Office Building Roof in Dörtöyl District of Hatay

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ABSTRACT

In this study, the use of solar energy, which is the most abundant renewable energy resource in the world, in the production of electricity and meeting the need for electricity by applying this technology on buildings is discussed. Examined the solar energy potential in Turkey within the scope of the study, the structure of photovoltaic panels, working principle, by considering the types, design principles of photovoltaic systems were examined. In addition, applications on buildings, design criteria and system dimensions of these applications are examined. The current standards and regulations regarding the use of photovoltaic systems in buildings are examined, and the problems and recommendations regarding the use of these systems are discussed. As a result of the research, a sample PV system was designed for an office building roof in Dörtöyl district of Hatay. When the sample application is examined in terms of cost, it is still possible to perceive PV systems as an expensive electricity generation method today, but when the return percentage is calculated, it turned out that there is a prospective investment. Considering the increase in electricity needs in the world, possible electricity prices in the future and the decrease in PV system costs, it has emerged that PV systems will be economically usable in the near future.

KEY WORDS: RENEWABLE; ENERGY; SOLAR ENERGY; PHOTOVOLTAIC (PV); BUILDING INDUSTRY.

INTRODUCTION

Most of the energies we use today are fossil-based energy systems, and they are rapidly depleted sources that, due to their use, harm the environment to a great extent. The most important of these energy sources are coal, oil and natural gas. The CO₂ released by the burning of fossil sources leads to the warming of the atmosphere,

increasing the greenhouse gas, and thus climate change. In addition, it has impacts such as Global warming, pollution of water and soil, damage of vegetation, acid rains, desertification and biological diversity. Accordingly, human health is negatively affected. It is an inevitable fact that these energies are not endlessly sourced, but they will be consumed in the near future. Industrial systems based on fossil-based technologies will also become inoperable. The results of this may be big enough to affect the whole world economy.

Water, wind, solar, liquid fuels and hydrogen technologies, which we can count among renewable energy sources, have become more important day by day. Solar energy is considered to be extremely important among these energy sources. In the past two decades, solar technology has developed rapidly, both the thermal applications of solar energy and the applications for obtaining electricity have

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accelerated promising for the future. Turkey's used in a very high level, domestic, renewable "Clean Energy" has potential. When this energy potential is used correctly, foreign dependency in energy and the use of energy types that pollute the air and produce emissions will cease. Considering the current environmental and energy problems, an effective way to utilize natural energy sources other than fossil sources is to use renewable

Figure 1: Solar Energy Potential of Turkey

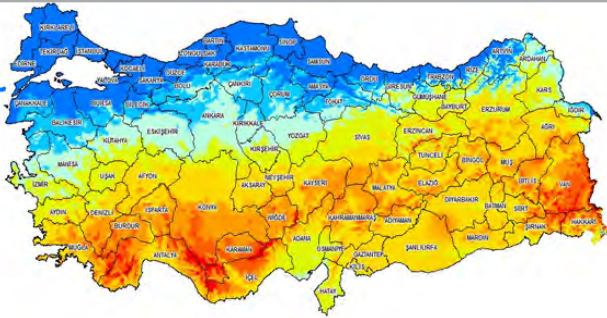


Table 1. Breakdown of Turkey's Total Solar Energy Potential of the Moon

Months	Sunbathing Time (hours / month)	Monthly Total Solar Energy	
		(KWh / m2 month)	(Kcal / cm2 month)
January	103,0	51,75	4,45
February	115,0	63,27	5,44
March	165,0	96,65	8,31
April	197,0	122,23	10,51
May	273,0	153,86	13,23
June	325,0	168,75	14,51
July	365,0	175,38	15,08
August	343,0	158,40	13,62
September	280,0	123,28	10,60
October	214,0	89,90	7,73
November	157,0	60,82	5,23
December	103,0	46,87	4,03
Total	2640,0	1311	112,74
Average	7,2 hour / day	3,6 KWh / m ² day	308,0 cal / cm ² day

Photovoltaic (PV) systems that utilize solar energy are among the most promising renewable energy sources in the world. We need to make maximum use of solar energy, which we can call continuous energy. In this work, the integration of solar and solar energy, solar cell structure, photovoltaic systems and their features, photovoltaic systems, which we can also use as a design tool in architecture, to architectural elements (roof, facade and building elements) are examined. A sample design has been made for roof application in Dörtöyl district of Hatay. Standards, regulations and regulations related to the subject have been researched. With this study, it was aimed to draw attention to the possibilities

energy sources. Solar energy is the first source that comes to mind as a renewable energy source.

Table 2. Total Annual Turkey's Regional Distribution of Solar Energy Potential

Turkey's Total Annual Regional Distribution of Solar Energy Potential		
REGION	TOTAL SOLAR ENERGY (kWh/m ² -year)	SOLAR TIME (H / year)
SOUTH-EAST ANATOLIA	1460	2993
MEDITERRANEAN	1390	2956
EASTERN ANATOLIA	1365	2664
CENTRAL ANATOLIA	1314	2628
AEGEAN	1304	2738
MARMARA	1168	2409
BLACK SEA	1120	1971

Figure 2: Cell, Module, Panel and Array Used in PV Systems

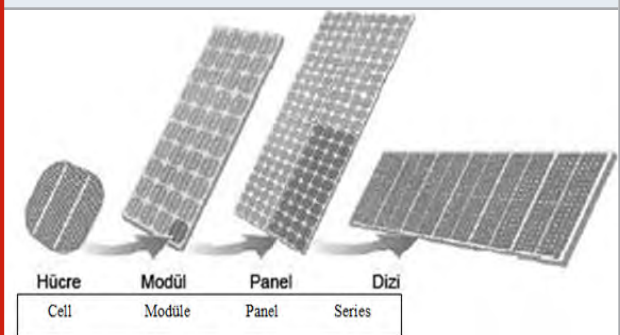
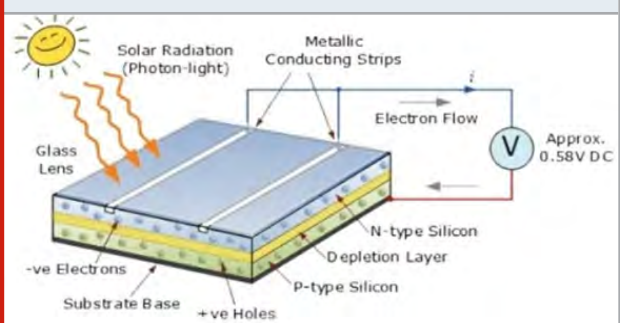


Figure 3: Structure of Photovoltaic Cell



of using solar energy in our country, especially in the field of architecture, and to make a contribution not to ignore this information in the new building designs to be made. It is aimed to develop suggestions on the subject.

2- Turkey's Solar Energy Potential: Turkey, the opportunity to use depending on the angle of incidence of solar radiation on Earth is quite high, is located on the

sun belt. Our country, which provides a significant part of its energy need by import, needs to utilize the solar energy that is inexhaustible, free, has no transportation problems, does not create environmental problems and air pollution. For this, there is a need for economic systems that will convert the radiation from the sun into the most efficient type of energy available. Turkey location as solar intensity and duration of sunshine is among the highest countries. Especially Southeast, Central Anatolia, Aegean and Mediterranean regions are rich in solar energy potential. Turkey's solar map in Figure 1 shows. Orange colors show the provinces with the highest solar energy density. The Black Sea region is the weakest settlements in terms of solar yield.

According to the study conducted by EIE; Turkey's average annual sunshine time of 2640 hours (7.2 hours per day total) average total solar radiation is 1311 kWh / m²-year (daily total of 3.6 kWh / m²) has determined that it is. Solar energy potential of Turkey and sunshine duration values by months is given in Table 1.

Turkey's biggest area of solar energy is the South East Anatolia Region, followed by the Mediterranean Coast. The distribution of solar potential and sunshine duration values by region is also given in Table 2.

Accordingly, Turkey as well as the overall most and the least solar energy will be produced in the months of June and December is. Southeastern Anatolia and Mediterranean coasts are among the regions. Except for the Black Sea region, where solar energy production is almost non-existent, 1,100 kWh of energy can be produced per square meter per year and the total amount of sunny hours is 2,640 hours. Accordingly, while the total annual amount of energy taken in Turkey is about 1015 kW hours.

Photovoltaic System and its Characteristics

a- Solar Cells: Photovoltaic is the name given to technology that can generate electrical energy directly from special semiconductor assemblies illuminated by photons. The devices designed to obtain direct electricity from solar energy with photovoltaic technology are called solar cells. Today, solar cells have wide usage areas. The trend towards renewable energy sources is increasing day by day. One of the most important reasons for this is the ability to generate electrical energy without harming the environment. Solar energy is also a renewable energy source and has been used in most applications recently. The main element that forms solar energy systems are solar cells, also called photovoltaic (PV) batteries. PV batteries are highly preferred for their longevity, easy electrical power generation and environmental protection. Solar cells are the most basic unit of PV systems. These cells are connected in series and in parallel, forming PV modules, modules joining panels and panels joining sequences. Figure 2 shows schematically PV cell, module, panel and array.

Solar cells (photovoltaic cells) are semiconductor materials that directly convert the sunlight (photon) coming to their surface into electricity. The solar cells, whose surfaces are shaped as square, rectangular, and circle, are generally around 1m² and their thickness is between 0.20.4mm. Solar cells operate on the basis of photovoltaic principle, that is, when the light falls on them, electric voltage is created at the ends. Depending on the structure of the solar cell, solar energy can be converted into electrical energy in an efficiency of 5% to 20%. Solar cells are electronic devices that convert sunlight directly into electricity. It consists of materials of electrical nature between a metal such as semiconductor copper and insulating material such as glass. Those working on these semiconductor materials; crystalline silicon is CuInSe₂ (CIS) (copper indium diselenide), CdTe, GaAs and Amorphous silicon oxygen. Effectively converting solar energy into electrical energy requires quality semi-permeable layers and a perfect structure in crystal. Crystal surface defects are passivated with high quality coating layers.

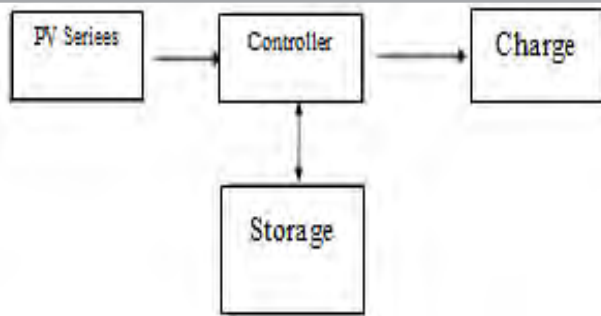
Solar cells, or solar cells, are a structure made of silicon and semiconductor materials. The upper layer of the solar cell is covered with a layer called ARC that minimizes reflection and absorbs incoming light. After that, there is a protective front contact part. Below that is the n-type layer. This layer was added with a small amount of phosphorus. In this way, a displacement occurs between silicon atoms and phosphorus atoms. This creates negative charges, which is why it is called the n-type. The lower layer contains a p-type silicone layer added with a small amount of boron. The displacement of the silicon and boron atoms also creates positive charges in this layer. The last layer is the back contact made of metal, which increases the cell's durability and closes its back.

Solar cells operate on the basis of photovoltaic principle, that is, when light falls on them, electric voltage is generated at their ends. The source of the electrical energy supplied by the batteries is the solar energy coming to its surface. The radiation intensity at sea level on a bright cloudless day is around 1000 W / M² maximum. Depending on the region, the amount of solar energy per 1m² varies between 800-2600 KWh per year. This energy can be converted into electrical energy with an efficiency of 5% -70% depending on the structure of the solar cell.

Solar cells consist of two layers, positive and negative. These layers consist of N type and P type semiconductor materials. Of these substances, the P-type semiconductor material has one more electron and the N-type semiconductor material has one less electron. The atom of the top layer, which has an excess of electrons in its atomic structure, is stimulated by photons of the sun rays, and the atomic structure in the lower layer tends to advance to an electron-missing layer. When electrons flowing from this upper layer to the lower layer are collected with appropriate circuits, an electric current is

created. The properties of PV panels change according to the material they are made of. Although the efficiency of PV panels varies according to the material used in laboratory conditions, PV panels made of crystalline silicon are preferred in our country. PV panel types are given below.

Figure 4: Basic Working Principle of Photovoltaic Systems



- Crystal Silicon Solar Cell
- Thin Film Solar Cells
- Other Cell Technologies Under Development

b- Photovoltaic Systems and Components: Photovoltaic modules are manufactured for outdoor use and are resistant to conditions such as sea conditions, tropical conditions, desert conditions. A photovoltaic module system is created by combining PV panels and complementary equipment to provide the desired current and voltage. The diagram showing the basic working principle of photovoltaic systems is shown in Figure 4.

Components that make up the photovoltaic system;

1. Solar Panels
2. Batteries
3. Charge Control Units (Regulator)
4. Inverters (Inverters)
5. Other System Components

The solar panel converts the solar energy falling on it into electrical energy as DC. There are batteries that store electricity to be used in situations where the user wants a constant voltage electrical energy or for use in sunless moments. Charge controllers are available to balance the input-output voltage values in order to prolong the life of the batteries. These prevent the battery from overcharging or discharging. If the user needs electrical energy with AC characteristics, the inverter must use the inverter. If DC electrical energy is required, there is no need for an inverter.

c- Photovoltaic System Types: Photovoltaic systems can be constructed independently from the local electricity grid to feed the electrical loads located at distant locations from the residential area, and photovoltaic systems located near the local power grid can also be designed to transfer energy to the grid. Solar cells can be used in any application that requires electricity. For this reason, they are used away from residential areas, where

there is no electricity grid, or if a renewable energy source is preferred, even though it is a grid. Basically, grid-connected systems are divided into three main groups: grid-independent systems and hybrid systems.

Grid Connected Systems (On-Grid): In solar cell systems connected to the grid, the solar energy is converted into electricity with the help of panels, it is given to the city grid with the help of converters. In these systems, PV plants are divided into two as domestic systems

Grid Connected PV Power Plants: These systems produce electricity by themselves and sell it to the network (Figure 3.10). The powers produced by these power generation centers vary between 100 kW and 10 MW. It is generally established for places that cannot reach electricity and its cost is quite high. The plant, which produces 1 MW of energy, costs about 4 million €.

Figure 5: Grid Connected PV Power Plant

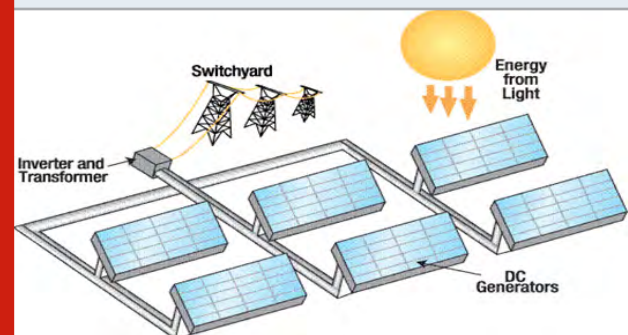


Figure 6: Grid Connected Domestic PV Systems

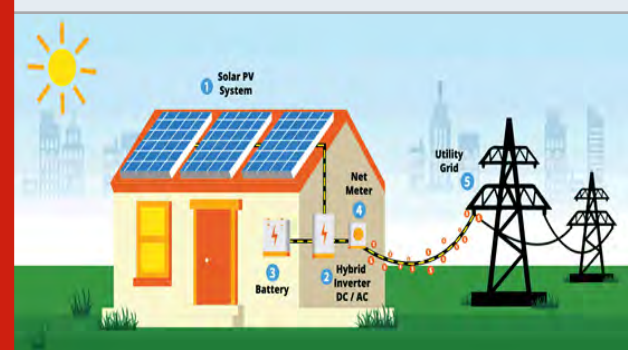
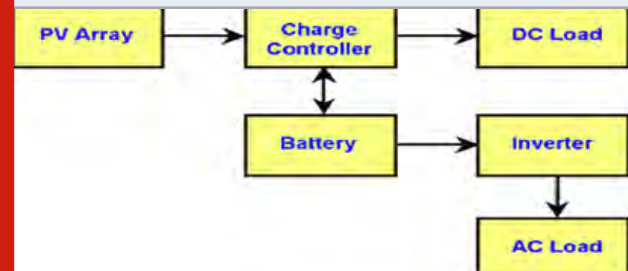


Figure 7: Off-Grid PV System

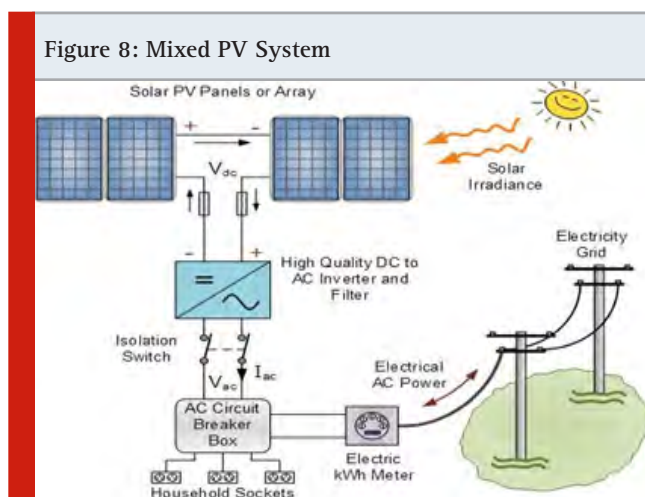


Domestic PV Systems: These systems, whose main purpose is to meet the electrical needs of a dwelling, can sell the excess electricity they produce to the city grid. In cases where sufficient energy is not produced, they receive energy from the grid. DC electricity produced from panels is converted to AC electricity. There is no need for energy storage because it can send the excess energy directly to the city grid. The power of these systems varies between 150 kW. The structures forming the domestic PV power systems are as follows;

- Solar panels arranged according to the required power,
- Converter (DC / AC conversion),
- Electronic control devices,
- Counter

Meters are two for measuring the electricity drawn from the network and the electricity supplied to the network. Electronic devices, on the other hand, stop the system in case of any malfunction of the system and thus ensure that other subscribers connected to the network are not affected.

Off Grid Systems: Grid-independent systems are often used in areas with high energy requirements away from the city grid. The energy range produced by the systems is very wide and can reach from 1 W to 100 kW. Independent PV systems seen in Figure 7 generally consist of solar panels, charge control unit, battery and converter if necessary. The electricity produced in the system is stored in the battery to be used when the sunlight is insufficient. There is a charge control unit to prevent the battery from being overcharged or discharged. The inverters convert the DC electricity produced by the panels into AC for use where necessary. Thus, both direct current and alternating current can be used.



Mixed Systems: These systems, also called Hybrid Connected Systems, have other systems that generate electricity outside of the panels (Figure 8). Primary electricity generators are panels, in addition, they can be a system that uses a renewable energy source such as a wind turbine or a diesel generator that generates secondary energy to the system.

In addition to the storage system, in mixed systems, there are conventional electricity generation systems with solid fuel or natural gas that will supply energy to the system and fill the storage devices (batteries) in case of extra power requirement. Mixed systems require more complex control systems, but are more reliable than other systems.

4- Usage Of Photovoltaic Systems In Buildings: The most common solar energy systems used in buildings are thermal and photovoltaic systems. Thermal systems can be used independently for space heating and domestic hot water or in combination with other fossil fuel-operated boilers. These systems can only meet the needs of the building they are established in and it is not always possible to use them efficiently throughout the year due to the seasonal change of the building need.

Photovoltaic systems are composed of modules used in solar power generation and are in the category of distributed electricity generation system. This means that these systems used in buildings work in parallel with the electricity grid to load the function of a small scale power plant and supply electricity to the nearest demand point. If there is a need for electricity in the building where they are installed, they can meet this, and if there is more than this need, they can meet the needs of other buildings by giving the energy they produce to the network. Such distributed electricity generation systems not only work with zero CO₂ emissions, but also prevent losses of 40% caused by central production and transmission.

a- Factors Affecting Energy Inputs of Photovoltaic Systems: The power that can be obtained from photovoltaic generators in photovoltaic systems installed in buildings is not a fixed value. We can list the main factors that affect the power we can obtain from generators as follows.

- The position of the world relative to the sun
- Solar radiation intensity received by the neighborhood
- Location of panels
- Tilt of panels relative to the floor (Tilt angle)
- Panels orientation to the south (Azimuth angle)
- Shading factor
- Temperature

b- Design Criteria of Photovoltaic Systems Used in Buildings: The design of the PV systems on the building depends on many parameters such as the area where the building is located, its location, the area it occupies, the architectural plan and for what purpose it is built. While designing my site, the most suitable project is prepared by considering the design of the architect and the functionality of the engineer. One of the most important advantages of using photovoltaic systems in buildings is that there is no need for an additional space to place the system. PV panels can be combined with the building envelope vertically (on the facade) or horizontally (on the roof). Module sizes, forms and colors are features that affect the design when using PV panels

in buildings. Factors such as location, orientation and angle of inclination, shading, panel type, maintenance and cleaning, and temperature occurring behind the modules affect the performance / efficiency to be provided from PV panels.

- External Climate Conditions
- Location
- External Barriers and Building Ranges (Shading)
- Direction and Surface Slope Angle
- Temperature Occurring Behind the Modules
- Converters (Inverters)
- Landscape
- Glare
- Color
- Form

c- Forms of Use of Photovoltaic Systems in Buildings:

The application of photovoltaic systems to buildings can be in two different ways. The first of these; designing and installing a photovoltaic system for a built building; The second is to consider the photovoltaic system from the beginning of the project when designing the building and to use the photovoltaic panels as an integral building element of the building. The design of the PV systems on the building depends on many parameters such as the area where the building is located, its orientation, the area it occupies, the architectural plan and for what purpose it is built. While designing my site, the most suitable project is prepared by considering the design of the architect and the functionality of the engineer. One of the most important advantages of using photovoltaic systems in buildings is that there is no need for an additional space to place the system. Systems can be applied to the roof or the facade in two ways.

PV modules are often used in building envelope. The building envelope is composed of elements that separate the internal and external environment. Building envelope users control the changing physical environmental conditions outside and provide comfort conditions for users inside.

Table 3. Use of PV Systems in Buildings

Usage on Roofs	Use on Facades	Usage in Different Building Sections
Flat roof	Curtain PV wall	Patio
Inclined roof	Rain-screen facade PV	Sun shutter
Set roof (saw tooth)	Shading element	Entrance fringe
Curved roof Atrium		Balcony railing

The use of PV systems in buildings is examined under 3 main headings.

1. Use on roofs
2. Use on facades
3. Use in different building sections

5- A Sample Bapv Application: As a case study; The two-storey office building of Filitoglu Petrol located in Dörtöl District of Hatay Province has been selected. In the image below, the yellow area indicates the oil office. Below is the Google Earth image of the example building. The sample house is shown in Figure 9. In the 2 floor building chosen as an example building; There are 4 rooms and a market on the ground floor and 6 rooms on the 1st floor. The second floor is used as a storage. Total building construction area is 756 m². The roffice area of the building is 340 m². In this building, where there is no elevator, the roof is triangular.

Figure 9: Google Earth Image of The Sample Building



Figure 10: Floor Plans of the Sample Building

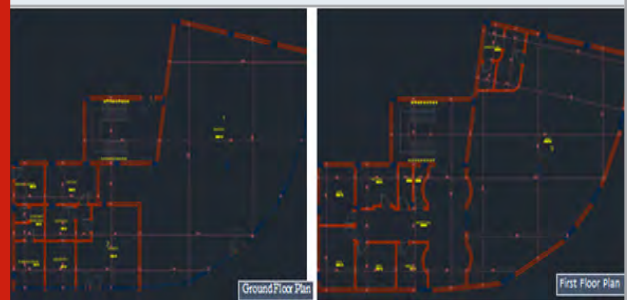


Figure 11: Site Plan of the Sample Building



a- Building Analysis

Climate Data Analysis: Although Dörtöl's annual total solar energy varies depending on the aspect, it varies

between 1450-1750 kWh / m². (Figure 12). Annual total sunshine duration is 2997 hours and annual total radiation amount is 1536 kWh / m².year (daily average 4.21 kWh / m².day). The reason why the amount of radiation is partially low compared to the duration of sunbathing is related to topography features and climatic conditions. In Dörtyol, where the Mediterranean climate is dominant, the high amount of humidity and the number of foggy days and the higher altitude in terms of topography reduce the amount of radiation partially. Considering the time and the sun radiation values are above the average of Turkey is seen as a high solar energy potential. Average radiation values and sunshine times by months are given in Figure 13.

Figure 12: Hatay- Dörtyol Solar Energy Potential

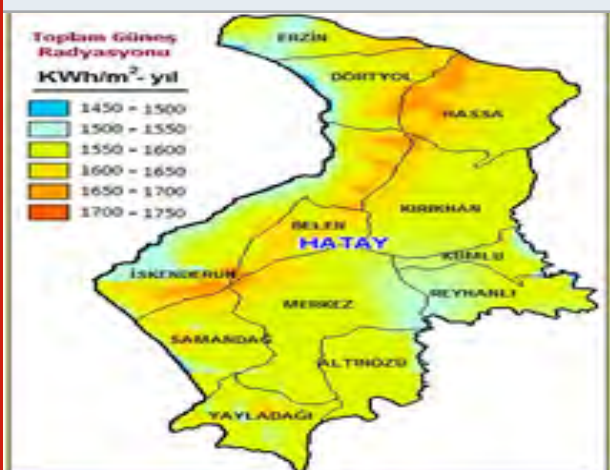
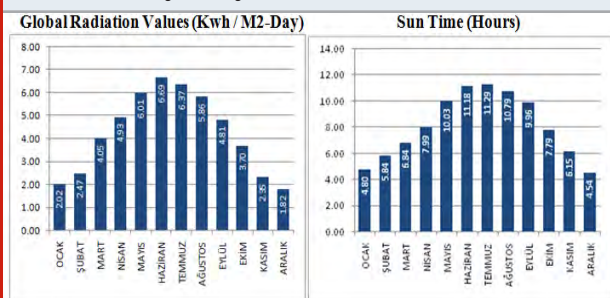


Figure 13: Radiation Amount and Sunbathing Times by Month in Hatay-Dörtöyl

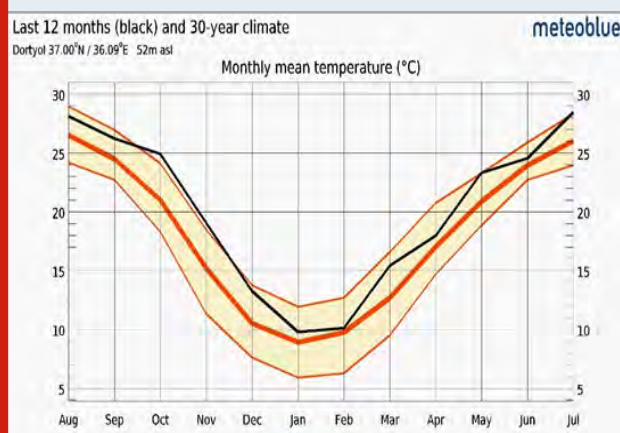


Dörtöyl has a typical Mediterranean climate. 70 m altitude in the district, most rainfall in Rize province after centers in Turkey. The average humidity is 48.3 %. It receives the most precipitation in December, January, February and March, and the least in August. As of the end of 2013, the temperature was the highest 43.2 ° C and the lowest 2.00 ° C. The surface area of the district is 342 Km².

This diagram shows the current season compared to the average climate for Dörtyol. The diagram is labeled with temperature and months.

- month of the last 12 months (current).
- The thick red line shows the calculated mean temperature of the last 30 years for every month (climate). This line denotes the exact mean of the temperatures but does not reveal fluctuations of the temperature from year to year.
- The orange buffer around the red line makes the fluctuations between the last 30 years more visible. It shows in what range the temperatures of the last 30 years are distributed. It shows the maximum monthly mean and the minimum monthly mean of the last 30 years.
- The monthly precipitation diagram for Dörtyöl shows the precipitation for every month of the last 12 months based on the precipitation of the last 30 years. The chart is labeled in millimeters and months.
- The black bars show the recorded precipitation for each current month.
- The dark blue bars show the maximum amount of precipitation during the last 30 years for each month. The light blue bars show the minimum amount of precipitation during the last 30 years.
- The boundary between dark blue and light blue is the monthly mean precipitation calculated from the last 30 years.

Figure 14: Monthly Avarage Temperature Graph of 2019



Location and Direction Selection: Dörtöyl, located between 36.925 0 - 36.805 0 North parallels and 36.075 0 - 36.300 0 East meridians. In the east of the Mediterranean Region; There are Amanos mountains and Hassa in the east, Payas in the south, Kskenderun Bay in the west and Erzin district in the north. The roof of the existing building is the pitched roof. The south, south-west and south-east facades are suitable for use. We will use the south facade to get high performance from the panels. The degree of azimuth (angle to the south) of the southern facade is 0 °, and the slope of the roof is 32°. The usable area value of the roof for the solar panel is about 340 m².

Shading Analysis: The location of the chimneys on the roof and the absence of other obstacles keep shadow losses at low values. As seen in Figure 17, the stairs and

other equipment of the existing building are located on the north facade. The possibility of shading of the panels is very low.

Figure 15: Average Monthly Precipitation Graph for 2019

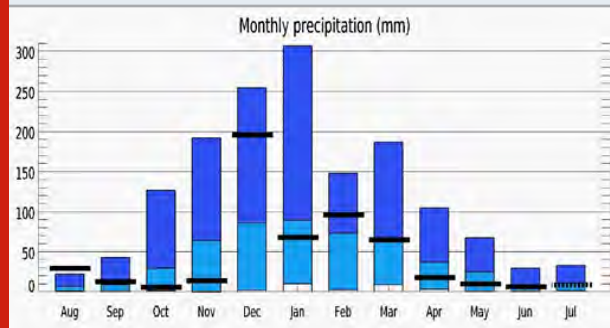


Figure 16: South View of Existing Building



Another important issue is the change of the angle that the sun makes to the earth every day. Radiations that are perpendicular to the summer fall to the earth at a narrower angle in winter. When we calculate hourly production for the longest day, July 21 and the shortest night, December 21, we see the production values for the longest day of the western part and the shortest day of the year. This analysis gives us more detailed and concrete information about the production profile of the system. In addition, although we say that solar panels are negatively affected by temperature, we see the effect of clouding by examining hot and cold days.

Consumption Analysis: When the consumption profile is examined, energy consumption in winter is higher than in summer. This situation shows us that a special care must be taken in production analysis. Because sunbathing hours differ in winter and summer. Studies should proceed based on winter consumption. The annual electricity consumption value of the building is explained below.

b- Standards And Regulations: In Turkey, 50 kW (50 kW included) features a rooftop legislation. The photovoltaic system we have established takes advantage of this legislation. All equipment used in the design and installation of the PV system under this legislation will comply with the latest editions of the Turkish Standards

(TS), International Electrotechnical Commission (IEC, EN, HD, ISO) Standards and other standards.

Figure 17: East View of Existing Building



Table 4. Annual Electricity Consumption Chart of The Sample Building on a Monthly Basis

Months	The Amount of Electricity Consumed	Energy Consumption
January	5.921 tL	6,713 KWh
February	7.512 tL	8.493 KWh
March	7.347 tL	7.903 KWh
April	5.187 tL	5.660 KWh
May	5.913 tL	6.162 KWh
June	4.513 tL	4.715 KWh
July	4.963 tL	6.985 KWh
August	6.686 tL	8.506 KWh
September	8.296 tL	10.542 KWh
October	7.488 tL	9.365 KWh
November	6.062 tL	6.873 KWh
December	4.833 tL	5.479 KWh
Total	74.721TL	87.396 KWh
Average	6.226 TL	7.283 KWh

c- PV Design Analysis

Technology And Product Selection: The selection criteria of solar panels and inverters, which are two important products that enable us to produce electricity and transmit it to the network, differ in each application. The points that we should be careful about in this application will be as follows for these two product groups.

Choosing of Solar panel: Since low air gaps in roof applications increase the temperature of the panels rapidly, temperature resistant solar panels should be chosen. This leads us to panel groups where the current temperature coefficient is low. Another issue is the use of solar panels consisting of efficient cells. In this way, a production facility with more capacity will be installed. The most efficient solar panel among PV panel types in this project, whose system size is designed as 50 kWp; monocrystal panel selected. This solar panel type generates great energy in a small space. The usage and electricity production life of these solar panels are longer. Monocrystalline solar panels can work more efficiently

in hot climates and the efficiency rate is around 24%. This rate is much higher than other solar panels on the market. Some of its advantages are as follows;

- High Conversion Efficiency
- Excellent Strength Capacity
- High Efficiency In Low Beam
- Self-Cleaning Glass That Reduces Reflection
- Easy Setup

Figure 18: Expected Monthly Energy Production Data

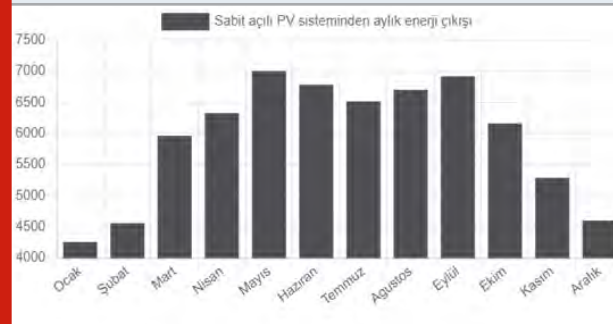


Figure 19: Monthly Solar Radiation Data

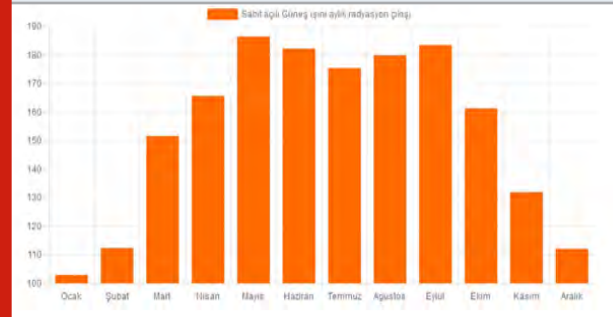
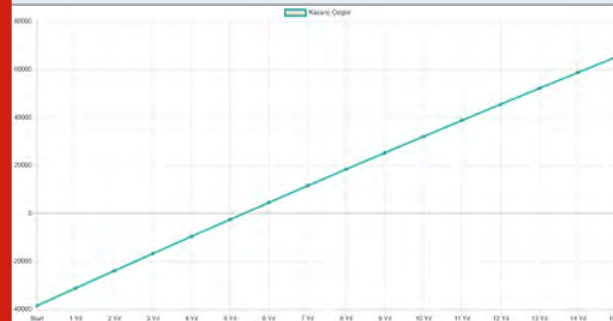


Figure 20: Expected Annual Earning Gain Curve



Choosing of invertör: The inverter selected in this project is ABB On-Grid inverter Uno-Dm 50. A single 3-phase inverter will be used.

Appropriate Electrical Design

This design; It was created by considering that the building has a consumption counter of 50 kW. 157 pieces of 320w monocrystalline solar panel will be used. Shades will be calculated and placed in the required places on

the roof. The inverter can be placed below if there is no space on the roof.

d- Production Analysis: The power generation capacity of the power plant per kW per year is estimated to be 1,422.4 kWh on average. Filitoglu Petrol GES will contribute to the evaluation of domestic and renewable resources of our country. It is planned to meet 82% of the electricity to be taken from the network thanks to the on-site production in this amount to be realized at the consumption point. Approximately 71.118 kWh of energy will be prevented from polluting the environment annually and approximately 73.000 kg of CO2 emission will be prevented annually. The values given in the figures below are obtained from the numerical values SOLMART veri base.

Table 5. System Production Data

Location of Building	Dörtöyl / Hatay
Annual Irradiation	1845.4 kWh / m ²
Annual Average Temperature Value	18.3 ° C
Azimuth Angle of the Roof	0 °
Suitable Space on the Roof	340 m ²
Slope Angle of Roof	32 °
Annual Electricity Consumption Value	87.396 kWh
Production Facility Installed Capacity	50 kWp
Number of Panels	157
Panel Power	320 Watt
Panel Technology Used	Monocrystalline Solar Panel
Inverter Technology Used	3 phase
Annual PV Electricity Production Value (P50)	71.118 kWh
Arrival Angle Reflection Rate	-2.67%
Temperature And Low Irradiation Rate	-8.25%
Spectral Effect Rate	0.36% by
Total loss rate	-22.92%
Project Cost	\$ 38,460
25-Year Energy Gain	\$ 223,025.40

As seen in Figure 18, the most efficient months of photovoltaic batteries are May and September. Dörtöyl is located in terms of location and climate; photovoltaic efficiency decreases in the summer months. Altitude and temperature affect the performance of the batteries.

CONCLUSION

In the architecture, areas that are not used with photovoltaic systems applied on roofs are evaluated and energy production is provided. Photovoltaic systems used on the building facade are applied as curtain walls. On the facades where translucent and opaque photovoltaic glasses are used, the amount of R energy consumed by reducing the comfort conditions of the space is reduced and energy is also produced. The first P50 production

value of the BAPV system, which is planned to be installed as 50 kWp, was analyzed as 71.118 MWh per year. It is predicted that 223.025 MWh electricity will be produced by the end of 25 years. The daily electricity consumption of the building, whose daily electricity usage is 1.777.95 kWh, is calculated as 194.8 kWh. It is expected to provide 25% return in 4 years. Project information is given in Table 5.

The cost of the sample project is approximately \$ 38.460.000. In order to keep the return time of an investment with such a high cost to a minimum, much attention should be paid to the analysis work to be carried out during the design phase. In the approach developed in this project, the whole process from location selection to income chart has been explained. The method in the study; It is applicable to all consumers who want to produce their own electricity from the roof.

As a result, designs should be realized by integrating photovoltaic systems with the projects from the first design stages of the buildings, considering the most efficient orientation and surface slopes for these systems. When these developments are achieved, architects should be informed about the structural design of photovoltaics, and they should be able to design well-integrated systems compatible with the building. Since the model presented in the study was created by examining the detection systems used today, new systems may be designed in the future by making use of the alternatives and design inputs in the model. The model can be updated depending on the developments in photovoltaic technology.

Solar power plants are distributed facilities and generate electricity only during the daytime. As the number of these facilities increases, these plants, which exhibit variable production during the day, do not work at full capacity at noon, and in the evening will cause voltage changes in the network. For this reason, in future studies, an answer should be sought to the question of how distributed plants can sustain their assets without harming the network by researching the impact of distributed generation facilities on distributed networks. Thus, with the increase in the number of samples in this study, a damage to the network will be prevented.

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Mapping the Contribution and Participation of Saudi Institutes in Research Associated with Radiological Sciences From 2014 to 2018

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ABSTRACT

The purpose of this observational study is, to estimate the participation of Saudi institutes in research related to radiological sciences. PubMed/Medline database is the main source to retrieve, collect and tabulate the research written or participated by authors as solo or corroborators in publications published in journals from the period 2014 – 2018 in Microsoft Excel 2010. There were 2738; 5.6 authors wrote 485 manuscripts as 97 per annum and 8.08 per month. The 304; 62.6% authors were identified as a first author following by 96; 31.5% and 37; 7.6% authors as a second and third author in 485 manuscripts affiliated with institutes operational in Saudi Arabia. There are 87; 17.9% institutes, which contributed and published their research in 232 journals allied with PubMed Indexed database. The 15 major disciplines as core subjects related to medical and radiological sciences have been figure out in this research. This is, firmly believed that one research article was published in every fourth day the past five years reflecting the participation of radiological sciences in healthcare. Technology helps in making collaborative manners to share ideas, experimental findings, designing of the research, drawing results and taking decisions and opinions.

KEY WORDS: BIBLIOMETRIC, RADIOLOGICAL SCIENCES, SAUDI ARABIA

INTRODUCTION

Radiological science used to identify the diseases and injuries of the human body in healthcare as supportive in diagnostic and treatment. Ultrasound, Magnetic Resonance Imaging (MRI), Sonography, Positron Emission Tomography (PET), nuclear medicine, Mammography and Computed Tomography Scanning (CT-Scan) are

famous technological methods to observe human tissues. Bibliometric study is a common practice for scientific institutes, libraries in healthcare societies, and pharmaceutical research to gauge the information of specific subject or sub-specialty of subject published in a particular journal or database. A bibliometric analysis provides a wide array of information on numerical data of published literature in a specific discipline or sub-specific branches of any discipline. Peer-reviewed literature in radiology required mechanism for investigators to communicate their results are focused, varying standards, evidence-based, encompassing influence on clinical or administrative management in advance human healthcare.

Open access (OA) journals allied with a PubMed Indexed database, which allows free access of academic articles to read, search, download, share, use them for indexing,

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and print the full texts. Published articles are immediately available on the websites of journals and charges of publications paid by the author where only subscribers have immediate access. However, to make the article available on their personal, institutional web pages. Subsequently in April 2003 a bibliometric study was conducted to compare, the radiological research in Europe published in biomedical peer-reviewed journals indexed in web of science (WeS) with the United State of America, which were found slightly decreased.

Additionally, another study analyzed the authorship pattern in radiology publications and retrieved 142,576 articles written by 699, 257 authors participating from all over the world in National Library of Medicine MEDLINE database from 1991 to 2012 as 4.9 average authors per article. Besides this, partially similar research conducted to evaluate the contributors in the functional magnetic resonance (fMRI) literature on chemosensory. This research finds that 1660 articles, those were produced by 5200 authors, which were published in 423 journals; orbitofrontal cortex, insula, and amygdala gather good numbers of citations. In all likelihood, The Kingdom of Saudi Arabia is focused on national health care information system with the number of healthcare professionals at all levels; primary, secondary and tertiary with facilities and proficiencies of educated and trained pre-hospital caregivers, quality equipment, along with the participation of society.

These initiatives highly recognized by World Health Organization (WHO). Recently, the data of global research on the topic of rehabilitation of spinal cord injury published from 1997 to 2016 in China, downloaded from the Web of Science (WOS) and evaluated to gauge the association of country, institute, and journal. United States of America (USA), The University of Washington and The Archives of Physical Medicine and Rehabilitation found most active participators. Relatively study was conducted to discover the quantity and quality of data on the contribution of African authors in neurosurgical journals worldwide and using the PubMed database from 1999 to 2018. Thirty-one African countries contributed 974 articles in reported research.

Simultaneously, data retrieved from the Science Citation Index Expanded (SCI-E) from 1999 – 2017 on a similar study with the same objectives was conducted on research trends on global obesity. United States of America, Japan, Italy, the United Kingdom, and Turkey come-forth on five slots among the 153 countries, which were produced 50,246 articles. [10] A prospective Strategic Research Agenda on the idea of responsible research and innovation in radiological protection proposed in International Symposia on Ethics of Environmental Health with six research lines of interest and concern, i.e. 1) Effects of social, psychological and economic aspects on radiological protection behavior, 2) Holistic approaches to the governance of radiological risks, 3) Responsible research and innovation in radiological protection, 4) Stakeholder engagement and participatory processes in radiological protection research, development, policy and practice, 5) Risk communication, and 6) radiological protection cultures. PubMed resources indexed in MEDLINE, which contain approximately 30 million citations, full-text journal articles and abstracts in supporting to the literature of biomedical and life sciences under the purpose of cure and prevent diseases globally since 1996.

MATERIAL AND METHODS

The data of research on radiological sciences published from January 1st, 2014 to 31st December 2018, in the PubMed indexed journals affiliated with institutes, functioning in Kingdom of Saudi Arabia was downloaded and tabulate in MS Office Excel Sheet 2010. The comma-separated value (CSV) file, and Abstract on Note-paid used to download. Boolean operator typed “Ultrasound, Magnetic Resonance Imaging (MRI), Sonography, Positron Emission Tomography (PET), nuclear medicine, Mammography and Computed Tomography Scanning (CT-Scan)”, AND appears by default, typed “Kingdom of Saudi Arabia” select as “Affiliation” in the second menu. The fourfold objective was set to identify; a) to assess the year wise growth, b) to estimate the authorship pattern, c) to evaluate the author position in the publications and d) to calculate the top ten subject specialties encompassing to radiological sciences published in journals.

Table 1. Study design.

S. No	Year	Articles Download	Excluded	Articles Included for analyzed	Articles per year average	Authors per Article
1	2014	107	12	95	7.9	465 (4.8)
2	2015	123	20	103	8.58	526 (5.1)
3	2016	115	13	102	8.5	547 (5.3)
4	2017	118	16	102	8.5	656 (6.4)
5	2018	111	28	83	6.91	544 (6.5)
Total	574	89	485	8.08	2738 (5.6)	574

RESULTS

This study retrieved 574 case reports, original and review articles. The inclusion criteria were only specialties and

sub-specialties of medicine and allied medicine, surgery, and allied surgery to take support from the discipline of radiological sciences. Table 1 show that 2738; 5.6 authors wrote 485 manuscripts as 97 per annum and 8.08 per month average during the period 2004 – 2018.

Table 2. Author's position in manuscript affiliated with institute functioning in Saudi Arabia from 2014–2018

S. No	Authors position in article	Year 2018	Year 2017	Year 2016	Year 2015	Year 2014	Total	%
1	Solo or Single Author	46	55	64	70	69	304	62.6%
2	Two Authors	20	22	23	17	14	96	19.7%
3	Three Authors	9	10	6	8	4	37	7.6%
4	Four Authors	3	6	4	1	3	17	3.5%
5	Five Authors	3	3	3	2		11	2.2%
6	Six Authors	1	1	2	5	3	12	2.4%
7	Seven Authors		1			1	2	0.4%
8	Eight Authors		1			1	2	0.4%
9	Nine Authors	1					1	0.2%
10	10 - 19 Authors		2				2	0.4%
11	20 - 29 Authors		1				1	0.2%
12	Total Articles	83	102	102	103	95	485	
13	Institutes Involve in Research	272	365	374	447	362	1820	3.7
14	Authors Participation per article	465	526	547	656	544	2738	5.6

Table 3. The participation of the institutes in research productivity of radiological sciences existing in the Kingdom of Saudi Arabia during the period 2014 - 2018

S No	Institutes	Articles	2014	2015	2016	2017	2018	Total	with%
1	King Saud University, Riyadh	94	13	15	24	24	18	94	19.3%
2	King Abdulaziz University Hospital & University, Jeddah	59	13	25	8	8	5	59	12.1%
3	King Faisal Specialist Hospital & Research Center, Riyadh	39	3	15	8	7	6	39	8%
4	Imam Abdulrahman Bin Faisal University, Dammam	32	3	5	10	11	3	32	6.6%
5	King Fahad Medical City, Riyadh	27	11	4	4	4	4	27	5.5%
6	King Fahad Specialist Hospital at Dammam	21	4	3	5	3	6	21	4.3%
7	King Abdulaziz Medical City, Riyadh	20	5		7	5	3	20	4.1%
8	Al-Qassim University	14	1	6	1	4	2	14	2.8%
9	King Saud bin Abdulaziz University for Health Sciences, Jeddah & Riyadh	13	3	2	1	5	2	13	2.6%
10	King Abdullah Medical City, Makkah	11	4	1	4	1	1	11	2.2%
11	02 Institutes Published Ten Articles							20	4.1%
12	02 Institutes Published Nine Articles							18	3.7%
13	02 Institutes Published Seven Articles							14	2.8%
14	03 Institutes Published Five Articles							15	3%
15	01 Institute Published Four Articles							4	0.8%
16	04 Institutes Published Three Articles							12	2.4%
17	09 Institutes Published Two Articles							18	3.7%
18	54 Institutes Published One Articles							54	11.1%
	Total Articles	485							

Table 2 reveals that the 304; 62.6% authors identified as a first author following by 96; 31.5% and 37; 7.6% authors as a second and third author in 485 manuscripts. Authors had 4th to 9th position in 45; 9.2% articles, only 3; 0.61 authors relate the position from 10th to 29th in articles.

Table 3 stated that 87; 17.9% institutes related to the public and private sectors have been participated in the 485 publications. Total n=330; 68% of articles were produced by 10 institutes. The 155; 32% articles were harvest by 77 institutes from 2014 to 2018 in various journals.

Table 4. Subject-wise distribution of publications (Largest to smallest, n=485)

Subject	2014	2015	2016	2017	2018	Total Articles	%
1 Radiology, CT Scan, Nuclear Medicine, Medical Imaging, Ultrasound and Magnetic Resonance Imaging (MRI)	20	31	14	23	27	115	23.7%
2 Dentistry	11	20	21	28	14	94	19.3%
3 Cardiology	9	14	12	12	5	52	10.7%
4 Oncology	7	11	14	8	9	49	10.1%
5 Surgery	21		10	6	12	49	10.1%
6 Otorhinolaryngology	6	3	7	6	3	25	5.1%
7 Neurology & Neurosurgery	2	3	4	2	6	17	3.5%
8 Ophthalmology	4	1	6	4	1	16	3.3%
9 Pediatric	5	2	4	2	2	15	3%
10 Urology	2	8	1	3		14	2.8%
11 Pulmonology or Respiratory Care	6	2		3	3	14	2.8%
12 Orthopedic	1	3	5	2	1	12	2.4%
13 Emergency Medical Sciences/Services		5	2	2	1	10	2%
14 Gastroenterology	1			1		2	0.4%
15 Anesthesia			1			1	0.2%
	95	103	101	102	84	485	

Table 5. Journal-wise distribution of publications (Largest to smallest, n=485)

S. no	Name of the journal	Publications	%
1	BMJ Case Reports.	27	5.5%
2	Saudi Medical Journal.	19	3.9%
3	Asian Cardiovascular Thoracic Annals.	14	2.8%
4	Journal of College Physicians and Surgeons Pakistan.	14	2.8%
5	Radiation Protection Dosimetry.	11	2.2%
6	Oral Surgery Oral Medicine Oral Pathology and Oral Radiology.	9	1.8%
7	Neurosciences (Riyadh).	8	1.6%
8	Ann Saudi Med.	7	1.4%
9	06 Journals published 4 article in each	24	4.9%
10	5 Journals published 5 article in each	25	5.1%
11	13 Journals published 4 article in each	52	10.7%
12	17 Journals published 3 article in each	51	10.5%
13	39 Journals published 2 article in each	78	16%
14	146 Journals published 1 article in each	146	30.1%
	Total articles	485	

Table 4, present 15 major specialties and sub-specialties of medicine, surgery and radiological sciences by the researcher's affiliation as core subjects in the melody

of the manuscript of research. Radiological sciences with its sub-specialties published 115; 23.7% out of 485 articles as maximum to explain the integrated value

of this discipline. Dentistry 94; 19.3%, Cardiology 52; 10.7% followed.

Total 232 journals were published n=485 articles from 2014 – 2018. Only n=85; 17.5% articles published in five journals and remaining 400 articles published in 227 journals out of 232 journals.

DISCUSSION & CONCLUSION

Presently, a study finds 61 institutes paid contribution and participation and produced 241 articles in publishing research interrelated with emergency medical services. Majority articles n=206; 85.4% were written by multi-authors collaboratively out of 241 articles. The spectrum of 485 articles constructing their magnum opus. It shows that 87; 17.9% institutes linked to the public and private sectors of Saudi Arabia, collaborate in writings and 2738; 5.6 authors wrote manuscripts in-connection with 15 major specialties and sub-specialties of medicine, surgery and radiological sciences. King Saud University,

Riyadh take lead and presents n=94; 19.3% articles as single institute and followed by King Abdulaziz University Hospital & University, Jeddah. In conclusion, it revealed that the provision of an article on every fourth day of the month shows the keen interest of researchers working in Saudi institutes specifically in radiological sciences and satisfaction with the policies, organizational vision and culture, and encouragements.

Disclaimer: This study reflects the data published in Med Indexed Journals not inclined or declined growth of any organization, city, country and standards.

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Investigation into the Negative Effects of Energy Drinks on Liver Efficiency and Lipid Metabolism in Rats

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ABSTRACT

This study aims to evaluate the negative effects of consumption of two types of Energy drinks; Red Bull (RB) and Code Red (CR) at two levels of doses on liver functions and lipid metabolism in rats. Forty male adult albino rats (weighing 80-100 g) were randomly assigned to five groups (8 rats per group) each was orally administered. Group 1 (control group), Group 2 and 3 received low doses of RB and CR (each 5ml/day per kg b.w), respectively, Group 4 and 5 received high doses of RB and CR (each 10 ml/day per kg b.w), respectively. At the end of the 31st day of experiment, liver functions and lipid profile were investigated. Data revealed that energy drinks affected the liver enzymes activities (ALT, AST, and ALP). Also changed in serum total proteins and albumin which were highly significantly ($P \leq 0.05$) affected at high doses of both energy. The results of total lipids, total cholesterol, triacylglycerols and LDL-cholesterol showed a significant lower levels of co administered lower or higher doses of RB or CR (5ml/day or 10 ml/day respectively), while the activity of serum FAS and ACC were significantly ($P \leq 0.05$) higher in rats administered high doses of both energy drinks. Also, the values of serum glucose and insulin were significantly ($P \leq 0.05$) higher in rats administered high doses of both energy drinks. These data emphasize that high doses of energy drinks were clearly effective of liver enzymes, glucose and fat metabolism.

KEY WORDS: CAFFEINE, ENERGY DRINKS, LIVER TOXICITY, RED BULL, TAURINE.

INTRODUCTION

(Alford et al., 2001) define energy drinks (EDs) are carbonated refreshments containing high concentrations of metabolic energizers. These drinks are said to enhance energy, readiness and perseverance, which has caused

drastic increases in their popularity over the last few years (Seifert et al., 2011). Several studies have found that Eds have transitory medical benefits, including the capacity to enhance sharpness, endurance and to conquer exhaustion in young people and adults (Howard and Marcinski, 2010). For example, (Souza et al., 2017) found that ED consumption improves perseverance, muscular strength and performance in sports activities. On the other hand, some researchers (Elitok et al., 2016, González Domínguez et al., 2017, Grasser et al., 2014, Higgins et al., 2015, Monnard et al., 2016, Nowak et al., 2018, Al Yacoub et al., 2020) have found that both short and long-term consumption of these drinks can have negative effects on the body. Such effects include poor heart rate, type 2 diabetes, cardiovascular disease, obesity and hypertension.

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Moreover, a case study found that ED may be related to kidney disease and hepatitis. In 2014, the World Health Organization (WHO) stated that energy drinks can have significant negative effects on adults and may cause lasting damage. However, following the regulations implemented on alcohol and tobacco sales in the same year, the ED market has experienced significant growth, with many different brands being created across the globe. (Bailey et al., 2014) report that approximately 5.8 billion litres of energy drinks were sold in 2013 across 160 countries. Caffeine (1,3,7-trimethylxanthine), is the primary ingredient in EDs contain approximately 80–150mg of caffeine in 8 ounces and actively stimulates the cardiovascular and central nervous systems (Boeck et al., 2009, Glade, 2010, Wolk et al., 2012).

A majority of these drinks contain high levels of glucose, and some companies have even offered misleadingly improved adaptations. Taurine is also a widely-used ingredient in such drinks, (2-aminoethanesulfonic acid), which is the most abundant form of amino acid which is either obtained through one's diet or synthesized from cysteine in the liver. Moreover, it plays a fundamental role in numerous bodily systems, including the central nervous system and also serves as an antioxidant, neurotransmitter and membrane stabilizer (Vivekanandarajah et al., 2011, Caine and Geraciotti, 2016). Energy drinks may also contain a variety of other ingredients, including ginseng, methylxanthines, yerba mate, guarana, acai, maltodextrin, creatine, inositol, carnitine, glucuronolactone, and ginkgo biloba extract. However, there are major concerns surrounding the safety of energy drinks sold on the market.

The present research thus aims to assess the negative impacts that two types of energy drinks have on liver function and lipid metabolism, namely Red Bull and Code Red. The study will be performed using male albino rats and is inspired by the apparent attractiveness of such drinks and concern regarding the unknown toxicological effects of their excessive consumption.

MATERIAL AND METHODS

Materials: All reagents used in this study were of analytical grade and were purchased from Siemens Healthcare Diagnostics and Bioassay technology laboratory. The energy drinks (Red Bull and Code Red) was purchased from local markets.

Experimental Animals: The adult male albino rats each weighing 80–100 g (eight per each group) were used in this study and supplied from the Animal House Colony of King Fahd Medical Research Center, Jeddah and acclimatized with a 12 h light/dark cycle at King Fahd Medical Research Center Animal Facility Breeding Colony. Rats were housed with ad libitum access of water and standard laboratory diet. The experiment was conducted in accordance with ethical guidelines of the Animal Care and Use Committee of King Abdulaziz University.

Experimental Design: Forty male rats were randomly divided to five groups (8 rats per group). The groups were treated as follows:

Group 1 (Control): received distilled water by oral gavage

Group 2 (RB-LD): Rats were administrated Red Bull, low dose (5 ml/day) by oral gavage.

Group 3 (CR-LD): Rats were administrated Code Red, low dose (5 ml/day) by oral gavage.

Group 4 (RB-HD): Rats were administrated Red Bull, high dose (10 ml/day) by oral gavage.

Group 5 (CR-HD): Rats were administrated Code Red, high dose (10 ml/day) by oral gavage.

The total duration of the experiment was 31 days. The body weights of rats were measured at the beginning and at the end of experiment. At the end of four weeks (experimental period), the animals were starved for 12 hours prior to blood collection. Rats were sacrificed under ether anesthesia, then blood was collected through optic nerve puncture. Serum was separated by allowing blood samples left for 30 minutes at temperature of 25°C then centrifuged at 3000 r.p.m for 10 minutes, then divided into several aliquots and stored at -20C until analysis was performed.

Biochemical Assays: Sera of the studied rats were collected and the levels of ALT, AST, ALP, T & D. Bilirubin, T. Protein, Albumin, T lipid, Cholesterol, Triglycerides, LDL, HDL and glucose were measured using Dimension VISTA 1500 (SIEMENS).

FAS, ACC and insulin were measured by double-antibody sandwich enzyme-linked immunosorbent assay (ELISA) (Bioassay Technology Laboratory).

Statistical Analysis: Analyzing the data were conducted by statistical package software (SPSS). The t-test of significance was tested for identified the differences between the means. Results were expressed as mean \pm SEM.

RESULTS

Effect of EDS on Body Weight: Results outlined in Table 1 uncover that EDs had more impact on body weight gain, with 89.66 % and 84.67 % for high doses Red Bull and Code Red compared with control (61.55 %), respectively. Changes in body weight were significantly ($P \leq 0.05$) more influenced of higher doses of EDs than lower doses of both EDs (RB-LD and CR-LD).

Effect of EDS on Serum Levels of Liver Enzymes and Lipid Profile: Figure 1 represent the impact of EDs on liver function enzymes (ALT, AST, and ALP). Generally, higher ALT was recorded in experimental rats when compared with the control, with essentially more elevated levels of ALP and AST exerted in rats co-administered both lower and higher doses of RB and CR. Utilization of EDs has higher impact on serum total protein and albumin levels particularly at higher doses of energy drinks as compared

with control group(Figure 2). However, lower levels of bilirubin and direct bilirubin were recorded in animals

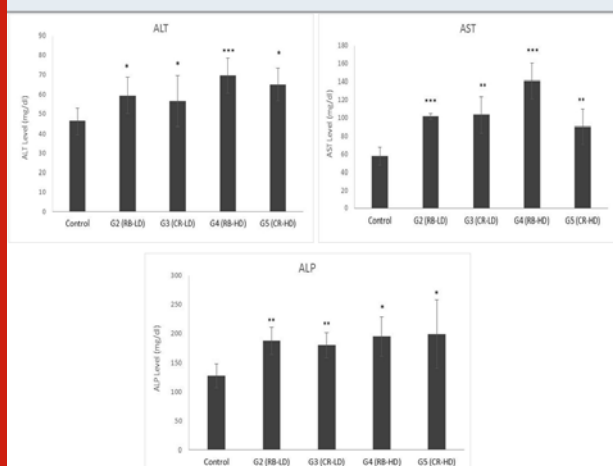
administered low and high doses of EDs comparable to the control group (Figure 3).

Table 1. Effect of different treatments on weight gain (%) in all rat groups.

Change in body weight	Weight Gain (%)	Final Weight (g)	Initial Weight (g)	Groups (g)
61.55	60.96	160 ± 12.23	99.04 ± 9.93	G1 (control)
53.77	55.25	158 ± 25.95	102.75 ± 9.33	G2 (RB-LD)
66.48	75.13	188.125 ± 27.16 **	113 ± 11.11	G3 (CR-LD)
89.66	90.00	190.375 ± 13.33 ***	100.37 ± 19.11	G4 (RB-HD)
84.67	82.87	180.75 ± 18.56**	97.88 ± 10.27	G5 (CR-HD)

All statistics data were stated as mean ± SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), (**) & (***) compared to normal control (G1), respectively. RB-LD = 5 ml Red Bull/day; CR-LD = 5 ml Code Red/day; RB-HD=10 ml Red Bull/day; CR-HD =10 ml Code Red/day.

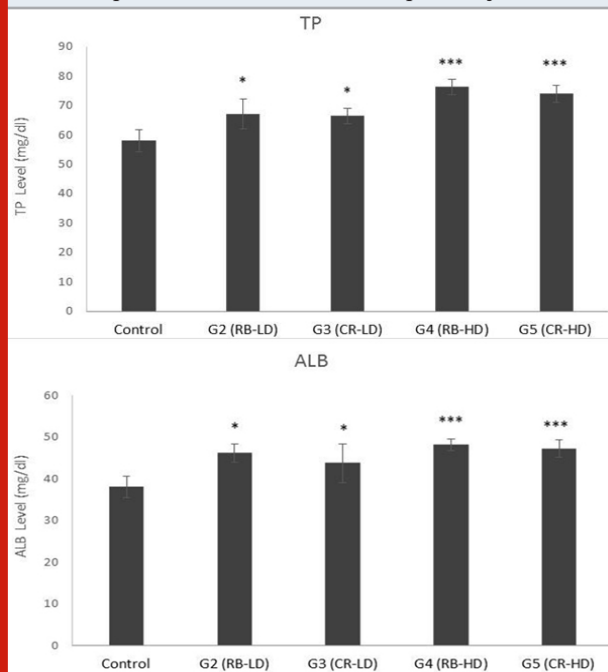
Figure 1: Comparison of serum ALT, AST and ALP activities (mg/dl) in different studied groups: control; G2: Red Bull (5ml/day); G3: Code Red (5ml/day) ; G4: Red Bull (10ml/day); G5: Code Red (10ml/day). All statistics data were stated as mean ± SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), (**) & (***) compared to normal control group, respectively.



The impacts of EDs on lipid profile as shown in Figure 4excreted a significant lower levels of total lipids, total cholesterol, triacylglycerol, and LDL-cholesterolin experimental animals co-administered lower or higher doses of Red Bull or Code Red (5ml/day or 10 ml/day individually). On other hand, significantly higher HDL-cholesterol levels was recorded when administered higher dosages of Code Red in contrast with the control (Figure 4).

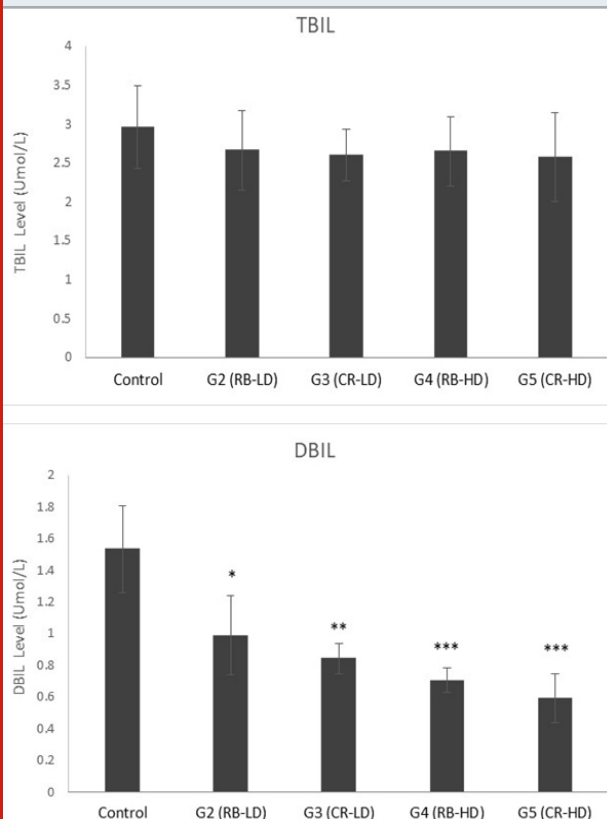
Consumption of energy drinks has significant effect ($P \leq 0.05$) on serum FAS as well as on ACC activities, significantly higher levels of both enzymes were observed when consumption of EDs as comparable with the

Figure 2: Comparison of serum total protein (TP) and albumin (ALB) levels (mg/dl) in different studied groups, control; G2: Red Bull-low dose (RB-LD, 5ml/day); G3: Code Red-low dose (CR-LD, 5ml/day); G4: Red Bull-high dose (RB-HD, 10ml/day); G5: Code Red-high dose (CR-HD, 10ml/day). All statistics data were stated as mean ± SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), (**) & (***) compared to normal control, respectively.



control group. The values of serum FAS and ACC were significantly ($P \leq 0.05$) higher in rats administered high doses of energy drinks (RB-HD and CR-HD) than those observed in rats administered low doses of energy drinks (RB-LD and CR-LD)(Figure 5).

Figure 3: Comparison of serum total bilirubin (TBIL) and direct bilirubin (DBIL) levels (Umol/L) in different studied groups, control; G2: Red Bull-low dose (RB-LD, 5ml/day); G3: Code Red-low dose (CR-LD, 5ml/day); G4: Red Bull-high dose (RB-HD, 10ml/day); G5: Code Red-high dose (CR-HD, 10ml/day). All statistics data were stated as mean \pm SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), () & (***) compared to normal control, respectively**

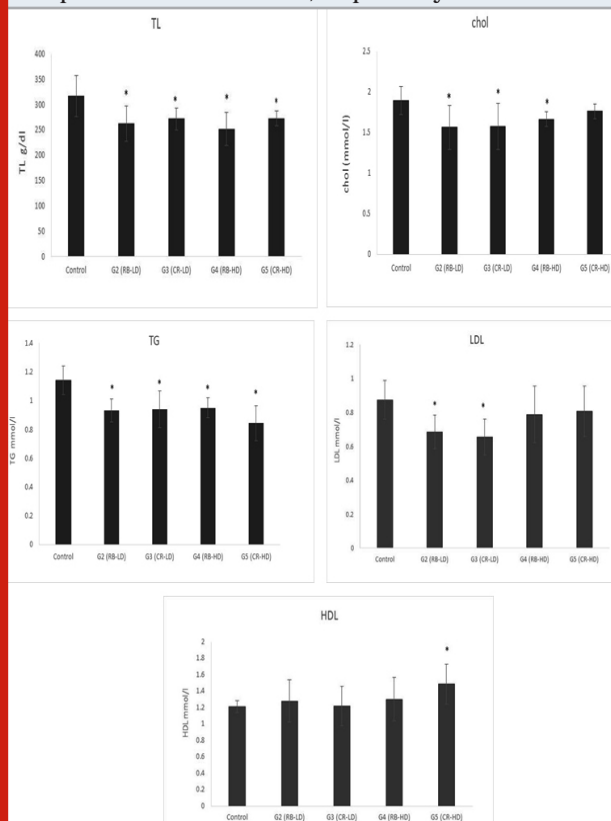


Effect of EDS on Levels of Blood Glucose and Insulin: The results showed that the consumption of EDs led to a significant increase in blood glucose and insulin levels compared to the control group. The results of the present study also indicated that the estimates of blood glucose and insulin were essentially higher ($P < 0.05$) in rats given high doses of RB-HD and CR-HD than those of low doses administered of both types (Figure 6).

DISCUSSION

In the present research, it was found that Red Bull® and Code Red® have differing effects on liver enzymes and lipid profile. However, both drinks contained increased levels of serum liver markers, which strongly indicates that they may cause a cellular leak and reduce the functional integrity of the hepatocyte membrane (Elsadek et al., 2017, Fathy et al., 2017). The ingredients of energy drinks are absorbed in the intestine, after which they pass through the portal vein to the liver. Thus, higher concentrations of ED ingredients pass through the portal circulation system than the systemic circulation (Pencek

Figure 4: Comparison of serum total lipids (TL), total cholesterol (chol), Triglycerides (TG), LDL-Cholesterol and HDL-Cholesterol levels in different studied groups, control; G2: Red Bull-low dose (RB-LD, 5ml/day); G3: Code Red-low dose (CR-LD, 5ml/day); G4: Red Bull-high dose (RB-HD, 10ml/day); G5: Code Red-high dose (CR-HD, 10ml/day). All statistics data were stated as mean \pm SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), () & (***) compared to normal control, respectively.**

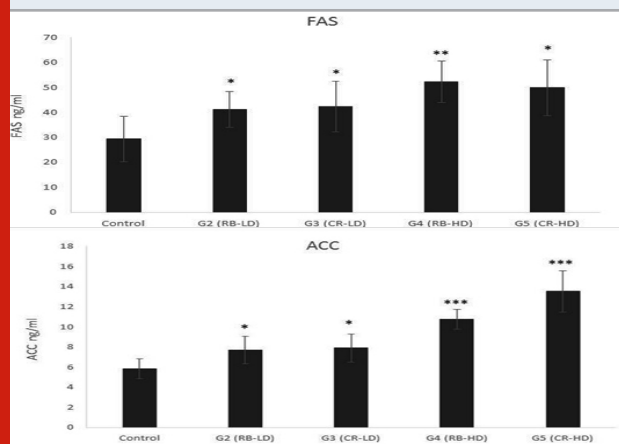


et al., 2004) It is thus likely that the extraction and metabolic conversion of energy drink ingredients take place in the liver.

If liver tissue becomes damaged, it can cause cellular enzymes to spill out into the blood, causing an increase in plasma or serum. This suggests that hepatic injury can result from the consumption of such drinks. Many researchers were in line with those of the present study, namely that increased serum AST, ALT and ALP are produced during long-term energy drink consumption (Kutia et al., 2019, Ugwuja, 2014, Mancy et al., 2017, University et al., 2019). On the other hand, Costa-Valle et al (2018) performed a study in which they singly administered 10 ml/kg doses of "Red Bull" to rats and found that these enzyme levels were within the reference range. However, the different experimental models used in different studies may explain the variation in results regarding the impacts that energy drinks have on hepatic functions. In other words, research findings may be impacted by the different animals, energy drinks, dose and duration of use employed in each study.

Niacin(vitamin B3) can cause hepatotoxicity, varying from mild aminotransferase increases to complete hepatic failure(Leung et al., 2018).

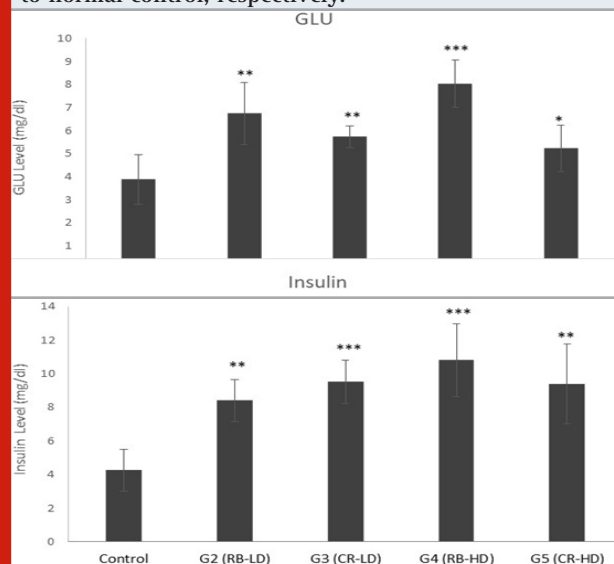
Figure 5: Comparison of serumfatty acid synthase(FAS) and acetyl-CoA carboxylase (ACC)activities in different studied groups, control; G2: Red Bull-low dose (RB-LD, 5ml/day); G3: Code Red-low dose (CR-LD, 5ml/day); G4: Red Bull-high dose (RB-HD, 10ml/day); G5: Code Red-high dose (CR-HD, 10ml/day). All statistics data were stated as mean \pm SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), () & (***) compared to normal control, respectively.**



It was revealed in the present study that both types of energy drink reduced plasma total cholesterol, LDL, total lipid and triglycerides. However, these findings contradicted those of other researchers (Ebuehi et al., 2011, Ugwuja, 2014). The reduction in lipid profile largely contrasts the increased bodyweight of the rats after being administered with doses of ED. In the present study, this is understandable because the excess energy consumed is not used, and thus is stored in the body, which ultimately affects body weight. However, this contradicts the findings of other studies which show that combining EDs with exercise or alcohol causes a decrease in body fat (Ballard et al., 2010, Ugwuja, 2014).

What's more, the reduction in cholesterol concentration after consuming both energy drinks may be explained by the increased taurine and/or niacin in the drinks. As both niacin and taurine are used to prevent and treat atherosclerosis, this change may be anticipated (Chen et al., 2012, Julius, 2015). To be more specific, niacin may reduce serum cholesterol and triglycerides whilst simultaneously increasing HDL concentration (Barter, 2011). Furthermore, several studies have investigated the impacts of caffeine (the key ingredient of most energy drinks) on lipid profile and atherogenesis predisposition (Adebayo et al., 2007). Many of these studies have revealed that caffeine consumption significantly alters lipid parameters (Marangon et al., 2012, Nakagawa and Pedrosa, 2013). Moreover, other studies have concluded that most of the observable effects caused by energy

Figure 6: Comparison of serum Glucose (GLU) and Insulin levels in different studied groups, control; G2: Red Bull-low dose (RB-LD, 5ml/day); G3: Code Red-low dose (CR-LD, 5ml/day); G4: Red Bull-high dose (RB-HD, 10ml/day); G5: Code Red-high dose (CR-HD, 10ml/day). All statistics data were stated as mean \pm SEM using student t-test with significant differences at $p < 0.05$, $p < 0.001$ and $p < 0.0001$ as indicated by (*), () & (***) compared to normal control, respectively.**



drink consumption are related to caffeine (Kammerer et al., 2014).

These drinks cause major increases in serum fatty acid synthase (FAS) and acetyl CoA ACC. Acetyl CoA carboxylase is a product of the carboxylation process of acetyl CoA, in which malonyl CoA is produced. Additionally, HCO_3^- and ATP are required in this process. Biotin is a coenzyme here, which covalently binds to lysyl residue produced by the carboxylase. (Harvey, 2011) stressed that long-term consumption of a high-calorie diet causes acetyl CoA carboxylase synthesis to increase, which ultimately increases fatty acid synthesis. In the present work, a reduction in lipid levels was observed. However, this was not reflected in the high activity of both enzymes following the consumption of energy drinks. On the other hand, caffeine could stimulate lipolysis by altering the regulation of FAS and AC, which led to a depletion in TG and cholesterol levels on lipid accumulation in the human liver cell line(Quan et al., 2013).

Serum insulin and glucose levels were found to be much higher in rats who were administered high doses of RB and low doses of CR in the present study. This is in line with other studies revealed that glucose levels were significantly increased in all energy-drinking human and animal models (Basrai et al., 2019, Macdonald, 2016). Sugar and caffeine are the primary components of energy drinks and they have been found to increase postprandial hyperglycemia in both animals and young

people(Desouky et al., 2019, Kolnes et al., 2010, Nowak et al., 2018). Moreover, combining niacin with high sugar or carbohydrate content (as is the case with EDs) can significantly impact the metabolism of carbohydrates metabolism and cause diabetes(Zhou et al., 2010).

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Development and Implementation of Composition on the Basis of Disposed Polymer Waste

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ABSTRACT

Every year, the amount of polymer products used in the country in our country is constantly growing, and these products, after use, turn into waste and cause environmental damage to our flora and fauna. The emissions of polymers used in technology are increasing year by year with the same intensity. The recycling of non-biodegradable polymer wastes is of both environmental and economic importance. However, the incomplete study of recycling methods limits the use of these valuable raw material sources. The article shows the reasons for the decommissioning of polymeric materials and analyzes the methods of recycling. Polymeric materials do not rot, do not corrode, etc. Their recycling is not only an economic problem, but also an environmental problem that needs to be addressed

KEY WORDS: WASTE, POLYMER PRODUCTS, RECYCLING, ECOLOGY, MODIFICATION, PROCESSING, BITUMEN. DESTRUCTION, POLYMER WASTE, POLYMER-BITUMEN COMPOSITION, PHYSICAL AND MECHANICAL PROPERTIES.

INTRODUCTION

Recycling of polymer waste from domestic sources is a very difficult task. It is almost impossible to organize the collection of this waste. Even if collected, there are difficulties in sorting, cleaning, shredding, washing and drying the waste. Despite all these difficulties, the recycling of polymer waste is of great environmental importance. If the structures remain and are not destroyed, it is much easier to recycle polymers of the same composition. Of course, the process of destruction is such that significant changes can occur in the macromolecule and morphology of the polymer. As a result of these changes, all the physical properties of the polymer deteriorate.

Therefore, the use of mechanical methods in the recycling of polymer waste does not give the desired results. Because during mechanical processing, macromolecules become more destructive and lose their physical and mechanical properties.

RESULTS

Taking into account the fact that there are 40-50 thousand tons of polyethylene and polystyrene waste in the republic every year, we determined that the method of their utilization is in the modification of road petroleum bitumen.

PS destruction occurs mainly as a result of high temperatures. As a result of destruction, the molecular weight of PS decreases. This can be seen more clearly in Figure -1. Polystyrene recycling and utilization methods. The reprocessing of homogeneous polymers is very simple if their structures are not destroyed. If the structure of the polymer is destroyed, then its molecular weight decreases and the physical and mechanical properties of the polymer deteriorate. If the polystyrene waste retains its original physical and mechanical properties,

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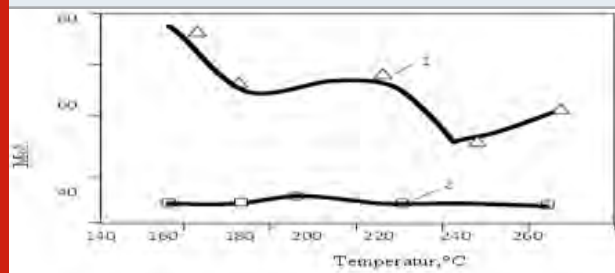
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it can be used only for special purposes. Polystyrene is used in many different fields. Polystyrene is the main raw material in the production of packaging materials, coatings, electrical and electronic structures, toys and other products.

Figure 1: PS destruction in oxygenated and non-oxygenated environments 1-oxygenated, 2-oxygen-free.



DISCUSSION

The article used the polystyrene waste shown in Table .1 to obtain a polymer-bitumen composition. 1-oxygenated, 2-oxygen-free. The joint use of PS and polyethylene waste is also of great environmental and economic importance. "Baku" brand bitumen was modified with polymer waste. The physical and mechanical properties of the obtained polymer-bitumen binder were studied by 2 modern research methods and the obtained results are given in Tables 1., 2., 3. and 4.

3.1 Polymer-bitumen binder: Polymer-bitumen binder (PBA) is the most important element of the asphalt-concrete pavement of modern roads. The life of the road built on the basis of polymer asphalt-concrete mixture prepared using PBE is at least 7-8 years longer. Disposal to produce PBA.; Xm ;. We recommend the use of Pokr; .kaiar waste.

Table 1. Physical and mechanical properties of polymer-bitumen composition obtained with "Baku" brand petroleum bitumen modified with polystyrene waste

the name of the indicator	DŪIST 52 056203 requirements for.	Bakı bitumu « 85/25 »	2,5 mass fraction polymer bitumen composition modified with polystyrene waste
The depth of penetration of the needle into the sample, 0.1 mm at 25 ° C 25°C-	60 32	74 25	62 27
Length, cm 25°C- 0°C-	25 11	140 3,5	103 23
, softening tem °C	54	42	68
elasticity % 25°C- 0°C-də	80 70	4 3	89 70
sand and stone adhesion		sticks well	
135°C- kinematic viscosity	455	-	1159
60°C- dynamic viscosity	270	-	931
after testing by the method ASTM P 1734			
Volume change, blunt. by%	-	0,3	0,21
softening tem, °C	-	604	1608

Table 2. Polymer-bitumen modified with polyethylene waste physical and mechanical properties of the composition

the name of the indicator	DŪIST 52056-2003 according to the norm	The amount of PE in the polymer-bitumen composition, m.f.		
		2 mass.f.	4 mass.f.	6 mass.f.
the depth of penetration of the needle into the sample, 0,1 mm 25°C-də 0°C-də	40 25	74 25	43 22	41 20
stretch, sm 25°C- 0°C	15 8	20 3,5	18 10	16 9
softening temperature, °C	56	64	68	72
brittleness temperature , °C	-18	-22	-26	-40
elasticity , % 25°C-də 0°C-də	80 70	85	95	60
Change of softening temperature after heating, °C	5	3	2	1
of the ignition temperature, °C	210	300	320	350
Kinematic viscosity at 135 ° C	-	455	4768	5940

Table 3. Physicochemical properties of polyethylene waste

№ r.	characteristic	brands of polyethylene waste					
		A-1	A-2	A-3	B-1	B-2	B-3 B-4
1	primary raw materials	Məişət tullantıları, kuloklar, qablaşdırma məmulatları, plyon-kalar			Aşağı təzyiqli polietilen tullantıları, istehsal tullantıları		
2	Density, g / cm ³	0,915	0,915	0,915	0,945	0,945	0,945
3	Axis index of the alloy: 21.17 H (2.16 kgf) at load 49.0 H (5.0 kgs) in load	0,1-10 -	0,1-10 -	0,1-10 -	- 0,1-35	- 0,1-35	- 0,1-2,0
4	Mass fraction of volatile substances, %	0,30	0,30	0,30	0,30	0,30	0,30
5	mass fraction of ash, %	5,0	5,0	7,0	5,0	5,0	0,1
6	Threshold in traction, MPa	8,0	8,0	8,0	15,0	15,0	15,0
7	Relative elongation at break, MPa	300	300	300	250	250	250
8	Compression density kg / m ³	400	400	250	400	400	400

These polymer wastes repeatedly increase the basic properties of petroleum road bitumen. These indicators include durability, water and cold resistance, resistance to cracking, durability (up to 50 ° C), resistance to displacement, etc. can be shown. Although we increase the price of asphalt concrete by 1% using PBA, its other properties are: longevity of the road, ecological cleanliness, effective use of the road surface in accordance with world standards.

According to the state program of our republic, the construction of 5,000 km of roads that can meet world standards by 2035 has become the most relevant. Polymer modification is the most effective way to ensure that the physical and mechanical properties of petroleum bitumen used in road construction meet the requirements of the standards. Rubber grind | RO | The physical and mechanical properties of the polymer-bitumen composition based on the properties of the original bitumen depend on it. Bitumen RO polymer is even 2.5% k. h. The elasticity of such a composition can be increased by more than 70% at 25 ° C. RO added to bitumen dramatically increases its viscosity. As can be seen from Table 3.6, the kinematic viscosity at 135 ° C and the dynamic viscosity at 60 ° C are blunt when Craton DT 1101CS is added with 2.5% SBS. increases by 2.4 and 3.65 times, respectively.

SBS polymer increases the ability of bitumen to deform at 0 ° C, which is 10 times higher than the deformation properties of the original bitumen. Anti-aging resistance of polymer-bitumen compositions by ASTM D 1754 method was studied. The results obtained are shown in Table 3.6. As can be seen from Table 3.5, the amount of SBS polymer in the polymer-bitumen composition is 2.5% k. h to 4.0% k. When raised to h, both the kinematic viscosity and the dynamic viscosity increase. At the same time, as can be seen from Table 3.6, the physical and mechanical properties of the composition fully meet the requirements of DUIS 52058-2003.

The high structure of the polymer-bitumen binder does not allow it to be fully studied. The amount of SBS polymer in the polymer-bitumen composition is 6%. When it reaches h, the "softening temperature" increases sharply and it becomes difficult for the needle to enter the sample. Thus, by changing the amount of SBS type polymer in the polymer-bitumen binder, it is possible to obtain any characteristic modified PBA. The dispersion modified by the SBS polymer is a system (not homogeneous), ie it does not have thermodynamic stability, so it breaks down into layers. The more similar the polymer to bitumen, the more thermodynamically stable a system can be based on them. This has been proved by our experiments. Thus, a polymer-bitumen

binder prepared in the laboratory is quickly separated into layers, while a high-efficiency mixer (Asphalt plant

with P-1) is used. If PBA is prepared in a colloid mill, its dispersion can be significantly increased. As shown in Table 3.3.

Table 4. Characteristics of industrial wastes consisting of YTPE and ATPE mixtures

№ sır.	characteristic	Industrial wastes consisting of YTPE and ATPE mixtures					
		Markalar:					
		B-1	B-2	B-3	Q-1	Q-2	Q-3
1	primary	PE-nin sənaye tullantıları			YTPE və ATPE qarışıqları əsasında sənaye tullantıları		
2	density q/sm^3	0,915	0,915	0,915	0,915	0,915	0,915
3	Flow rate of the alloy, g / 10 min. Loads: at 21.17 H. When 49.0 H	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35	0,1-35 0,1-35
4	Mass fraction of volatile substances, %	0,30	0,30	0,30	5,0	5,0	5,0
5	Mass fraction of ash, %	5,0	5,0	5,0	7,0	7,0	7,0
6	Stretch limit, MPa	8,0	8,0	8,0	8,0	8,0	8,0
7	Fracture strength limit, MPa	8,0	8,0	8,0	8,0	8,0	8,0
8	Relative elongation at break, %	300	300	300	250	250	250
9	Scattering density (kg formation), kg / m ³ 400 400 400 300 300 300 Characteristics of industrial wastes consisting of YTPE and ATPE mixtures	400	400	400	300	300	300

Table 3.5. Polymer-bitumen obtained using SBS polymer physical and mechanical properties of the composition

Göstəricilərin adı	Bakı 85/25 bitumun göstəriciləri	DÜİST 52056 əsasən tələbat	SBS-lə modifikasiya olunmuş polimer-bitum		
			2 k. h. SBS	4 k. h. SBS	6 k. h. SBS
İynənin nümunəyə girmə dərinliyi (Penetrasiya), 0,1 mm 25°C-də	40 25	47 25	64 26	78 27	68 25
Uzanması, sm 25°C-də 0°C-də	15 8	40 3,5	50 13	48 12	53 14
Yumşalma temperaturu, °C	56	48	53	72	78
Qızdırıldıqdan sonra yumşalma temperaturunun dəyişməsi, °C	3	2	2	1	1
Kövrəklik temperaturu, °C	-15	-19	-23	-24	-26
Elastiklik, % 25°C-də 0°C-də	40 30	80 70	75 65	85 74	85 75
Alovlanma temperaturu, °C	230	300	340	360	400
Quma və ya marmərə yapışması (ilişməsi)	tələbatı ödəyir				
Yanğın təhlükəsi	təhlükəlidir				
135°C-də kinematik özlülük	-	455	980	1914	2102
60°C-də dinamik özlülük	-	210	1806	2947	3048
ASTM D 1754 üsulu ilə həcm dəyişikliyi, % küt.	sınaq olunanndan sonra				
Qalıq penetrasiya, %	-	72	80	93	96
Yumşalma temperaturu, °C	40	53	63	66	74
25°C temperaturda uzanması, %	110	47	45	38	32

CONCLUSION

The use of HRS, mainly in the modification of petroleum bitumen, has a more significant effect. The price of HRS-modified bitumen increases by 30%. The price of asphalt concrete made with modified bitumen increases by 7%. However, the life of the asphalt layer of the HRS-modified bitumen pavement increases by 40%, extending the service life of the road from 2 to 8 years, which saves more than 50% of the cost of repairing and rebuilding the road. Our calculations show that the city of Baku and its environs have 600,000 tons of modified road surfaces per year. When covered with asphalt concrete, it is possible to achieve 3.5 million economic benefits per year. Tehnoloji this new method is proposed etdiyimiz at the same time, are the two most important issue, but ask you to say that the use of, than those used rezin tullantılarında emalı tullantılarında and oil product is taken and ekologiyamıza eligible following the polimer and oil emalı which brings great falakat tullantılarında clean the city of Baku.

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The Creative Skills of Administrative Leaders and Their Impact on Employees' Job Characteristics in Jordanian Public Financial Institutions

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ABSTRACT

The present study aimed to explore the creative skills of administrative leaders in Jordanian public financial institutions. It aimed to explore the impact of the creative skills of the administrative leaders on employees' job characteristics in Jordanian public financial institutions. To meet the study's goals, a questionnaire was used. Questionnaire forms were distributed to 582 individuals. Several results were reached. For instance, it was found that the respondents' attitudes towards the creative skills of administrative leaders are positive. It was found that the respondents' attitudes towards their job characteristics are positive. It was found that the creative skills of administrative leaders have significant impact on the employees' job characteristics (i.e. variety of skills, task identity, task significance, autonomy and feedback). The researchers recommend developing the creative skills of administrative leaders in financial institutions. That shall improve the employees' job characteristics. It shall improve the performance efficiency and effectiveness of financial institutions. It shall enable those institutions to meet their intended goals

KEY WORDS: CREATIVE SKILLS OF ADMINISTRATIVE LEADERS, JOB CHARACTERISTICS.

INTRODUCTION

The world has been witnessing developments in various areas .Such areas include: the technological, economic and social areas. In this regard, effective leadership is needed to keep up with the latest developments and achieve much growth. However, having an effective leadership requires understanding employees and promoting cooperation among employees. It requires adopting modern leadership styles. Due to the significance of effective leadership, leaders' behaviours have been

receiving much attention by researchers. Such behaviours have significant impacts on organizational success and employees' behaviours.

The success of the group work requires having wise leaders who make plans, coordinate efforts and set goals efficiently. It requires having leaders who possess positive personal traits and much knowledge. That is needed in order for the employees to trust the leaders (Abu Baker, 2001). In this regard, organizations are in need for having creative leaders who promote creativity through using a variety of methods. Such methods include: taking the individual differences between employees into consideration, and supporting employees' non-conventional ideas. They include: engaging employees in the processes of setting goals and making decisions. They include: developing employees' creative skills, promoting trust among employees and developing employees' team work and problem solving skills (Radostina, et.al, 2006).

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It has been suggested that the administrative leaders' creative skills affect the employees' job characteristics. Hence, the researchers of the present study believe that it is very necessary to conduct studies about such impact. Conducting such studies shall contribute to meeting the organizational goals and utilizing the full potentials of employees.

Statement Of The Problem: Several changes have been experienced. In this regard, Jordanian public and private organizations must handle such changes. That should be done through making changes to the functions of leaders, using modern systems and coming up with innovative ideas. To handle changes efficiently, Jordanian public financial institutions have been providing much attention to the development of the creative skills of their administrative leaders. Such skills affect the employees' organizational loyalty and extent of achieving alignment between the employees' personal goals and the organizational goals (Yeh, 1995). The extent of having creative skills by administrative leaders affect the employees' desire to develop and achieve self-realization (Lambert, 2004). The problem of this study is represented in exploring the impact of the administrative leaders' creative skills on employees' job characteristics in Jordanian public financial institutions.

3. Questions

This study aimed to answer:

- Q.1. What is the extent of possessing creative skills by administrative leaders in Jordanian public financial institutions?
- Q.2. How do employees perceive their job characteristics in Jordanian public financial institutions?
- Q.3. What is the relationship between the creative skills by administrative leaders and the employees' job characteristics in Jordanian public financial institutions?

4. Significance of the Study

The significance of the present study is listed below

- As far as the researchers know, the present study is the first study that addresses this subject
- The present study fills a gap in the relevant literature published in Arabic language. It provides information that facilitate the process of conducting research about the creative skills by administrative leaders

5. Objectives: The present study aimed to explore the creative skills of administrative leaders in Jordanian public financial institutions. It aimed to explore the impact of the creative skills of administrative leaders on employees' job characteristics in Jordanian public financial institutions. It aimed to explore the way employees perceive their job characteristics in Jordanian public financial institutions

6. Hypotheses

The researchers of the present study developed the following hypotheses:

H0.1. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' variety of skills.

H0.2. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' autonomy.

H0.3. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' task significance.

H0.4. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' task identity.

H0.5. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the feedback.

7. Operational Definitions:

The operational definitions are listed below

1)-Administrative leaders' creative skills: They include the skills listed below:

a) Problem solving skills: They involve the skills needed for solving problem(s) which may be social, philosophical or scientific problems or etc.... (Randy, 1993).

b) Personal skills: They include the skills needed for dealing with individuals and groups and promoting collaboration and a team work spirit. They enable leaders to identify the opinions and interests of employees (Al-Anani, 1995).

c) Collaboration skills in the decision making process: They include the skills needed for engaging emotionally and cognitively in the decision making process. They enable the leader to meet the common goals and handle responsibilities efficiently (Al-Salmi, 1999).

d) Communication skills: They include the skills needed for exchanging information, data, opinions, ideas, and commands in a direct or indirect manner to meet the organizational goals (Abbas, 2004).

e) Negotiation skills: They include the skills needed for holding negotiations with others (Tawfeeq, 2004).

2)-Job characteristics: They include the ones listed below:

a) Variety of skills: It is represented in having a variety of skills that enable one to do various functions and works at the workplace.

b) Autonomy: It is represented in enjoying much freedom at work in terms of setting work schedule, making decisions, and choosing the methods needed to do tasks.

c) Task significance: It is represented in the employee's feeling that his/her job is important. and has significant impacts on individuals and the whole organization.

d) Task identity: It is represented in doing the work from the beginning to the end.

e) Feedback: It is represented in providing employees with clear information about the outcomes of their work.

8. The Study's Methodology:

8.1. The Study's Approach: A descriptive analytical approach was adopted and a survey was used for collecting data.

Variable	Category	Frequency	Percentage
Gender	Male	338	58.1%
	Female	244	41.9%
Age	30 years or less	112	19.2%
	31-40 years	218	37.5%
	41-50 years	178	30.6%
	51 years or more	74	12.7%
Academic qualification	Secondary school	86	14.8%
	certificate or less		
	Diploma	187	32.1%
	BA degree	281	48.3%
Job	Graduate degree	28	4.8%
	Manager	33	5.67%
Experience	Employee	549	94.33%
	5 years or less	72	12.4%
	6-10 years	204	35.1%
	11-15 years	123	21.1%
	16-20 years	100	17.3
	21 years or more	83	20%
			14%

8.2. Population: The study's population is represented in all the employees working at five Jordanian public financial institutions that are specialized in lending. It includes the managers of the top, middle and low management levels. It consists from 1332 female and male employees. Those employees work in (Agricultural Credit Cooperation, Orphans Fund Development Foundation, Development and Employment Fund, Industrial Development Bank, and Cities and Villages Development Bank).

8.3. Sample: The researchers of the present study selected a sample that consists from 666 employees. This sample represents 50% of the population. Questionnaire forms were distributed to the members of the sample. 609 forms were retrieved. 27 questionnaire forms were excluded because they aren't valid for analysis. Thus, 582 questionnaire forms were analyzed statistically. Data about the sample is presented below in table (1)

5.67 % of the respondents are managers and 94.33% of the respondents are employees. 58.1% of the respondents are males and 41.9% of the respondents are females. 37.5% of the respondents' ages are within the range of 31-40 years.19.2% of the respondents' ages are 30 years or less. 48.3% of the respondents hold BA degree and 32.1% of the respondents hold diploma. 35.1% of the respondents have an experience that is within the range of 6-10 years.

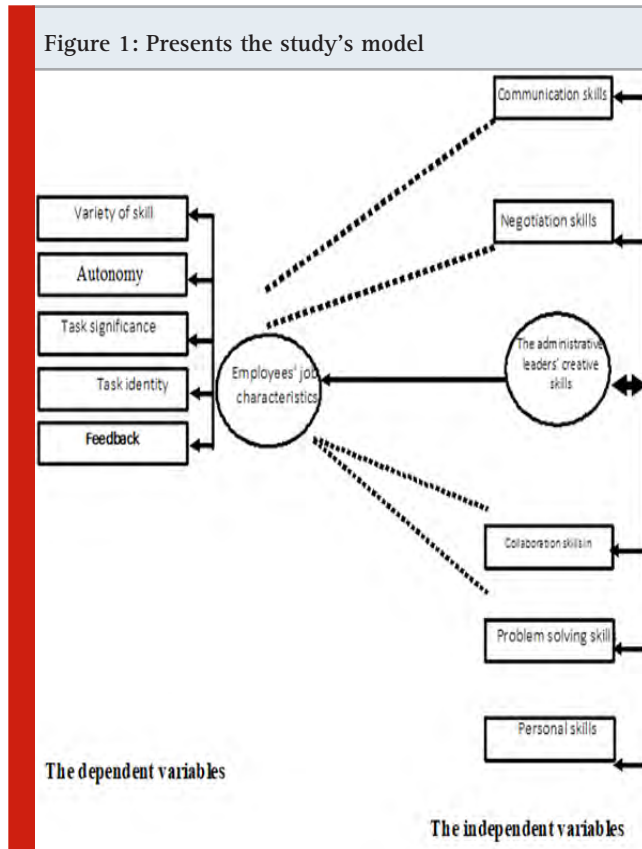
8.4. Instrument: The researchers used a questionnaire. The first part of the questionnaire collects demographic data about the sample. The second part includes 54 items. It collect data about the independent and dependent variables. Items No. (1-34) collects data about the administrative leaders' creative skills. They were drafted based on the works of Bass, & Avolio (1990), Shakeela (2004), Al-Kharshah (2006), Al-Khlafat (2006) and Ba Omar (2007). Items No. (35-54) collects data about the employees' job characteristics. They were drafted based on the works of Hackman & Oldham (1976), Askar (1989), Al-Kalabi (1997) and Al-E'baidain (2004). The five point Likert scale was used. It consists from the following categories: It always applies, it often applies, it applies sometimes, it rarely applies, and it never applies. They stand for the following scores respectively: 5, 4, 3, 2 and 1.

8.5. Validity and Reliability of the Instrument: To measure the validity of the questionnaire, the initial version of the questionnaire was passed to 10 experts who work as faculty members in Jordanian universities. Those experts were asked to assess the questionnaire. Changes were made to the questionnaire in the light of their comments. The Cronbach Alpha coefficient values are presented in table (2). They were calculated to measure the reliability of the questionnaire.

Items No.	Variable	The Cronbach Alpha coefficient value
1-34	The administrative leaders' creative skills	0.8952
35-54	The employees' job characteristics	0.9035
1-54	Overall	0.9125

The overall Cronbach alpha value is 0.9125. The latter value indicates that the questionnaire is very reliable.

8.6. The study's model



8.7. Statistical analysis:

The SPSS.10 program was used. The following statistical methods were used:

- Descriptive statistical methods (i.e. means and standard deviations)
- Pearson's correlation coefficient values
- Analysis of variance (ANOVA)
- Stepwise Multiple Regression Analysis
- Variance Inflation Factory (VIF) and Tolerance values to make sure that there isn't any Multicollinearity problem
- Skewness analysis to make sure that data is normally distributed

9. Theoretical framework

9.1. Creative leadership: Leadership has a major impact on employees and the whole organization. However, the effective leadership must be based on creativity. In fact, creative leadership shall enable leaders to employ knowledge efficiently for solving problems, handling responsibilities and planning actions in a strategic manner. Leaders should be very creative and promoters of creativity. They should link new ideas with each other in a creative manner. They must identify and address problems in a unique manner (Ibrahim, 2002:211; Robbins, 1997). Creative leaders are intellectualists.

They play a significant role in carrying out the research and development operations (Huczynski & Buchanan, 2001). The absence of an environment that is supportive

for creativity shall hinder the promotion of creativity. Promoting creativity requires accepting others' ideas and tolerance for others' different and non-conventional ideas (Ibrahim, 2002: 218). In this regard, the researchers of this study define creative leadership as the process of leading others in a creative manner in order to meet the intended goals of the organization. Such leadership involves influencing, guiding and motivating others.

9.2. Relationship between leadership skills and employees' job characteristics: Showing and promoting creativity in organizations aren't easy. To facilitate such processes, it is necessary to understand the relationship between administrative leadership and creativity. Leaders today must be creative. That shall enable them to solve problems, re-construct knowledge and find creative solutions. It shall enable them to handle risks and responsibilities efficiently, realize the consequences of things, and plan actions in a strategic manner (Darren, 2005).

To improve leadership, leaders' skills must be developed and more attention must be provided to collaboration in the decision making process. Improving leadership requires developing employees' team work skills and leaders professionally. Developing leaders professionally includes developing the leaders' creative skills (Kouzes, and Posner, 2002) Leadership is the process of interaction between leaders and subordinate. It aims at meeting the organizational goals. The effectiveness of the leadership is affected by the leader' skills and personality (Karen, & Ian, 2007). For instance, the leader must be able set goals efficiently. He must be able to achieve alignment between the employees' personal goals and organizational goals (Trudy et al., 2007).

The capability of the leader to inspire employees shall affect his/her credibility. It is affected by the leader's capability to align the organizational goals with the individuals' interests and values. It is affected by the extent of rewarding employees who made achievements (Kouzer and Posner, 2002, Zanatta, 2004). Effective leaders are capable of motivating and inspiring employees (Wallis & Dollery, 1997). The leader who can effectively implement the organizational strategies have various skills. They are capable to imitate other. They are capable of motivating others and identifying the available opportunities. They have decision making skills. They can make changes. They can drive employees to change themselves in a positive manner (Sultan, 2002).

In the light of the aforementioned information, the researchers of the present study found that creative leaders affect the employees' job characteristics. For instance, creative leaders are capable of promoting organizational commitment and loyalty and achieving alignment between between the employees' personal goals and organizational goals. They delegate powers to employees and engage employees in the decision making process. They emphasize the significance of team work. Hence, they significantly develop employees'

skills and increase their autonomy. They develop the employees' task identify and task significance. They provide employees with feedback (i.e. clear information about the outcomes of his/her work).

10. Previous Studies: Al-Khalayleh and Sa'adeh (2010) aimed to explore the extent of practicing transformative leadership by principals in Zarqa and its relationship with the female and male teachers' organizational citizenship. The sample consists from 256 female and male teachers. Two scales were used. It was found that there is a significant positive relationship between the extent of practicing transformative leadership by principals in Zarqa and the teachers' organizational citizenship.

Al-Zaydaneen (2008) aimed to explore the impact of the team characteristics on developing employees' job characteristics in the Jordanian Ministry of Interior. A questionnaire was used. The sample consists from 255 individuals. It was found that the team characteristics have a significant impact on the employees' job characteristics in the Jordanian Ministry of Interior. The job characteristics in the latter study are: (variety of skills, task identity, task significance, autonomy and feedback).

Al-Marhadi (2008) aimed to explore the relationship between job characteristics, workplace environment, and motivation from one hand and organizational performance. The sample consists from 434 employees who were selected from none Yemeni banks and industrial and healthcare organizations. A questionnaire was used. It was found that the attention provided to training and moral and financial incentives are inadequate. The workplace environment is inconvenient. There are significant relationships between job characteristics, workplace environment, and motivation from one hand and organizational performance. Ba Omar (2007) aimed to explore the administrative leaders' creative skills on employees' performance at the workplace in Oman from the perspective of the head of departments. A questionnaire was used. The sample consists from 253 employees. It was found that the administrative leaders' creative skills have a significant impact on employees' performance at the workplace in Oman. It was found that the administrative leaders' creative skills in Omani ministries are excellent. The researcher recommends encouraging administrative leaders to delegate powers.

Al-Kharsah (2006) aimed to explore the impact of leadership skills of achieving excellence in Jordanian business organizations. A questionnaire was used. The sample consists from 100 employees who were selected through the simple random sampling method from 10 Jordanian banks. It was found that Leadership skills have a significant impact on achieving excellence in Jordanian business organizations. In addition, the leadership skills of leaders in Jordanian banks are excellent. The latter researcher recommends achieving administrative development unit in banks to promote creativity. Al-E'baidain (2004) aimed to explore the relationship between administrative empowerment and

job characteristics in Jordan Cement Factories Co. and Jordanian Ports Institution. They selected a stratified random sample that consists from 457 employees. It was found that there is a statistically significant relationship between administrative empowerment and job characteristics. The attitudes towards job characteristics are positive. The level of administrative empowerment is moderate.

Al-E'taibi (2003) aimed to explore the impact of the leaders' leadership skills on employee's job performance in the Saudi Ministry of Defense. He selected a sample that consists from 255 officers. He found that the leaders' leadership skills have a significant impact on employee's job performance in the Saudi Ministry of Defense. The leaders' leadership skills in the latter ministry are excellent. Al-Kalabi (1997) aimed to explore the relationship between job characteristics and outcomes of work. The latter characteristics are: (i.e. variety of skills, task identity, task significance, autonomy and feedback). The latter outcomes are: (performance at workplace, job satisfaction, organizational loyalty, work-related stress, role conflict, work pressure, and work-related problems). 203 questionnaire forms were distributed. 276 forms were retrieved and analyzed. It was found that there is a significant relationship between job characteristics and outcomes of work.

Katsikea et al. (2010) aimed to explore the impact of organizational structure and job characteristics on organizational commitment and satisfaction among sales managers. They selected a sample consisting from 548 individuals. It was found that organizational structure and job characteristics have a significant impact on organizational commitment and satisfaction among sales managers. Organ (2018) aimed to explore the impact of job characteristics and the fairness of the administrative leader on the employees' organizational citizenship behavior. The sample consists from 195 employees who work in the Ministry of Transportation and Communications in Taiwan. It was found that the job characteristics and the fairness of the administrative leader have a significant impact on the employees' organizational citizenship behavior. The job satisfaction of respondents can be used to predict the fairness of leaders and the respondents' citizenship organizational behavior.

11. Results related to the questions:

11.1. Results related to the first question: Q.1. What is the extent of possessing creative skills by administrative leaders in Jordanian public financial institutions? To answer this question, means and standard deviations are calculated that are presented in table (3). The means that are higher than 3.5 are high. The means that are within the range of 2.5-3.49 are moderate. The means that are less than 2.49 are low.

Based on table (5), the overall mean is 3.69 which is high. That means that the extent of possessing creative skills by administrative leaders in Jordanian public financial institutions is high. The latter skills

include communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process. The mean of the communication skills is 3.74 which is high and ranked first. The mean of the personal skills is 3.69 which is high and ranked second.

The mean of the negotiation skills is 3.68 which is high and ranked third. The mean of the Problem solving skills is 3.65 which is high and ranked fourth. The mean of the collaboration skills in the decision making process is 3.64 which is high and ranked fifth.

Table 3. The extent of possessing creative skills by administrative leaders in Jordanian public financial institutions

Items No.	Dimension	Mean	Std.	Rank	Level
1-6	Communication skills	3.74	0.56	1	High
7-12	Collaboration skills in the decision making process	3.64	0.61	5	High
13-18	Problem solving skills	3.65	0.59	4	High
19-25	Negotiation skills	3.68	0.57	3	High
26-34	Personal skills	3.72	0.53	2	High
1-34	Overall	3.69	0.51	-	High

Table 4. The employees' perception for their job characteristics in Jordanian public financial institutions

Items No.	Dimension	Mean	Std.	Rank	Level
1-6	Variety of skills	3.36	0.97	5	Moderate
7-12	Autonomy	3.37	1.00	4	Moderate
13-18	Task significance	3.93	0.91	1	High
19-25	Task identity	3.61	0.87	3	High
26-34	Feedback	3.85	0.84	2	High
1-34	Overall	3.62	0.69	-	High

11.2. Results Related to the Second Question: Q.2. How do employees perceive their job characteristics in Jordanian public financial institutions? Table (4) presents the results related to this question

Based on table (6), the overall mean is 3.62 which is high. That means that the employees' perception for their job characteristics in Jordanian public financial institutions

are positive. The mean of the (Task significance) is 3.93 which is high and ranked first. The mean of the (feedback) is 3.85 which is high and ranked second. The mean of the (task identity) is 3.61 which is high and ranked third. The mean of the (autonomy) is 3.37 which is moderate and ranked fourth. The mean of the variety of skills is 3.36 which is moderate and ranked fifth.

Table 5. The Pearson correlation coefficient values for the relationship between the creative skills by administrative leaders and the employees' job characteristics in Jordanian public financial institutions

Dependent variable						
Independent variables	Overall	Feedback	task identity	Task significance	autonomy	variety of skills
Communication skills	0.73*	0.58*	0.65*	0.72*	0.60*	0.70*
Collaboration skills in the s decision making proces	0.74*	0.47*	0.63*	0.69*	0.66*	0.73*
Problem solving skills	0.73*	0.53*	0.67*	0.68*	0.62*	0.72*
Negotiation skills	0.77*	0.46*	0.69*	0.70*	0.67*	0.75*
Personal skills	0.81*	0.56*	0.73*	0.73*	0.74*	0.77*
Overall	0.87*	0.54*	0.77*	0.81*	0.76*	0.86*

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$).

11.3. Q.3. What is the relationship between the creative skills by administrative leaders and the employees' job characteristics in Jordanian public financial institutions? Table (5) presents the results related to this question.

Based on table (7), there are statistically significant correlations between all the dependent and the independent variables. The overall value is 0.87. That indicates that there is a significant positive relationship between the creative skills by administrative leaders and the employees' job characteristics. The strongest correlation exists between the creative skills by administrative leaders from hand and the employees' variety of skills from another hand. That is because the relevant correlation value is 0.86. The weakest correlation exists between the creative skills by administrative leaders from hand and feedback from another hand. That is because the relevant correlation value is 0.54.

Table 6. The Variance Inflation Factory (VIF) and tolerance values and the Skewness coefficient values

Independent variables	VIF	Tolerance	Skewness
Communication skills	2.403	0.416	0.625
Collaboration skills in the decision making process	2.246	0.445	0.624
Problem solving skills	3.192	0.313	0.616
Negotiation skills	3.519	0.373	0.781
Personal skills	3.410	0.284	0.786

12. Testing the Hypotheses: Before testing the hypotheses, the researchers calculated the Variance Inflation Factory (VIF) and tolerance values to make sure that there isn't any multicollinearity problem between the independent variables. VIF values must be less than 10 and the tolerance value must be less than 0.05. The researchers calculated the Skewness coefficient values to make sure that the data can be normally distributed. The latter values must be less than 1.

The VIF values are within the range of (2.246 -3.519). All the VIF values are less than 10. The tolerance values are within the range of (0.284-0.445). All the tolerance values are greater than 0.05. Thus, there isn't any multicollinearity problem between the independent variables. All the Skewness coefficient values are less than 1. Thus, the study's data can be normally distributed. To test the hypotheses, the analysis of variance was conducted. The results of the latter analysis are presented in table (7).

Based on table (7), 79.8% of the changes in the employees' variety of skills can be attributed to the creative skills of the administrative leaders. 78.3% of the changes in the employees' autonomy can be attributed to the creative skills of the administrative leaders. 63.7% of the changes in the employees' task significance can be attributed to the creative skills of the administrative leaders. 67.2% of the changes in the employees' task identity can be attributed to the creative skills of the administrative leaders. 62.4% of the changes in the feedback can be attributed to the creative skills of the administrative leaders.

Table 7.

Dependent variable	Source	Determination coefficient (R ²)	Sum of squares	Mean square	Calculated F value	F value
Variety of skills	Regression	0.798	198.52	24.82	185.37*	0.000
	Error		50.34	0.13		
Autonomy	Regression	0.783	225.44	28.18	169.59*	0.000
	Error		62.48	0.17		
Task significance	Regression	0.637	182.65	22.83	82.38*	0.000
	Error		104.21	0.28		
Task identity	Regression	0.672	202.33	25.29	96.33*	0.000
	Error		98.72	0.26		
feedback	Regression	0.624	195.98	24.49	78.12*	0.000
	Error		117.90	0.314		

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Testing the first sub-hypothesis:

H0.1. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' variety of skills.

Based on table (10), Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) have a statistically significant impact on the employees' variety of skills at the statistical significance level of ($\alpha \geq 0.01$). That was concluded

because the calculated t value is greater than the tabulated t value.

Stepwise Multiple Regression analysis was conducted to explore the amount of changes in the employees' variety of skills that can be attributed to each skill of the administrative leaders' creative skills. The results of the latter analysis are presented in table (9). 65.8% of the changes in the employees' variety of skills can be

attributed to leaders' communication skills. 73.2% of the changes in the employees' variety of skills can be attributed to leaders' personal skills. 77.4% of the changes in the employees' variety of skills can be attributed to leaders' negotiation skills. 78.9% of the changes in the employees' variety of skills can be attributed to leaders' problem solving skills. 79.6% of the changes in the employees' variety of skills can be attributed to leaders' collaboration skills in the decision making process.

Table 8. The results of the multiple regression analysis for exploring the impact of the administrative leaders' creative skills on the employees' variety of skills

Independent variable	B	Standard error	Beta	Calculated t value	Sig.
Communication skills	0.235	0.033	0.288	7.120*	0.000
Collaboration skills in the decision making process	0.149	0.038	0.149	3.931*	0.000
Problem solving skills	0.192	0.061	0.189	4.582*	0.000
Negotiation skills	0.191	0.041	0.191	4.691*	0.000
Personal skills	0.211	0.038	0.244	5.617*	0.000

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Table 9. The results of the Stepwise Multiple Regression analysis for exploring the capability to predict the employees' variety of skills through each skill of the administrative leaders' creative skills

Variable	Determination coefficient R2	Calculated t value	Sig.
Communication skills	0.658	7.403*	0.000
Personal skills	0.732	6.279*	0.000
Negotiation skills	0.774	5.179*	0.000
Problem solving skills	0.789	4.511*	0.000
Collaboration skills in the decision making process	0.796	3.658*	0.000

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Table 10. The results of the multiple regression analysis for exploring the impact of administrative leaders' creative skills on employees' autonomy

Independent variable	B	Standard error	Beta	Calculated t value	Sig.
Communication skills	0.143	0.045	0.120	3.210*	0.001
Collaboration skills in the decision making process	0.156	0.042	0.146	3.701*	0.000
Problem solving skills	0.182	0.102	0.173	4.163*	0.000
Negotiation skills	0.18	0.045	0.172	4.072*	0.000
Personal skills	0.379	0.037	0.432	10.311*	0.000

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

H0.2. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' autonomy.

Based on table (10), the administrative leaders' creative skills (i.e. communication, problem solving, personal and

negotiation skills and collaboration skills in the decision making process) have a statistically significant impact on the employees' autonomy at the statistical significance level of ($\alpha \geq 0.01$). That was concluded because the calculated t value is greater than the tabulated t value. The Stepwise Multiple Regression analysis was conducted to explore the amount of changes in the employees' autonomy that can be attributed to each skill of the administrative leaders' creative skills.

Table 11. The results of the Stepwise Multiple Regression analysis for exploring the capability to predict the employees' autonomy through each skill of the administrative leaders' creative skills

Variable	Determination coefficient R ²	Calculated t value	Sig.
Personal skills	0.678	10.635	0.000
Problem solving skills	0.750	4.665	0.000
Negotiation skills	0.768	4.193	0.000
collaboration skills in the decision making process	0.778	3.971	0.000
Communication skills	0.782	2.630	0.009

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

The results of the latter analysis are presented in table (11) below. 67.8% of the changes in the administrative leaders' creative skills can be attributed to personal skills. 75% of the changes in the administrative leaders' creative skills can be attributed to the leaders' problem solving skills 76.8% of the changes in the administrative leaders' creative skills can be attributed to the leaders' negotiation skills. 77.8% of the changes in the administrative leaders' creative skills can be attributed to the leaders'

collaboration skills in the decision making process. 78.2% of the changes in the administrative leaders' creative skills can be attributed to the leaders' communication skills.

H0.3. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' task significance.

Table 12. The results of the multiple regression analysis for exploring the impact of administrative leaders' creative skills on employees' task significance

Independent variable	B	Standard error	Beta	Calculated t value	Sig.
Communication skills	0.198	0.048	0.226	4.169*	0.000
collaboration skills in the decision making process	0.193	0.054	0.180	3.539*	0.000
Problem solving	0.190	0.058	0.159	3.299*	0.001
Negotiation skills	0.167	0.059	0.156	2.858*	0.004
Personal skills	0.318	0.054	0.343	5.875*	0.000

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Based on table (12), administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) have a statistically significant impact on the employees' task significance at the statistical significance level of ($\alpha \geq 0.01$). That was concluded because

the calculated t value is greater than the tabulated t value. The Stepwise Multiple Regression analysis was conducted to explore the amount of changes in the employees' task significance that can be attributed to each skill of the administrative leaders' creative skills.

Table 13. The results of the Stepwise Multiple Regression analysis for exploring the capability to predict the employees' task significance through each skill of the administrative leaders' creative skills

Variable	Determination coefficient R2	Calculated t value	Sig.
Personal skills	0.551	5.903*	0.000
Communication skills	0.595	3.046*	0.002
collaboration skills in the decision making process	0.614	3.852*	0.000
Problem solving skills	0.627	2.666*	0.008
Negotiation skills	0.632	2.265*	0.024

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

The results of the latter analysis are presented in table (13) below. 55.1% of the changes in the employees' task significance can be attributed to leaders' personal skills. 59.5% of the changes in the employees' task significance can be attributed to leaders' communication skills. 61.4% of the changes in the employees' task significance can be attributed to leaders' collaboration skills in the decision making process. 62.7% of the changes in the employees' task significance can be attributed to leaders' problem

solving skills. 63.2% of the changes in the employees' task significance can be attributed to leaders' negotiation skills.

H0.4. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the employees' task identity.

Table 14. The results of the multiple regression analysis for exploring the impact of administrative leaders' creative skills on employees' task identity

Independent variable	B	Standard error	Beta	Calculated t value	Sig.
Communication skills	0.170	0.055	0.165	3.122*	0.002
collaboration skills in the decision making process	0.171	0.053	0.156	3.223*	0.001
Problem solving skills	0.173	0.053	0.182	3.293*	0.001
Negotiation skills	0.207	0.046	0.231	4.484*	0.000
Personal skills	0.166	0.057	0.151	2.909*	0.004

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Based on table (14), administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) have a statistically significant impact on the employees' task identity at the statistical significance level of ($\alpha \geq 0.01$). That was concluded because the calculated t value is greater than the tabulated t value.

The Stepwise Multiple Regression analysis was conducted to explore the amount of changes in the employees' task identity that can be attributed to each skill of the administrative leaders' creative skills. The results of the latter analysis are presented in table (15) below. 53.4% of the changes in the employees' task identity can be attributed to the leaders' negotiation skills. 61.5% of the changes in the employees' task identity can be attributed to the leaders' problem solving skills. 64.4% of the

changes in the employees' task identity can be attributed to the leaders' collaboration skills in the decision making process. 66.0% of the changes in the employees' task identity can be attributed to the leaders' collaboration skills in the leaders' communication skills. 67.0% of the changes in the employees' task identity can be attributed to the leaders' personal skills.

H0.5. Administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process) don't have any statistically significant impact on the feedback.

Based on table (16), administrative leaders' creative skills (i.e. communication, problem solving, personal and negotiation skills and collaboration skills in the decision

making process) have a statistically significant impact on the feedback. That was concluded because the calculated t value is greater than the tabulated t value.

The stepwise multiple regression analysis was conducted to explore the amount of changes in the feedback that can be attributed to each skill of the administrative leaders' creative skills. The results of the latter analysis are presented in table (17) below. 53.0% of the changes in

the feedback can be attributed to the leaders' negotiation skills. 59.0% of the changes in the feedback can be attributed to the leaders' problem solving skills. 61.4% of the changes in the feedback can be attributed to the leaders' personal skills.

Note: Communication skills and collaboration skills in the decision making process were excluded from the regression equation

Table 15. The results of the Stepwise Multiple Regression analysis for exploring the capability to predict the employees' task identity through each skill of the administrative leaders' creative skill

Variable	Determination coefficient R2	Calculated t value	Sig.
Negotiation skills	0.534	4.433	0.000
Problem solving skills	0.615	3.658	0.000
Collaboration skills in the decision making process	0.644	3.641	0.000
Communication skills	0.660	3.590	0.000
Personal skills	0.670	3.476	0.001

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

Table 16. The results of the multiple regression analysis for exploring the impact of administrative leaders' creative skills on feedback

Independent variable	B	Standard error	Beta	Calculated t value	Sig.
Communication skills	0.128	0.061	0.103	2.094**	0.037
Collaboration skills in the decision making process	0.130	0.060	0.102	2.147**	0.032
Problem solving skills	0.246	0.062	0.219	3.946*	0.000
Negotiation skills	0.258	0.058	0.266	4.482*	0.000
Personal skills	0.156	0.051	0.170	3.080*	0.002

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

(**): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.05$)

Table 17. The results of the Stepwise Multiple Regression analysis for exploring the capability to predict the feedback through each skill of the administrative leaders' creative skills

Variable	Determination coefficient R2	Calculated t value	Sig.
Negotiation skills	0.530	5.043	0.000
Problem solving skills	0.590	4.761	0.000
Personal skills	0.614	3.654	0.000

(*): This sign means that the value is statistically significant at the statistical significance level of ($\alpha \geq 0.01$)

CONCLUSION

The researchers concluded the following:

1. The respondents' attitudes towards the creative skills of administrative leaders are positive.
2. The respondents' attitudes towards their job characteristics are positive.
3. The creative skills of administrative leaders have significant impact on the employees' job characteristics (i.e. variety of skills, task identity, task significance, autonomy and feedback. The latter skills are: communication, problem solving, personal and negotiation skills and collaboration skills in the decision making process

Recommendations:

The researchers recommend:

- Developing the creative skills of administrative leaders in financial institutions. That shall improve the employees' job characteristics. It shall improve the performance efficiency and effectiveness of such institutions. It shall enable those institutions to meet their intended goals
- Increasing the extent of engaging employees in the decision making process. That shall improve their skills and capabilities. It shall develop their personalities and promote a sense of security among them.
- Encouraging managers to delegate powers.
- Conducting studies about the impacts of leaders' creative skills on motivation.
- Developing the creative skills of administrative leaders and utilizing them. That can be done through exerting efforts for creating an environment that improves the employees' job characteristics. Creating such an environment shall improve the performance efficiency and effectiveness of in Jordanian public financial institutions. It shall enable those institutions to meet their goals.

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A Review of Literature on the Determinants of the Stock Market Performance and it Company's Performance

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ABSTRACT

The study aims at reviewing and discovering the existing empirical evidence regarding the stock market performance and IT investments. The significant analysis of the statistical tools used is out of the purview of this study. The performance of the stock market is analyzed through the determinants of the stock market which is broadly classified into macro-economic factors like Gross Domestic Product (GDP), GNP, Inflation Rate, Exchange Rate, and Interest Rate; and institutional factors like income inequality, legal environment, political, and financial liberalization. Also, to measure the performance of the IT company, indicators like Price earning ratios, dividend yield, Earnings Per Share, and Return on Equity are considered.

KEY WORDS: IT INVESTMENTS, EPS, DIVIDEND YIELD, CORPORATE GOVERNANCE, EXCHANGE RATE, STOCK MARKET, FINANCIAL LIBERALISATION.

INTRODUCTION

A stock market, equity market, or share market is the aggregation of buyers and sellers of stocks (also called shares), which represent ownership claims on businesses. Participants in the stock market range from small individual stock investors to larger investors, who can be based anywhere in the world, and it also includes banks, insurance companies, pension funds, and hedge funds. Their buy or sell orders may be executed on their behalf by a stock exchange trader. So, investors should analyze the stock market performance and the IT company's performance. Among other sectors, the IT industry is at a robust speed which lures the investors to invest in the

stock market with a motive of earning higher returns from their investment.

The paper instigates the discussion on the review of the literature regarding determinants of the stock market performance which is classified into macro-economic factors and institutional factors; and the indicators of the IT company's performance.

2. Determinants of Stock Market Performance:

Researchers have conducted studies on the empirical literature of determinants of stock market performance. So, to investigate the determinants of stock market performance, three factors are considered i.e., macroeconomic factors, institutional factors, and a combination of both the factors.

2.1 Macro-Economic Factors

2.2 This Section Covers The Reviews Of The Empirical Literature On The Macro-Economic Factors Like Inflation Rate, Exchange Rate, Money Supply, Industrial Production, The Wholesale Price Index, Gnp, Fdi, And Gdp Are Studied

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- P.Shrestha, Biggyan Raj Subedi (2014) has conducted an empirical study on determinants of stock market performance in Nepal. The study has also assessed the impact of major changes in politics and Nepal Rastra Bank's policy on lending against share collateral. Using OLS estimations of behavioral equations the empirical results have obtained by indicating that the performance of the stock market is positive to inflation and broad money growth, and negative to the interest rate. That study suggests that investors have taken equity as a hedge against inflation and believe stock as an alternative financial instrument. In addition to that, Nepalese stock market performance is also stimulated by the availability of liquidity and low-interest rates. To conclude, the stock market has significantly responded to changes in the political environment and the policy of Nepal Rastra Bank.
- John, E. (2019), has examined how macro-economic variables affect the stock market performance in Nigeria with four macroeconomic variables – money supply, interest rate, exchange rate, and inflation rate as independent variables and market capitalization as the dependent variable. It was found that money supply and interest rates are the two factors influencing the stock market performance in Nigeria as they exhibit a significant effect on stock market performance, whereas exchange rate and inflation rate indicate a weak performance of the stock market.
- Gan, C., Lee, M., Yong, H., and Zhang, J. (2006) conducted a study on the relationships between New Zealand and stock market index and a set of seven macroeconomic variables using the Granger causality test and co-integration. It was found that there was a long-run relationship between New Zealand's stock market index and the macroeconomic variables. Also, it was revealed that the New Zealand stock index was not a leading indicator for changes in macroeconomic variables though it indicated consistently determined by the interest rate, money supply, and real GDP.
- Robert, D.G. (2008) investigated the effect of two macroeconomic variables (the exchange rate and oil price) on stock market returns of emerging economies, namely, Brazil, Russia, India, and China. It was found that there was no significant relationship between present and past market returns with macroeconomic variables and indicated a weak form of efficiency for the four emerging economies. Also, it cleared that there was no significant relationship between the exchange rate and oil price on the stock market index of these four countries.
- Bhattacharyya, B. and Mukherjee, J. (2006) have examined the Indian stock market and seven macroeconomic variables relationship by using the VAR framework, Toda, and Yamamoto non- Granger causality tests. It was found from the study that there was no linkage between stock returns and money supply, index of industrial production, GNP, real effective exchange rate, foreign exchange reserves, and trade balance, also bi-directional causality between stock return and rate of inflation was observed.
- Latha, K., Gupta, S., & Kumar, A. (2016) examined the short and long-run dynamic relationship between the Indian Stock Index and Major Macroeconomic variables, viz. GDP, Inflation, Interest Rate, Exchange Rate, Money Supply, and International Oil Prices. It was found that the Indian Stock Index is cointegrated with Money Supply, GDP, and Inflation. ARDL model evidenced a significant positive relation with contemporaneous GDP and significant negative relation with own lagged values; lagged values of interest rate and long-run money supply. Investors and stock market analysts can search for the presence of exploitable arbitrage opportunities in the Indian market to earn above-normal returns by formulating long-run investment strategies based on GDP, Money Supply, and Inflation.
- Naik, P., & Padhi, P. (2012) investigates the relationships between the Indian stock market index (BSE Sensex) and five macroeconomic variables, namely, industrial production index, wholesale price index, money supply, treasury bills rates, and exchange rates. The analysis reveals that macroeconomic variables and the stock market index are co-integrated by indicating a long-run equilibrium relationship exists between them. It is observed that the stock prices positively relate to the money supply and industrial production but negatively relate to inflation. The exchange rate and the short-term interest rate are found to be insignificant in determining stock prices. But in the Granger causality test macroeconomic variables causes the stock prices in the long-run as well as in the short-run.
- Sur, D., & Bhunia, A. (2015) examined the influence of selected macroeconomic variables in terms of international crude oil price, exchange rates, domestic gold price, real interest rates, and wholesale price index on stock market indices (Sensex and Nifty) of India. With the help of time series, monthly data was collected from Reserve Bank of India database; BSE and NSE database, investing.com and yahoo, finance database for the period July 1997 to July 2015 with the application of financial econometrics. It was found that Sensex and Nifty reactions to shocks on crude oil prices, exchanges rates, real interest rates, and wholesale prices indices were positive while a negative shock from Sensex and Nifty to real interest was noticed.
- Jeffus (2004), has examined the relationship between the FDI and stock market in selected Latin American countries. It is found that FDI and stock market development are highly and positively correlated and FDI is a predictor of stock market growth. So, he argues that when firms enter into a new market, they may seek to raise additional capital through the local stock market. This enhances the local stock market.
- Alexander Owiredun, M. Oppong, Sandra A Asomaning (2016) examines the macroeconomic determinants of stock

market development in Ghana by using annual secondary data from Bank of Ghana Quarterly Economic Bulletins, Ghana Statistical Service, Ghana Stock Exchange Market Statistics, the World Bank and IMF's International Financial Statistics. The macroeconomic indicators such as the real income (GDP per capita income), domestic saving, stock market liquidity, financial intermediary growth, macroeconomic stability (inflation), and private capital flows with stock market capitalization used as a proxy for the study were collected and used for the analysis. These variables were examined to establish a relationship with stock market developments based on a linear regression model.

The regression analysis found stock market liquidity to be statistically significant to stock market developments as opposed to the other determinants (such as macroeconomic stability (inflation) real income and domestic savings and private capital flows) which were found to be non-significant. This result suggests that macroeconomic stability (inflation), real income, domestic savings, and private capital flows proved not to have any significant impact on stock market development since their regression coefficients were not statically significant at the 5% level of significance.

2.3 Institutional Factors: Along with the studies on the impact of macroeconomic factors on stock market performance, there are also studies conducted on the relationship between institutional factors and stock market performance. So in this section, the empirical literature on institutional factors like income inequality, legal environment, political, and financial liberalization are examined.

- Ameer, R. (2010) has conducted an empirical study to assesses the overall economic performance of South East Asian countries has remarked in the 1990s concerning significant increase in economic development and focusing on the impact of foreign direct investment, trade openness, financial liberalization, and institutional developments on the income equality and social welfare. It was found that the households' income shares (or income inequality) were affected by foreign direct investment and trade openness for 1991-2004 and the stock market liberalization and institutional developments have increased the income share of only the high-income group. It was also observed that trade openness and population demographics were significant welfare-enhancing determinants of social expenditure, whereas, financial liberalization and foreign official loans were significant welfare reducing factors.

- Reuveny, R., & Li, Q. (2003) has conducted a systematic statistical study of the effects of both economic openness and democracy on income inequality. To measure the national income inequality the researcher has used a comprehensive Gini coefficient data set. Economic openness is measured from trade flows, foreign direct investment inflows, and financial capital inflows. The period studied is 1960 to 1996 with a sample of

69 countries. It was found that democracy and trade reduce income inequality, foreign direct investments increase income inequality, and financial capital does not affect income inequality. Hence, policy implications are discussed.

- La Porta (1998) has analyzed the legal rules which cover the protection of corporate shareholders and creditors. The origin of these rules and the quality of their enforcement can be seen in 49 countries around the world. It was found that the legal tradition influences the degree of protection of creditors and shareholders, and the efficiency of contract enforcement, thereby affecting financial market development.

- Pistoret (2000) has examined a comprehensive analysis of legal change in the shareholder protection and creditor rights in 24 transition economies from 1992 to 1998 and its effect on the propensity of firms to raise external finance. It was found that not only the quality of legal frameworks but also the effectiveness of legal institutions are important for financial market development. Hence, the effectiveness of legal institutions has a stronger impact on external finance when compared with the law on the books, even though there is a substantial improvement in shareholder and creditor rights.

- Bayar, Y. (2016) has investigated the impact of institutional development on stock market development in 8 European Union transition economies during the 2002-2013 period by employing a panel regression method. It was found that political stability, regulatory quality, rule of law, and control of corruption had a positive impact on stock market development.

- Julio, B., & Yook, Y. (2012) has documented the cycles in corporate investment corresponding with the timing of national elections around the world. During election years, firms reduce investment expenditures by an average of 4.8% relative to nonelection years by controlling for growth opportunities and economic conditions. The magnitude of the investment cycles varies with different country and election characteristics. So, the researcher has investigated several potential explanations and found evidence for supporting the hypothesis that political uncertainty leads firms to reduce investment expenditures until the electoral uncertainty is resolved. It was found that political uncertainty is an important channel through which the political process affects real economic outcomes.

- R. Paudel, N. Perera (2009) has examined the role of financial liberalization on money demand and economic growth by employing the ARDL(Autoregressive distributed Lag) approach of cointegration in Sri Lankan data from 1963 to 2006. It was found that financial liberalization has a significant negative impact on narrow and broad money demand in the long-run, while such impact is found to be positive in the short-run but not significant; and there was a significant positive impact in the short-run on broad money. In the case of economic

growth, financial liberalization has played a positive role but not significant, while in the short-run the relation is found to be negative.

2.4 Combination of Macroeconomic and Institutional Factors

- Islam, F.T., Mostofa, M.S., & Tithi, A.A. (2017) conducted a study on the institutional and macroeconomic determinants of stock market performance using data in the last 20 years starting from 1995 to 2015. Gross Domestic Product (GDP), Consumer Price Index (CPI), inflation rate, and Foreign Direct Investment (FDI) inflows were used as the proxy of macroeconomic determinants, whereas market capitalization, the total issued capital and market turnover of Dhaka Stock Exchange was the proxy of institutional determinants of capital market performance. Both descriptive and inferential statistics are used to identify the determinants and their significance in capital market development. It was found that both institutional and macroeconomic variables significantly influence the capital market performance. Whereas, CPI and GDP as macroeconomic determinants and Total Market Capitalization as institutional determinants were found significant based on their coefficient value in the ordinary least square multiple regression analysis.

- Yartey (2007) has examined the macroeconomic and institutional determinants of stock market development in 13 African countries. It was found that the income level, domestic savings and investment, financial intermediary development, and stock market liquidity had a positive impact on stock market development in Africa. In addition to it, institutional quality – which consists of corruption, law, and order, bureaucratic quality, democratic accountability, and government stability – to be an important determinant in fostering stock market development in Africa.

- Cherif, M., & Gazdar, K. (2010) in their paper on the influence of the macroeconomic environment and institutional quality on stock market development has provided new evidence by using data from 14 MENA (the Middle East and North Africa) countries from 1990-2007. With the help of panel data and instrumental variable techniques, it was found that income level, saving rate, stock market liquidity, and interest rate influence stock market development with the expected theoretical signs. Also, it showed that banking and the stock market sectors are complementary instead of being substitutes. It was also found that the institutional environment is captured by a composite policy risk index which does not appear to be a driving force for the stock market capitalization in the region.

- Matadeen, J. (2019) has investigated a paper on the macroeconomic and institutional determinants of stock market development in Mauritius during the period 1989-2016 through a dynamic vector error correction model. It was found that macroeconomic factors such as economic growth, banking sector development, stock market liquidity, and gross fixed capital formation are

important drivers of stock market development on the island. Additionally, political stability, rule of law, government effectiveness, voice accountability, and control of corruption also play a key role in terms of enhancing stock market development.

3. Indicators of the it Company's Performance

- Rosa, A.C., Mello, C.H., Chimendes, V.C., Andrade, H.S., & Amorim, G. (2019) has addressed in their paper the difficulties in researching innovation and Open Innovation (OI) performance metrics through exploratory literature research followed by a survey conducted with small technology-based enterprises incubated at important Brazilian industrial and technological centers. Small business entrepreneurs and managers are well known for the idea of OI practices are still restricted to large corporations. The indicators proposed are developed with the support of the statistical technique of factorial analysis which has been proved to be the most significant to measure OI with the company and it has been possible to understand that a small company can successfully use OI. Even though it is not common today, it should be encouraged.

- Stores, F. S. (2015) analyzed the relationship between IT investment and the firm's financial performance in Malaysian Public Listed Companies. Firm performance was measured by revenue, return on investment (ROI), and return on assets (ROA). A panel data analysis was applied to the data observed from 2009 to 2012 with a sample of 90 firms via annual reports. It was found that regressing return on investment against IT investment indicates that there is a relationship between IT investment and return on investment. However, the result of the regressing return on assets and revenue indicates that there is no relationship between IT investment and return on assets, IT investment, and revenue respectively. To conclude, the analysis provides useful implications for managers to better understand the relationship between IT investment and firms' performance so that they can make wiser decisions to maximize the business value of their investments.

- Hui-Shan Lee, Wai-Mun Har, Sin-Yee Lee (2016) conducted a study on the profitability determinants of information technology software companies in Malaysia with intangible assets included as an important independent variable. Other variables used are profitability (ROA), change of total revenues, opportunities growth, past earning growth, and size. It was found that all independent variables have a positive and significant relationship with profitability except the relative size of the firm variable. A negative result between size and profitability could be due to the role of flexibility by smaller size software firms to transform rapidly as the peripheral business surroundings change. To conclude, it is unnecessary to expand the size of the firms in achieving prosperous profit. Moreover, engagement in innovative intangibility can enhance the competitive capability and reputation of software firms, hence it will improve firms' profitability.

- Jahangir Chauhan, Mohd Shamim Ansari, Mohd Taqi, Mohd Ajmal (2019) has investigated the impact of dividend policy on the profitability of Indian Information Technology (IT) companies listed on the Bombay Stock Exchange. Companies were selected for the study based on market capitalization. Correlation matrix and panel regression model were used for testing of hypotheses. It was found that the selected companies do not follow a consistent pattern of dividend payments and the association between Price Earning Ratio (PER) and Dividend Payout Ratio (DPR) was low positive. Also, there is a strong relation between ROE-ROA. Hausman Test reveals that the random effect model is appropriate thereby indicating that the performance of selected companies has a significant impact on the dividend policy of selected companies. The dividend policy is still regarded as one of the complicated areas in corporate finance.

- N.Shin (2001) has examined the empirical contribution of IT to financial performance as measured by net profit, ROA, and ROE by focusing on the alignment of IT with business strategies such as vertical disintegration and diversification. It was found that IT does not directly improve financial performance. In conjunction with vertical disintegration and diversification, however, it does improve financial performance as measured by net profit. Financial performance ratios such as ROA and ROE are not correlated with the alignment (or interaction) factor of IT with vertical disintegration and diversification. To conclude, an increase in IT spending improves net profit, but not performance ratios such as ROA and ROE of firms with decreased vertical integration and higher diversification.

CONCLUSION

Stock markets can be volatile, and the reasons behind stocks rise and fall can be complex. Stock prices are affected by many factors like macroeconomic factors, institutional factors, and other factors that influence stock prices directly or indirectly. The empirical literature shows that macroeconomic variables such as inflation rate, exchange rate, money supply, industrial production, the wholesale price index, GNP, FDI, and GDP are important and have a positive impact on stock market development. Macroeconomic instability can adversely affect the development of the stock market. Moreover, institutional factors such as institutional quality, financial liberalization policies, political risk, law and order, and bureaucratic quality play major roles in the development of stock markets.

Financial indicators are a neutral tool for evaluating the company's performance. Investors are always searching for that one golden key measurement that can be obtained by looking at a company's financial statements. Although, investors should analyze these four main areas of financial health that should be examined are liquidity, solvency, profitability, and operating efficiency. Among the four, the best measurement of a company's health is the level of its profitability. However, no single metric can

identify the overall financial and operational health of a company. Liquidity will tell you about a firm's ability to ride out the short-term rough patches and solvency will tell about longer-term debt and obligations. Whereas, efficiency and profitability say about its ability to convert inputs into cash flows and net income. All of these factors together are necessary to get a complete and holistic view of a company's stability.

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Low Level Laser Therapy in Orthodontics: An Update

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ABSTRACT

There has been an increase in demand for esthetic treatment in recent years. In spite of the benefits associated with the Orthodontic treatment in improving esthetics, the increased duration of treatment and the discomfort associated has led to the treatment rejection by patients. As a result, various methods have been explored to reduce the pain associated with the treatment also to enhance the speed of Orthodontic treatment. Lasers are being used widely in dentistry for many years. Recently low-level laser therapy has gained attention in orthodontics owing to its wide area of application like in orthodontic pain management, acceleration of orthodontic tooth movement and bone regeneration. This article aims to discuss about the applications, effectiveness and clinical feasibility of Low - level laser therapy in Orthodontics.

KEY WORDS: LOW LEVEL LASER THERAPY (LLLT), ORTHODONTIC TOOTH MOVEMENT (OTM), ORTHODONTIC PAIN, LASERS.

INTRODUCTION

With the spending times and evolving ways of life, an ever-increasing number of patients are getting aware of their appearance because of which there is an expanded interest for orthodontic treatment. Despite the increased interest for orthodontic treatment with time, the pain and discomfort associated with the orthodontic treatment along with the longer treatment duration have been significant reasons leading to refusal and discontinuation of orthodontic treatment. The pain during orthodontic tooth movement mainly occurs after orthodontic force application creating a zone of Compression and tension further resulting in a cascade of reactions occurring at molecular level.

Various methods have been advocated for the management of Orthodontic pain like analgesics, bite wafers, chewing gum, transcutaneous nerve stimulation and vibratory stimulations. NSAIDS are considered effective in controlling pain, however the side effects associated with them, forestall their broad use. There is little evidence in literature supporting the clinical applicability of other alternatives. Laser therapy, especially low-level laser therapy (LLLT) has received increased attention in recent years as of late alternative to reduce the pain and discomfort associated with the orthodontic procedure.

History of Lasers: The first Laser was introduced by an American physicist, Dr. Theodore Maiman utilizing a ruby precious stone in 1960. Soon from that point forward, Goldman brought Lasers into the clinical field. He additionally reported the role of ruby lasers on dental caries and furthermore their impact on teeth in his resulting examines. Bell laboratories developed the neodymium doped yttrium aluminum garnet (Nd:YAG) laser and carbon dioxide (CO₂) laser in 1964 and their use in oral tissues was investigated. The early commercial laser, Pulsed Nd:YAG was created by Myers and Myers in dentistry in 1989. From that point forward the potential utilization of Lasers has been explored in dentistry.

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Various studies are being led to investigate the clinical ease of use of Lasers in different fields of Dentistry.

Basic Theory of Lasers: Laser stands for Light Amplification by Stimulated Emission of Radiation. It works on the principle of spontaneous emission based on Einstein's theory. An excited atom absorbs a quantum of energy and releases photons. These photons travel as a coherent wave and cause further emission of identical photons resulting in amplification and hence production of Laser beam.

Components of Lasers: Laser light is a monochromatic light consisting of a single wavelength of light. It has following three components: A lasing material or an active medium consisting of a gas, a crystal, or a solid-state semiconductor, energy source or a pump source which adds energy to the active medium such as, a flash-lamp strobe device, an electrical current, laser radiation and the optical cavity or resonator consisting of 2 mirrors or reflectors to act as the feedback mechanism. As the pumping mechanism supplies energy the laser system, energy is pumped into an active medium present within an optical resonator, resulting in spontaneous emission of photons resulting in amplification.

Properties of Laser: The three unique properties of Laser are Monochromacity: As compared to conventional light the wavelength of light emitted is of only one broad wavelength or colour; Collimation: Laser light has a constant direction, size and shape as all the photons emitted have ;Coherency: All the light waves are moving together in a similar manner.

Laser delivery systems and Emission modes: In dental lasers, the different types of Laser light delivery systems are via a Glass fiberoptic cable in which a glass fiber cable is encased in a sheath .This can be used in both contact and non contact fashion; ND: YAG lasers, diode and Erbium lasers are the different types using this delivery system. Hollow tube- like waveguide, or articulated arm or hand pieces: The beam is delivered in a non-contact system like in CO2 lasers.

The various types of emission modes are Continuous wave in which the laser is emitted at a constant power level like Argon, Diode and CO2; Gated pulsed mode in which alteration of the laser energy occurs from time to time like Diode and CO2; Free running pulse mode in which energy is released for a short period followed by a longer duration in which the Laser is off, like Nd: YAG, Erbium and H:YAG

Tissue interactions: As the Laser hits the target tissues, there are four types of interactions that can take place depending on the optical properties of that tissue. The first is the Transmission which occurs when the Laser passes through the tissues without affecting the target tissue. This effect depends on the wavelength of the Laser. The second effect is the Reflection which occurs when the beam redirects from the tissue surface resulting in no effect. The third effect is the Scattering that transfers

the heat produced by Laser beam to the adjacent tissues resulting in no biological effect on target tissues. The fourth effect is the absorption which is the desirable effect of Lasers and depends on its wavelength and emission mode and tissue characteristics.

Biological Effects on Tissues: There are different photo biological effects of dental lasers: Photo thermal effect of Laser energy is when the light energy is converted into heat. This thermal effect depends on the degree of temperature rise and also on the water content of tissues. Surgical incision and excision, ablation and hemostasis occur as a result of this effect. Photochemical effects are produced when the Lasers result in chemical reactions such as curing of the composite resin. The photoacoustic affects of Laser produces a Shock wave resulting in explosion of tissues and creation of crater. This effect is beneficial for procedures on dental hard tissues. Lasers also have a bio stimulating effect, which is useful in pain relief, wound healing and anti-inflammatory effect.

Applications in Orthodontics: The lasers which are used in dentistry are of two types- Low level Laser therapy (LLLT), also known as Cold Laser performing under wavelength of 500mW like Diode and Helium Neon and High Intensity Laser therapy, known as Surgical Lasers owing to their tissue cutting capacity like CO2, Nd:YAG, Erbium and diode lasers of applications of LLLT include acceleration of tooth movement, reduction of pain caused during orthodontic procedures and bone regeneration following expansion.

According to the studies carried out in Literature, low-level Laser therapy seems to be a promising alternative in pain control and acceleration of tooth movement. The energy output of LLLT is low enough so as not to cause the temperature of the treated tissues to rise above 36.5°C or normal body temperature, as a result of which LLLT's mainly show non-thermal and biostimulatory effects. The mechanism of laser analgesia is attributed to multiple actions, including elevating body surface temperature, creating a nerve block, inhibiting pain inducing substances through the increased local circulation reducing the oxidative stress and increasing the production of ATP. LLLTs also have also shown an increase in osteoblastic and osteoclastic activity explaining their role in bone remodeling and acceleration of tooth movement. This article reviews the use of LLLT in the field of Orthodontics.

Pain Control during Orthodontic tooth movement: Pain can be experienced by the patient in varying amount is different procedures like separators placement, initial wire placement, reactivation. The fear of pain and discomfort associated with these procedures can prevent patients from beginning orthodontic treatment or can lead to poor compliance in those already undergoing the treatment. Different strategies for controlling pain have been suggested among which NSAIDS are still the main option. However, due to the adverse effects and interference with orthodontic tooth movement (OTM)

associated with the use of NSAIDs, the LLLT is explored not only for pain control but also for accelerating orthodontic tooth movement.

A lot of research has been done to explore the effectiveness of LLLT in pain control in Orthodontics. The exact mechanism of pain control is still not known but different hypothesis have been proposed for the same. The possible mechanisms are: inhibition of cyclooxygenase-2 mRNA expression, inhibition of nerve depolarization, reactivation of enzymes targeting pain-inductive-factors, production of ATP, reduction of prostaglandins (peripheral level) and affecting the synthesis and metabolism of endorphins (central level). The various low-level laser therapy (LLLT) laser described in literature for pain control in orthodontics are Helium Neon Laser, Carbon Dioxide (CO₂) laser and the diode Gallium aluminium arsenic (GaAlAs) lasers. All these lasers have varying wavelengths.

Diode Lasers, also known as semi conductive lasers, are the most widely used lasers. They can penetrate deep into the tissues, hence controlling the pain based on their wavelength which varies from 600-1000nm. The two commonly used diode lasers used for pain management are Gallium Aluminium, Arsenic (GaAlAs) with a wavelength of 780-790 nm and GaAlP laser with a wavelength of 630-700nm. Numerous studies have been done to support their role and efficacy in pain management and the results are conflicting. The effect on pain has been evaluated during different phases of Orthodontic treatment like separators placement, banding, placement of initial wire, occlusal functions, canine retractions and reactivations.

Elastic separators are placed so as to create space between adjacent teeth to aid in for band placement. This procedure can result in initiation of pain starting from within 30 sec after separators placement to up to 24 hours. The analgesic effect of low level laser therapy after separators placement and wire reactivations has been documented in literature. However, the results are conflicting with few studies that do not support the role of low level laser therapies in pain control. The variation in results in different studies can be because of the difference in the methodologies, the different study designs, the variations in the technical specifications of different laser systems and also the methods of applications.

There exists a wide variation in the wavelength of lasers used, the mode, and the type of study, number of application of lasers, the pain assessment scale and the optimal dosage. Regarding the laser wavelength, it was found that a greater analgesic capacity was seen in studies using a wavelength between 800 and 830 nm as compared to studies using Lasers in a wavelength of 904-940 nm. When different modes were compared, it was reported by some researchers that there is greater tissue penetration and repair with pulsed modes as compared to continuous modes. Effect on pain with Single vs. Double or multiple applications of Lasers has also been studied.

In most of the studies, LLLT has shown to be effective for pain reductions with single applications by most of the studies. Few studies have shown effectiveness of LLLT with only two or more applications.

There has been a wide variation in the dosage used in studies ranging from 5 to 35 J/cm². Bjordal et al had used a dose of 7.5J/cm². Farias et al and Abtahi et al used 6 J/cm² but there were difference in their results because of the different wavelengths used. So, energy density can be one of the factors in determining the effectiveness but not the only parameter in determining the success. Variations are also found in the type of study designs. The method of pain evaluation, the methods to elicit pain and pain assessment scale can also vary depending on the type of occlusal forces applied. Systematic reviews and Meta analysis conducted to study the effect of Lasers on pain suggest that in spite of the heterogeneity and the methodologies bias in the study, low level laser therapy is found to be beneficial in alleviating orthodontic pain. However, future studies with better study designs are required to establish an effective LLLT protocol so as to consider low-level Laser therapy as a routine method in alleviating pain during orthodontic procedures.

Accelerating Orthodontic tooth movement: Prolonged duration of 2 to 3 years associated with orthodontic treatment can be a major reason for denial by patients in spite of the benefits associated with the treatment. Not only the duration but also the iatrogenic effects associated with longer treatment time such as root resorption, decalcification, caries etc. has led to a search for less invasive techniques like LLLT to fasten the orthodontic tooth movement. The rate of tooth movement depends on the periodontal and alveolar bone remodeling in response to force by alteration of blood flow, release of chemical messengers and recruitment of osteoblasts and osteoclasts. Various in vivo studies have shown that LLLT has a bio-modulating effect such as increased collagen synthesis, increased proliferation of fibroblasts, differentiation and activation of osteoblasts and osteoclasts, increased ATP levels, activation of enzymes involved in healing and repair, neovascularization thereby leading to accelerated orthodontic tooth movement (OTM).

At the molecular level, increased levels of receptor activator of nuclear factor- κ B (RANK and RANKL) and the macrophage colony-stimulating M-CSF on the compression sides and increased expression of Type I collagen, fibronectin and osteopontin on the tension side are suggestive of increased Osteoclastogenesis and bone formation on the compression and tension sides respectively.

Many animal and human studies have found LLLT's to be effective in accelerating tooth movement. The first human study to evaluate the effect of LLLT on OTM was conducted by Cruz et al in 2004 in which they used a Galium Aluminium Arsenic GaAlAs diode laser with a wavelength of 780 nm and an output power of 20mW applied 4 times a month (On day 0, 3, 7, 14, and 21 days

) and found that the increase in rate of tooth movement by 34%. Several other studies conducted have also shown an increase in the rate of tooth movement when diode lasers were used in the range of 780-810nm, with almost similar output power, time and irradiation intervals. In a study conducted by Limpanichkul (2006), they used GaAlAs Diode lasers and found that the LLLT had no effect on canine retraction and it was concluded from the study that it could be because of the low energy density (25J/cm²) used at the surface level because of which there was neither any stimulatory nor inhibitory effects on the tooth movement.

Few recent studies have also shown conflicting results showing no effect of LLLT on tooth movement. In the study conducted by Madhavi et al., 57 no effect was found on the tooth movement which was attributed to the low sample size used in the study and also the duration of the study which was only 4 weeks. Another recent triple blind split study by Mistry et al. has shown nonsignificant findings with LLLT and have concluded that no change in rate of tooth movement was found on application of LLLT. The nonsignificant results in this study could have been because of the difference in energy dosage and the frequency of applications. It has been suggested by few authors that there has to be balance between power density and the time so as to achieve optimal results. The authors in this study have used an energy dose of 13 J per session which is an intermediate of the doses used in earlier studies and also the frequency of application is less as compared to the previous studies. The difference in the outcomes of the studies conducted can be related to the sample size, the laser type, wavelength, power, total energy, the energy density used, irradiation time and also on factors like tissue thickness, composition and the mode of contact of lasers with tissues. Therefore, the future research should aim in a direction so as to determine an optimal dosage for low level laser therapy.

Bone regeneration: Studies have been done to evaluate the role of Low-level laser therapy on bone regeneration. The reason for relapse which occurs can be attributed to insufficient bone regeneration along the mid-palatal suture following maxillary expansion using orthopedic forces. LLLT stimulates new bone formation by increased osteogenesis, angiogenesis, and increased fibroblast proliferation. As a result of this, the stability of the bone expansion procedures increases.

According to the Randomized Controlled trials on humans evaluating the effects of low level laser therapy on bone healing following rapid maxillary expansion, it was found that immediate bone regeneration and healing after midpalatal suture expansion was enhanced with the use of low level laser therapy in spite of the variations in studies like the application protocol, the wavelength, the dosage used, the points of irradiation. [59-62] Histological analysis of the irradiated bone also shows an increased production of osteoblasts, osteoclasts, fibroblasts, collagen, increase in the vascular proliferation, growth factors and synthesis of new bone

matrix. As per the recent systematic reviews carried out by Skondra et al. LLLT can be considered as an effective intervention for stimulating immediate bone regeneration and healing after midpalatal suture expansion, however stronger evidence is required for the clinical applicability of LLLT in bone regeneration.

CONCLUSION

Low level laser treatment can be utilized in orthodontics to reduce the pain and discomfort, quicken the treatment procedure consequently reducing the duration of treatment and furthermore in increasing the stability of the bone regenerating procedures. Many randomized controlled trials conducted to assess the effects of LLLT on pain, support the usefulness of Low level laser therapy in Orthodontics but due to the heterogeneity of the studies especially due to the different parameters used, results are conflicting. So, newer studies with stronger evidence are required so that a standard protocol can be developed for application of Lasers in Clinical practice.

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Applications of Cone Beam Computed Tomography in Orthodontics: An Overview

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ABSTRACT

Cone beam computerized tomography (CBCT) has changed numerous aspects of dentistry and added great value to its diagnostic phase also as that of orthodontics. Three-dimensional imaging CBCT has the potential to improve the diagnosis and treatment planning of cases. The introduction of cone beam computerized tomography (CBCT) technology to dentistry and orthodontics revolutionized the diagnosis, treatment and monitoring of orthodontic patients. The information obtained from CBCT imaging provides several substantial advantages. For example, CBCT imaging provides accurate measurements, improves localization of impacted teeth, provides visualization of airway abnormalities, it identifies and quantifies asymmetry, it is often used to assess periodontal structures, to spot endodontic problems, to plan placement sites for temporary skeletal anchorage devices, and to look at condylar positions and mandibular joint (TMJ). Moreover, CBCT imaging involves only a minimal increase in radiation dose relative to combined diagnostic modern digital panoramic and cephalometric imaging. Cone-beam computed tomography (CBCT) is now being widely used in orthodontic practice. On the one hand, there is an increasing need of CBCT for diagnosis and research, and on the other hand, there is a broad concern for the exposure to radiation. Prescribing CBCT scan requires judicious clinical judgment to maximize the benefits and minimize the harm. The best way to reduce unnecessary ionizing radiation from CBCT is to follow recommended guidelines and ethical principles. CBCT provides a superb tool for accurate diagnosis, more predictable treatment planning, more efficient patient management and education, improved treatment outcome and patient satisfaction. This review discusses the utilization of CBCT in diagnosis and treatment planning in orthodontics.

KEY WORDS: CONE BEAM COMPUTED TOMOGRAPHY; CBCT; THREE-DIMENSIONAL IMAGING; ORTHODONTICS; EVIDENCE-BASED DIAGNOSIS; TREATMENT PLANNING AND TREATMENT OUTCOMES.

INTRODUCTION

Orthodontic clinical examination and documentation is the basis for diagnosis, treatment planning, growth evaluation, and outcome assessment in orthodontics.

Diagnostic records for an orthodontic patient consist of dental casts, intra- and extra-oral pictures, a panoramic X-ray, and a lateral head film, supplemented with other diagnostic tests as indicated. Since the introduction of cone beam computerized tomography (CBCT) in 1998, there has been a rapid evolution in CBCT technology, driven largely by the stress of every specialty for providing accurate and reproducible three-dimensional (3D) images, and minimizing the radiation dose.

Applications of CBCT in orthodontics include evaluation of skeletal and dental malocclusions, localization of impacted canines and molars, evaluation of potential Temporary Anchorage sites, and for orthognathic surgical planning. CBCT also plays a valuable role in airway

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analysis and in managing syndromic patients, including cleft lip and palate. While the clinical applications spanning from evaluation of anatomy to pathology of most structures within the maxillo-facial area, the key advantage of CBCT is its high-resolution images at a comparatively lower radiation dose.

The main advantage of CBCT is that the ability to look at and analyse the osseous oral and maxillofacial structures in three dimensions (3D), overcoming the magnification and superimposition of structures found with two-dimensional (2D) imaging modalities. However, despite the advantages of CBCT imaging, it shouldn't be used routinely for all orthodontic patients, and there must be a risk–benefit balance between any radiation exposure versus the knowledge which will be gained by the investigation.

The introduction of CBCT specifically dedicated to imaging the maxillofacial region heralds a real paradigm shift. It has created a revolution in maxillofacial imaging expanding the role of imaging from diagnosis to image guidance of operative and surgical procedures with the assistance of varied software applications. Accurate diagnostic imaging is an important requirement to derive the right diagnosis and optimal treatment plan, also as monitor and document the treatment progress and outcome.

Essentials of CBCT Imaging: Cone-beam refers to the cone shape of the X-ray beam, unlike conventional CT, which uses a fan-shaped beam to create multiple thin slices. CBCT produces panoramic and cephalometric projections, which become 3D when the information is reformatted during a volume. With CBCT technology all possible radiographs are often taken in under 1 minute. The orthodontist now has the diagnostic quality of periapical, panoramic, cephalograms, occlusal radiographs, and TMJ series at their disposal, alongside views that can't be produced by regular radiographic machines like axial views, and separate cephalograms for the right and left sides. Clinicians are encouraged to use the smallest available volume in keeping with the region of interest. As a trend for the same CBCT unit, the larger the FOV, the greater the effective dose to the patient. However, comparable FOV on different CBCT units produce a range of radiation exposures.

Radiation Considerations in CBCT: Since the introduction of the CBCT in dentistry, there has been considerable discussion and uncertainty about the radiation associated with a CBCT scan. Because of potential hazardous effects of ionizing radiation on living tissues, the radiation exposure to a human being for medical and dental reasons should be kept As Low As Reasonably Achievable (ALARA). Every radiation dose of any magnitude, no matter how small, involves a certain degree of detrimental effect. CBCT effective doses are smaller than those of medical CT. However, significant modifications of those parameters aimed toward significant reduction of the effective dose can reduce the image quality. Therefore, clinical judgment should be exercised with

dose reduction efforts in order to maintain diagnostic and quality images.⁷ It should be noted that the effective doses mentioned here could be rapidly outdated when new CBCT devices come on the market. Therefore, dose measurements of newer equipment should be constantly monitored by an independent agency.

Practical Applications of CBCT in Orthodontics

Impacted Tooth Position: The most recognized need for CBCT imaging in orthodontics is that of impacted canine evaluation. CBCT imaging is precise in determining not only the labial/lingual relationship but also a more exact angulation of the impacted canine. These 3D images are beneficial in determining the proximity of adjacent incisor and premolar roots, which may be invaluable in determining the convenience of uncovering and bonding. CBCT enhances the power to localize impacted canines accurately, evaluate their proximity to other teeth and structures, determine the follicle size and therefore the presence of pathology, estimate space conditions, assess resorption of adjacent teeth, assist in planning surgical access and bond placement, and aid in defining optimal direction for extrusion of these teeth into the oral cavity.

Root Resorption: CBCT has been shown to be at least as good as periapical radiography for determining tooth and root length. Furthermore, because CBCT can generate precise images of small root defects, it provides more accurate insights into root resorption and has greater sensitivity and specificity than do panoramic or other 2D radiographs in detecting these lesions. Root resorption are often observed readily in CBCT images, and therefore the image clarity allows clinicians to classify the sort of root resorption. For teeth with multiple roots, resorption can be localized to a specific root.

Fractured Roots: To view root fractures radiographically, it's going to be difficult if the fracture is in an oblique direction. With CBCT, the tooth of interest are often viewed altogether the three planes of space making it easier to work out the location of root fracture and degree of displacement.

Orthodontic Implants Placement (TADs): The knowledge of the basic positioning can greatly enhance the chance for correct placement and success of orthodontic implants. CBCT images allow more accurate and dependable views of the inter-radicular relationships than panoramic radiographs. CBCT data are often wont to construct placement guides for positioning mini-implants between the roots of adjacent teeth in anatomically difficult sites. The volume and quality of the bone within the proposed placement sites are often evaluated before insertion of the mini-implants.

Temporomandibular Joint Assessment: Conventional tomography has been widely used for TMJ evaluation; however, technique sensitivity and therefore the length of the examinations made it a less attractive diagnostic tool for the dentist. CBCT images of the TMJ are shown to supply greater reliability and accuracy than

tomographic or panoramic views in detecting condylar erosions. Presence of temporomandibular dysfunction can complicate orthodontic treatment and hence requires careful assessment of TMJ anatomy, before, during and after orthodontic treatment. CBCT facilitates visualization of minor to overt osseous hard tissue changes and congruency of articulating surfaces resulting from pathology and adaptive processes and allows for accurate detection and evaluation of pathological changes.

Airway Analysis: Initial investigations on airway patency, function and disorders utilizing CBCT have provided preliminary answers, including dimensions of normal airway anatomy in adults, relationship of 2D to 3D measurements, differences in airway morphology in subjects with OSA and non-OSA, the effects of extractions on 3D pharyngeal volume and structure, and the consequences of RME and orthognathic surgery on airway dimensions.

Cleft Lip and Palate: CBCT can provide the cleft's exact anatomic relationships and bone thickness around the existing teeth in proximity to the cleft or clefts. The information is invaluable for the grafting procedures planned and for possible tooth movement within the existing dentition. CBCT images are valuable for determining the volume of the alveolar defect and, therefore, the amount of bone needed for grafting in patients with CL/P and for determining the success of bone fill following surgery. Finally, CBCT can be useful for diagnosis and treatment of impacted canines that are common in patients with CL/P and their paths of eruption through grafted bone sites.

Location of Anatomic Structures: Anatomic structures, like the mental foramen, inferior alveolar nerve, sinus, and adjacent roots are easily visible using CBCT. CBCT images also allow precise measurement of distance, area and volume which helps the clinicians in treatment planning for sinus lifts, ridge augmentations, extractions and implant placements.

Asymmetry Evaluation: Three-dimensional visualization of the patient allows for a more accurate evaluation of both dental and skeletal asymmetries. Presence of a very unilateral crossbite vs one after a shift of the mandible into centric occlusion are often determined more easily by viewing and measuring the maxillary and mandibular bones in three dimensions.

CBCT generated Cephalograms: The CBCT data set can be reformatted to generate a CBCT reconstructed lateral cephalogram so that conventional measurements can be made and compared with existing 2D norms. These CBCT reconstructed lateral cephalograms offer the advantage of ability to digitally reorient the head position in cases in which the patient did not undergo scanning with the proper head position. The image quality also can be enhanced by virtually sculpting away extraneous superimposing skeletal structures. In addition, separate images can be created of the left and right sides for assessment of asymmetries.

Orthognathic Surgery: Several applications of CBCT in orthognathic surgery treatment simulation, guidance and outcome assessment are developed. CBCT 3D surface reconstructions of the jawbones are used for preoperative surgical planning and simulation in patients with traumas and skeletal malformations. Coupled with dedicated software tools, simulations of virtual repositioning of the jaws, osteotomies, distraction osteogenesis and other interventions can now be successfully implemented. Indicated where bone information is required in orthognathic surgery planning in order to obtain 3D data sets of the craniofacial skeleton.

Pathologies of Jaws: Presence of radiopaque lesions near the apexes of teeth, like condensing osteitis, dense bone island and focal apical osteopetrosis aren't readily visualized on panoramic radiographs. They appear to have no causative factors but can prevent tooth movement. Such lesions can be viewed easily using CBCT images.

Fabrication of custom orthodontic appliances: The fabrication of custom lingual orthodontic appliances has been demonstrated using CBCT image data with existing technology to virtually plan a patient's treatment and therefore the manufacturing of custom appliances with 3D printing technology (Ye et al., 2011). Such advances appear to be rapid, and that they also promise efficient and effective patient-specific treatments. Correspondingly, Orametrix (Richardson, TX) may be a company that has been using CBCT technology for the last several years to supply the info necessary for planning and executing technology-assisted treatment through its SureSmile system.

Superimpositions: This method eliminates the need for segmentation and selecting landmarks, the errors associated with these steps are eliminated, thereby reducing the overall cumulative errors. Common weaknesses of many outcomes studies are image fidelity and method errors in the superimposition process, leading to confounding and often conflicting results.

Localisation of supernumerary teeth: The localisation of supernumerary teeth specifically when they are multiple is a diagnostic challenge. While single supernumerary teeth could be easily localised using conventional images, cases with multiple supernumerary teeth could benefit from the use of CBCT.

Incidental findings, missed findings and medico-legal implications: The incidence of incidental findings in CBCT images unrelated to the first purpose of the scan are reported to be as high as 25% during a group of 500 consecutively scanned individuals. These included airway findings, TMJ abnormalities and endodontic lesions. An additional question that requires further study is the capability of the orthodontist to identify non-orthodontically relevant findings and to make appropriate referrals when needed. Lack of the recognition of incidental lesions can have substantial

medicolegal ramifications. In contrast, the potential for inadvertent diagnosis of false-positive findings by the untrained eye have the potential to add unnecessary costs to healthcare, as well as cause unnecessary anxiety to the patient and family.

Advantages of CBCT Imaging in Orthodontics: CBCT imaging provides many unique features and advantages to orthodontic practice over conventional extraoral radiographic imaging.

- **Greater Clinical Imaging Efficiency.** Full field of view (FOV) CBCT imaging provides volumetric data acquisition of the entire maxillofacial skeleton in a single radiographic procedure. This data can be easily reformatted to provide simulated radiographic (e.g. lateral and posterior-anterior cephalometric, panoramic) or comparable volumetric images currently used in orthodontic diagnosis, cephalometric analysis, and treatment planning. This provides for greater clinical imaging efficacy
- **Provides 3D Visualisation.** CBCT data can be reconstructed to provide unique, inter-relational, orthogonal (i.e. axial, sagittal and coronal) images previously unavailable for orthodontic assessment. Other imaging processing can also be performed such as maximum intensity projection (MIP) and surface or volumetric rendering that provides an interactive volumetric model enabling visualisation and inter-relationship of craniofacial structures including the maxillofacial skeleton and soft tissue boundaries like the airway and facial outline.
- **Anatomic Accuracy.** Unlike traditional extraoral and panoramic radiography, CBCT images and renderings are anatomically accurate and can be displayed at any angle for any part of the maxillofacial skeleton. Therefore, actual measurements can be obtained without the need for considerations of magnification or projection discrepancies.

Limitations and Risk considerations of CBCT: CBCT images have inherent “noise” that reduces image clarity and produces limited soft tissue contrast resolution. CBCT image quality is also affected by image artifacts such as streaking, shading, rings, and distortion due to high areas of attenuation (such as metallic restorations) and inherent spatial resolution may limit adequate visualisation of structures in the dento-alveolar region. CBCT imaging uses ionising radiation which is a potential carcinogen.

Recent public and scientific reports have increased public awareness and professional concerns over the potential association between diagnostic radiation exposure and cancer. The risk associated with various dental radiographic procedures, specifically CBCT imaging, has most often been compared to the radiation dose imparted by a “baseline” imaging modality (e.g. typical panoramic radiographic procedure) or to average background equivalent radiation time (e.g. days of background). The use of patient protective shielding like lead torso aprons

and thyroid shields, is recommended, when possible, to minimise exposure to radiosensitive organs outside the field of view. The use of low dose protocols may be adequate for low level diagnostic tasks such as root angulations.

Future uses for CBCT: Technology is consistently changing and new applications arise almost daily. The subsequent applications of CBCT technology gives a glimpse of what could also be available within the near future.

- **Virtual Models** CBCT data are often wont to produce 3D digital study models without the necessity for alginate impressions. It avoids patient discomfort and saves orthodontist’s valuable chair time. These models are of upper diagnostic value than other digital models because it includes not only the tooth crowns but also roots, impactions, developing teeth and alveolar bone.
- **Invisalign Aligner** it’s going to be possible within the future to execute the whole fabrication process of the aligners using CBCT digital data. The CBCT images might be wont to create the virtual models, thus negating the necessity to require and mail impressions and bite registration. This information is often transferred electronically to laboratories and therefore the desired virtual tooth movement are often accomplished by way of e-mail communication between the orthodontist and the laboratory. Even the retainers might be fabricated by the info within the laboratory electronic database of the ultimate tooth positions.
- **Indirect Bonding of Brackets** Construction of ‘hardcopy’ models from the CBCT image are often used for laboratory procedures required for indirect bonding
- **Custom-made Brackets and Wires** CBCT data are often used precisely to manufacture custom made orthodontic brackets and wires for a private patient.¹³
- In the future, it’s likely that superimposition or similar approaches will replace or complement linear and angular measurements made on images from 3D.
- **Segmentation of bone, teeth or the other structure** from CBCT scan, are going to be achieved automatically, saving time and avoiding bias. An equivalent is going to be for anatomic landmarks and measurements through the synthetic intelligence and computer vision. CBCT imaging of digital models are going to be an alternate to digitization with optical devices, thus a further dedicated optical dental digitizer wouldn’t be necessary required.
- **Individualized brackets, and arch wires** bent by robots are going to be fabricated supported these digital casts. within the next few decades, a customized treatment and biomechanical planning are going to be more fully realised, maybe in one’s own office.

CONCLUSION

Three-dimensional CBCT based hard and soft tissue simulations, photographic integrations and superimpositions have ushered a new era of dynamic CBCT imaging. Future developments during this field offer promises of even greater benefits in orthodontic diagnosis and treatment. The long-awaited incorporation of the 3D to our radiographic records is soon becoming a reality. CBCT is the way forward for orthodontics and therefore the applications in orthodontics seem almost limitless. The recognition of CBCT imaging in orthodontics is probably going to extend significantly within the future. Currently, the limiting factor for widespread use of CBCT in orthodontics is the radiation dose especially in children. Further technical development of CBCT devices and flat panel detectors will reduce the radiation dose within the future and fully adjustable collimation of the radiation beam to the specified field of view (FOV) will contribute to lowering the radiation dose.

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Cancer Patient Care and its Medical Management in India: the Impact During Covid-19 and Government Funding Assistance

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ABSTRACT

Cancer is emerging as a major public health concern for the entire globe. According to the World Cancer Report, cancer is the world's second most common cause of death. This poses a rapidly increasing threat worldwide to individuals, health systems and economies. Cancer patients are more susceptible to critical illness and death as compared to the general infected population. Various cohort studies were conducted in China between December 2019 to June 2020; it was inspected that among overall cancer patients admitted in hospital during the pandemic, 79% were Covid-19 Positive among which 39% died in ICU; whereas among all general population admitted to the same hospital 37% were Covid positive out of which 8% died. It suggests that the cancer patients are at more risk due to Covid-19 pandemic outbreak. In order to prevent 7 million cancer deaths over the next decade, countries must expedite their health care system. In low-income and middle-income countries, during the next decade, the incidence of cancer is expected to almost double. In 2018 India had about 1.16 million cancer cases, 784800 cancer deaths amongst population of 1.35 billion people. Furthermore, the treatment cost for more than 40% of cancer hospitalization is made by selling the assets and borrowing from relatives; they incur out-of-pocket (OOPE) expenditure in the private sector and can cost more than 20 percent of their annual per capita household spending. And over 76% of cancer patient families faced financial problems during treatment. The main aim objective of the study was to understand the cancer scenario in India, its treatment cost implications and various treatment facilities and different funding assistance cum Health schemes implemented by central and state governments in India. The data is collected from secondary sources and descriptive study was performed. Therefore in conclusion we find that, we require effective prevention for surviving against cancer along with the proper awareness of the funding schemes by the government for the cancer patients and greater investment in the healthcare infrastructure needs proper attention.

KEY WORDS: CANCER BURDEN, CANCER FACILITIES, COST OF TREATMENT, DIRECT AND INDIRECT COST, GOVERNMENT SCHEMES, CANCER MANAGEMENT IN COVID-19.

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INTRODUCTION

The generic non-communicable disease (NCD) which is distinguished by the development of life-threatening (neo-plasms, cancerous) abnormal cells (tumour/lump) in any part of the body is termed as Cancer which is derived from the Greek word "Karkinos" (for crabs) (Rajpal, S et al., 2018). By the end of December 2019 following

Coronavirus(COVID-19) outbreak in Wuhan in China, the virus speedily expanded across 215 countries around the globe. The World Health Organization announced it as a pandemic on 11th March 2020. The Covid-19 pandemic disrupted various healthcare services including cancer care services which lead to transformations in healthcare services across the globe. (MitraManasij et al., 2020).

Due to Covid-19 outbreak cancer patient faced a lack of resource pressure. For example, limited resource availability led to a delay in cancer diagnosis, untreated/undetected cases. (Yadav,Sunishtha Singh et al., 2020). According to the International Agency for Research on

Cancer (WHO), the load of cancer is predicted to be twice over the next ten years among middle and low-income countries. WHO declared an advisory stating that kids (below 10 years), old people(above 60 years), patients with breathing problems, diabetic patients, heart patients and cancer patients should follow quarantine stay at their home to save themselves from pandemic(Yadav,Sunishtha Singh et al., 2020).A study was conducted in India to estimate the prevalence of 28 different types of cancer in every state of the country between 1990 to 2016 and it was found that the incidence of new cases of cancer as well as deaths due to cancer have doubled in India between 1990 to 2016. (ICMR, NICPR, 2020).

Table 1. As per the Cancer statistics In India report given by the Indian Council for Medical Research report (ICMR, 2018) and National Institute of Cancer Prevention and Research report (NICPR, 2020).

Avg. No. of people living with the disease	Approximately 2.25 Million
New Cancer Patients Registered every year	Approximately 11,57,294 Lakhs
Deaths related to cancer	7,84,821
Risk of Developing Cancer before 75years of age	9.81% in Males And 9.42% in Females
Risk of Death from Cancer before 75 years of age	7.34% in Males And 6.28% in Females

(Source: ICMR, 2018;NICPR, 2020)

- Total Deaths due to Cancer in 2018= 7,84,821
- Men = 4,13,519
- Females= 3,71,302

The cancer disease has led to catastrophic health spending and distress financing, which leads to increased expenditure before death in India. In India, the out-of-pocket-expenditure (OOPE) has become approximately three times higher for private inpatient cancer-care. A huge amount (approximately 40%) of the treatment cost for cancer patients are covered by the sales of the assets, borrowing, or contributions from friends and family. The Facilities provided by the government for cancer care are woefully inadequate, and due to this, there is a large presence for cancer facilities in the private sector (Robert D. Smith et al., 2019).

They incur out-of-pocket expenditure (OOPE) in the private sector and can cost more than 20 percent of their annual per capita household spending. And over 76% of cancer patient families faced financial problems during treatment. It is estimated that the average total expenditure is Rs. 29, 066 (at 2014 purchasing power parity) for public sector hospitals and Rs. 84, 320 for private sector hospitals (Rajpal, Sunil et al., 2014).

Objectives: The main aim objective of the study was to understand the cancer scenario in India, its treatment facilities, the patient care management during and post Covid pandemic for the cancer patients, its implications for cost of treatment and create awareness about various government funding schemes;

A) To explore and understand the cancer disease

scenario in India and its cost of treatment implications in Government and Private Hospitals.

B) To understand the management of cancer patients' treatment during and post Covid pandemic.

C) To review and create awareness about the various Health Schemes implemented by both the central and state governments for funding assistance and helping the cancer patients.

Literature Review: Cancer has become the biggest reason for concern for human beings globally. The main reason for such a high rate of incidence is due to internal, external, or environmental factors. (Ali, Imran et al., 2011). The regular change in lifestyle, improved lifespan, and good control of infectious diseases, the incidence of the non-communicable disease has increased in developing countries (Singh, M et al., 2018). Lack of insurance policies, reduced government expenditure, and huge out-of-pocket expenditure create a deliberately vicious cycle for the patients. Only 29.6% of patients were having insurance coverage. The patients facing catastrophic impact was the most in semi-private wards at 86.7% and further followed by those in public and private hospitals. (Basavaiah, G et al., 2018).

MATERIAL AND METHODS

The data was collected from secondary sources. The data was collected from various Published Research articles, Google Scholar, Pubmed. The other sources of data were collected from news press releases from Economic Times and Times of India, Government of India, WHO cancer report 2020. A descriptive study was performed.

RESULTS AND DISCUSSION

A) Cancer Scenario in India: The report given by WHO says that every 1 out of 10 Indians has the risk to develop cancer during his/her lifetime and 1 Indian out of 15 Indians will die due to Cancer (WHO IARC, 2020;

Financial Express, 4th February 2020). As estimated by the World Cancer report the cancer burden in India (WHO IARC, 2020; Financial Express, 4th February 2020)

- New Cases Registered – 1.16 million
- Deaths due to Cancer – 7,84,800

Table 2. Total No of New Cancer Cases Registered in 2018 (As per the World Cancer Report 2020 released by WHO, IARC (Financial Express, 4th February 2020).

New Registered Cases in Men = 570,000	New Registered Cases in Women = 587,000
Stomach Cancer= (39,000 cases)	Ovarian Cancer = (36,000 cases)
Colorectal Cancer = (37,000 cases)	Colorectal Cancer = (20,000 cases)
Oral Cancer = (92,000 cases)	Cervical Cancer = (97,000 cases)
Lung Cancer = (49,000 cases)	Breast Cancer = (162,500 cases)
Oesophageal Cancer = (34,000 cases)	Oral Cancer = (28,000 cases)
Accounts for 45% of cases	Accounts for 60% of cases

(Source: World Cancer report 2020, WHO-IARC-Financial Express, 4th February, 2020)

B) Management of Cancer patients in India during and post Covid-19 pandemic

1) Service Delivery: The cancer patients are immune-suppressed due to the reduced immunity as a result of side effects of anti-cancer therapy performed on them; so they have a greater risk of complication and death due to Covid-19 virus. The most cancer patient does not have a choice except to face the outside world and take life-saving treatment. The responsibility for protecting them from the virus lies with government policymakers as well as healthcare providers and workers.

Various techniques such as infection control, covid-19 facilities, cancer segregation, and treatment modification can reduce the exposure of cancer patients to the virus. (Sengupta, Mitu et al., 2020)

a) Infection Control: Infection Control's primary aim is to decrease viral transmission between medical personnel, patients and caregivers. This can be done by various means, such as training courses for hospital staff about the proper use of PPE (Personal Protective equipment) kits, managing patient flow, reducing contact between patients, developing isolation wards for the confirmed cases of Covid-19, transferring patient to the areas with a low incidence of infections. (Pramesh, CS et al., 2020) The routine consultation and follow-up could be done through telemedicine. The aerosol containment and disinfectant cum sanitisation measures including instruments sanitisation scrubbing should be established during emergency, endoscopies and surgery in clinics and hospitals. The other measures of sanitisation and hygiene and pre-test of caregivers/ health workers must be done before collection of the blood sample from home and home delivery for medicines, regular screening of staff and patient before entry into clinics or hospitals, reducing the entry of attendants and relatives in hospitals and clinics. (Sengupta, Mitu et al., 2020)

b) Segregation of cancer and covid-19 facilities:

Separating the facilities used to treat Covid-19 patients is the most important step to ensure safety for cancer patients during treatment in a pandemic.; separate blocks or building should be used which has been strongly recommended by the UK's National Health Service, and other professional medical associations and international bodies. (Pramesh CS, et al., 2020) Due to limited health infrastructure of the country multi-speciality hospitals are under high pressure as they are an important part of advanced cancer care in India. Merging of the cancer facilities with the Covid-19 facilities is not a defensible option as the cancer patients are at higher risk as compared to the general population. (Sengupta, Mitu et al., 2020; Damani, Anuja et al., 2020)

c) Treatment Modifications: The modification of aspects of treatment is another way to reduce patient exposure to the virus. In addition to international guidelines that can be used to monitor decisions on customized treatment adjustment, there are several general variables that include the tumor's biological characteristics, the patient's clinical condition, and the treatment's possible benefit from the predicted adverse effects. (Curigliano, G et al., 2020) Patients may be divided into various priority categories for successful cancer therapy; higher priority may be given to patients whose condition is clinically unstable or life-threatening or who are at risk of developing significant comorbidities and lower priority may be given to patients in the early stage of cancer who do not need immediate treatment or who are in the second or third line of care. (Ramesh, Anita et al., 2020).

Treatment modification can be avoided for high priority patients but it can be considered for a group of lower priority by different means such as switching to oral therapies from intravenous means or altering the

frequency of maintenance treatment.(Sengupta, Mitu et al., 2020).

2) Access to health care-

a) Physical access: Due to the poor geographical spread of medical facilities present in India, the cancer patient has to travel long distances to receive treatment and care. Complex restrictions on intra-and-inter-state travel and disruption of public transport facilities have been imposed during the lockdown process in India.This led to grave difficulties for many cancer patients. The cancer patients should be provided with targeted and effective support such as easy procedures for obtaining travel passes etc.(Curigliano, G et al., 2020;Sengupta, Mitu et al., 2020).

b) Financial access: In India, the cost for treatment for the cancer patient is highest among all non-communicable diseases. The out-of-pocket expenditure is 2.5 times for cancer hospitalization than that of overall average hospitalization expenditure, which leads to selling off assets, borrowing money etc.(Sengupta, Mitu et al., 2020). COVID-19 pandemic had further worsened the bad situation. Due to the loss of job or loss of income source during this pandemic worldwide, it had made the situation more worse as the cancer patient and their family members have fewer resources to pay the treatment cost. Most numbers of the cancer patient are under financial stress and should be targeted for various types of financial support from government and private sources in the form of insurance schemes, special loans, grants etc. (Damani, Anuja et al., 2020).

c) Main Health Access: Most cancers are diagnosed in late stages when medical results are low and many cancer cases are related to preventable causes such as tobacco use and infections.First the primary healthcare providers are confronted with the complaint of symptoms that may be suggestive of cancer; then it is also the duty of the healthcare provider to encourage cancer awareness.The huge diversion of human capital to handle the pandemic and materials has hit India's healthcare system.(Harky, Amer et al., 2020)Accredited social health activist (ASHA) has been diverted to health issues linked to service Covid-19 cases. It is the first health option that vulnerable and disadvantaged groups of the population have access to; their routine work is the promotion of maternal health, family planning and child immunization. Some ASHA workers have been trained in cancer prevention particularly in early detection and treatment of breast and cervical cancer,as early detection can prevent high death rates due to this cancer. Thus the most important step towards safeguarding early detection is at the primary level. (Pandey, A et al., 2020;Sengupta, Mitu et al., 2020).

3) Communication: Patients have been prevented from pursuing high priority medical care and treatment by misleading knowledge about the pandemic. Many cancer patients have been led to believe that when taking medical care, there are no effective ways to avoid infection with the virus. However if adequate protective measures

are taken against infection, cancer treatment may be administered safely. (Pramesh, CS et al., 2020) The main challenge for government policymakers and healthcare providers is to ensure that correct and trustworthy information is conveyed to cancer patients regarding the managing of illness, evidence-based knowledge about the virus, its mode of transmission, origins, symptoms etc.All pandemic information should be gathered from official sources, such as the portal of the Indian Ministry of Health and Family Welfare Coronavirus and the Covid-19 response portal of the World Health Organization. (Sengupta, Mitu et al., 2020).

C) Cancer Treatment Centres and Financial Aids for Cancer Burden In India: Tertiary Regional Cancer Treatment Centres- Under the National Cancer Control Programme, initiated by the Government of India, there are 27 cancer centres in India.(ICMR-NICPR, 2020)

Financial Aids Provided By the Government-(ICMR-NICPR, 2020).

1) Government of India Funded Schemes-(ICMR- NICPR, 2020).

A) Announcement of Ayushman Bharat By Government of India- The two crucial initiatives in the Health Sector (ICMR- NICPR, 2020).

I. Health and Wellness Centres – National Health Policy, 2017 has successfully visualized Health And Wellness Centres, which played a very crucial role in making the foundation of India's Health System. (ICMR- NICPR, 2020).

II. National Health Protection Scheme- It is the second flagship program that runs under Ayushman Bharat. Under this scheme, 10 crore poor and vulnerable families are covered and providing coverage up to the sum of 5 lakh rupees per family for their secondary and tertiary care hospitalization. (ICMR- NICPR, 2020).

B) Prime Minister's National Relief Funds- These funds came into existence by Late. Prime Minister of India Pt. Jawaharlal Nehru in the year 1948. The funds (PMNRF) are mainly utilized to provide relief to the families of those people who were killed in any natural calamities such as floods, cyclones, and earthquakes, etc. (ICMR- NICPR, 2020).

C) Ministry of Health and Family Welfare- This government body gives financial support to the poor patients for their treatment at different hospitals present in the country under two schemes(ICMR- NICPR, 2020).

I. RashtriyaArogyaNidhi (RAN)- Provides Financial Assistance to poor patients for treatment at various hospitals present in the country. The amount up to Rs. 1,00,000 per every respectable case reported for treatment in any respective hospital/centres. (ICMR- NICPR, 2020).

II. State Illness Assistance Funds (SIAF)- The state's Illness Assistance Funds are set up by all state govt./ Union Territory Administration where the funds for each of these states are released by the central government. These funds also receive contributions from donors (RAS). (ICMR- NICPR, 2020).

D) Central Government Health Scheme (CGHS)- This scheme is only applicable for retired Central Government Employees and dependents to provide the best cancer treatment facilities. (ICMR- NICPR, 2020).

E) Railway Concession For Cancer Patients and one Bystander- The Cancer patient travel is free and only 25% of actual class II fare has to be paid by the bystander. (ICMR- NICPR, 2020).

F) Air Concession For Cancer Patients- The Cancer Patient has to only pay 50% of the basic fare of the normal economy class. (ICMR- NICPR, 2020).

G) RashtriyaSwasthyaBimaYojna (RSBY)- Only the families under Below Poverty line, Mahatma Gandhi Rural Employment Guarantee Act(MGNREGA) job cardholder. (ICMR- NICPR, 2020).

H) Income Tax Relief for cancer Patient- Form No. 10 I have to be filled for getting these funds.

Funds by state Government- (ICMR- NICPR, 2020)
Chief Minister of Relief Funds- (ICMR- NICPR, 2020)

These funds are also provided for the treatment of distressed people who are affected by various natural calamities. These funds also assist the poor and needy patients for the treatment of cancer, cardiac surgery, Liver and multi-organ failure, etc. All states present in the country have set up an Illness Assistance Program except Assam, Meghalaya, and Nagaland.

CONCLUSION

This article gives a fair idea about the cancer burden over the world as well with special reference to India. The top 6 cancer illnesses present in India are Lung cancer, Breast Cancer, Oral Cavity Cancer, Cervical Cancer, Stomach Cancer, and Colorectal Cancer. This cancer accounts for 40% of total deaths among males and 60% of total death among females. The maximum death taking place in the country is due to Breast Cancer, Oral Cavity Cancer, and Cervical Cancer. According to the GLOBOCAN 2018 data, there were 87,090 deaths due to Breast Cancer, 72,161 deaths due to Oral Cancer, 60,078 Deaths due to cervical cancer in India, which is the reason for great concern for the Government of India.

There are various Tertiary cancer care centres present in the country, mainly the government hospitals that are identified by the Government of India in every state except Assam, Nagaland, Meghalaya. With the help of these centers, the government is trying to help the patient with their treatment by providing various sources of

funding. Due to the increased load of cancer patients, all the government hospitals are full and the patient has to go to a private hospital to get better care for cancer which ultimately leads to the situation of the bankruptcy of the poor and low-income families. The Government of India's Ayushman Bharat scheme is a good step taken by the government to provide better treatment facilities to the patients at a low cost.

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Changing Workspace and Rising Precarity: When Work and Family Come Together

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ABSTRACT

In a situation that demands shifting one's professional environment into personal space, it becomes significant to understand its influence on work ethics and social relations. This article focuses on the experiences of the software engineers in India, who are allowed to work-from-home for more than once a week. But when work-from-home became a compulsion, a change in work-life and work-family relations was marked. This paper attempts to study how the blurring thresholds of work & home space require an understanding of the implications of a new work process and rethinking precarity concerning the deflating boundaries.

KEY WORDS: IT PROFESSIONALS, PRECARIY, WORKPLACE CHANGE, WORK FROM HOME, WORKING CONDITIONS.

INTRODUCTION

Throughout times we have witnessed many changes in the work process and working styles of the people. Engels in *The Condition of the Working-class in England* (1845), discussed the problems faced by industrial workers. When industrial society began to undergo profound changes from the 1970s onwards, it paved the way for a post-industrial society marked by the growth of service sectors and white-collar jobs. Daniel Bell's 'The Coming of the Post-Industrial Society' gave an idea of how a transformation to a service sector society and the ensuing new age jobs were defined increasingly by the use of information technology (Strangleman and Warren, 2010).

But in India, as Chitra Joshi, remarks, labour history emerged in the post-colonial period.

Prior to that, in the 1950s and 60s, the colonial discourse on labour brought out a lack of commitment to work and irregular work rhythms. The writers of late 1970s focused on how caste and village ties played a significant role in among the working class and how working-class protest emerged (Joshi 2000). The shift marked during the 1980s was classified as a discursive structure and then questioning of earlier notions of class and class consciousness (ibid.). But with the growth of the neo-liberal global market, in 1990, and flourishing technological and communication revolution, increased work flexibility was witnessed. But even with work flexibility, there are certain professional ethics that the employees are made to follow.

Emile Durkheim (1957 [1992]) remarked that the professional ethics that govern individuals, compel them to act in a way, impose limits to their inclinations and forbid them to go beyond. These regulations and moral standards put an end to the conflict that disturbs life. Therefore these rules telling each of the workers his rights and duties, must not be vague or written in general

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terms but must be precise, detailed and taking into consideration the most ordinary day-to-day occurrences. Although in a different context, Kamala Sankaran rightly argued that with the changing scenario in the 1990s, the Declaration on Fundamental Principles and Rights at Work (DFPR) by the International Labour Organization (ILO) in 1998 to effectively monitor the compliance with labour standards everywhere is a significant decision (Sankaran 2013).

DFPR mandates ILO to conform to the fundamental principles and rights at work particularly in the areas relating to freedom of association and right to collective bargaining, the elimination of forced or compulsory labour, abolition of child labour and elimination of discrimination in employment and occupation (ibid.). Various reports and academic writings have discussed on compensation to employees, income inequality, a decline of unions and redistributive role work flexibility, globalization of competition between workers, changes in collective bargaining structures, and welfare state provisions (Michele Lamont 2011 et.al.). But today it becomes significant to look from the other side particularly with growing flexibilities and deflating bounds of work and personal life that lead to conflicting personal responsibilities and professional roles.

Arguments of the paper are based on interviews and the use of questionnaires with IT professionals to enter their worlds of work that is not much explored. Telephonic interviews with ten and questionnaires in form of google forms sent to the sixty IT professionals (inc. those interviewed) in order to understand their experiences on their changing work process and the influence of rising flexibility on the employees. Convenient and snowball sampling was used to get the contacts of the respondents of which thirty-five were male and twenty-five were female aged between 21-40 years and are continuing in the work for more than one year. 26 out of 35 males and 13 of the 25 female were also married.

Twenty-eight of the married respondents have children. The study was conducted between May-June 2020, after two months of lockdown announced from time-to-time by the state due to severity of the situation and these professionals were asked to work from home for more than two months. The sector comprises of nearly 1.2 million people of six leading corporate companies. These professionals, who are usually allowed to work from home when required, revealed interesting stories of their increasing levels of work-stress, uncertainties regarding job security, and restricted movement and confinement. They revealed how the transition of the workplace to home space also change the work ethics and social and personal relations.

The paper is divided into three sections that begin with a brief overview of literature related to work and precarity. The next section brings out the arguments to the workplace changes and its implications on the IT professionals, how space plays a major role when we discuss 'work' and how the blurring boundaries

between work and home space can lead to new work precarity. The last section is the concluding section that discusses the need for discussing the implications and rethinking the precarity in the context of the collapsing boundaries.

Changing Workplace and Rising Precarity: The term "precarity" originating from the Latin root *prex* or *precis*, referred to "to pray, to plead," and it commonly implies risky or uncertain situations (Maribel Casas-Cortés, 2014: 206). It gained importance in the 1990s, in Europe, as a response to the unstable labour relationship, usually associated with a lower salary and less protection against firing (ibid. 209). Rodgers and Rodgers (1989) developed four dimensions of precarious jobs for the International Labour Organization (ILO):

1. uncertainty over the continuity of employment;
2. a lack of individual and collective control over wages and conditions;
3. low or no levels of social protection against unemployment, discrimination, etc.; and
4. insufficient income or economic vulnerability

Although the level precarity, according to ILO report, varies based on a country, region, and the economic, political and social structure, as well as the labour markets, certain characteristics are common in every country or region (ILO 2011). These include uncertainty on the duration of employment, multiple possible employers, a disguised or ambiguous employment relationship, lack of access to social protection and benefits usually associated with employment, low pay, and substantial legal and practical obstacles to joining a trade union and bargaining collectively (ibid.). In a neoliberal globalized era marked by technological advances, the state regulations on minimum acceptable standards in the labour market got eroded like the rules that governed competition in product markets (Arne L. Kalleberg 2009).

Flexibility at the workplace resulted in restructuring and transformations in the employment relationship. Kalleberg rightly remarks that in transitional and less developed countries the term precarious work is affixed with the informal workforce. But precarity, in short, as Andrea Muehlebach is shorthand for those of us documenting the multiple forms of nightmarish dispossession and injury that our age entails (Muehlebach 2012). According to Vosko (2010, p. 51), the standard employment relationship (SER) is "a regulatory architecture built upon employment status (i.e., the bilateral employment relationship), standardized working time (normal daily, weekly, and annual hours), and continuous employment (permanency)" (see Dennis Arnold and Joseph R. Bongiovi 2013: 294). Absence of any of these features often leads to the growth of uncertainty and precarity in the work process.

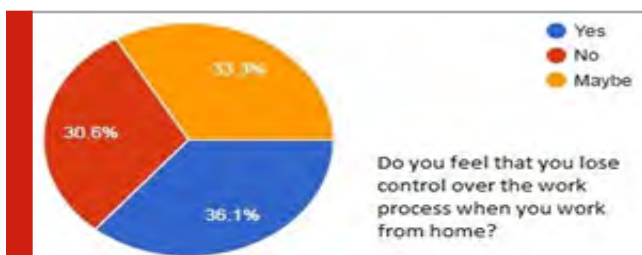
Precarity, in the Indian context, is often been associated with the informal workforce that includes self-employed petty commodity producers, migrants, women and child

workers. But in a situation marked by crises due to a global pandemic, it becomes significant to understand its influence on different sections of the society. The announcement of national lockdown on March 24, 2020, due to national health emergency arising out of COVID 19 outbreak, left many informal migrant workers stranded.

Reports of these thousands of daily wage workers without food or money, struggling to reach their home state safely made news everywhere. The impact was also noticed in the transportation and manufacturing sectors, street sellers, small shop owners, artisans, domestic help and construction workers. Not just the informal workers, but also private corporate employees' witnessed a severe blow with this transition. It not only influenced their lives and livelihood but also social and occupational relation thus causing severe work stress and work-life imbalance.

When Work and Family Come Together: Role of Space in a Corporate Sector: Lack of adequate internet connectivity and a room entirely dedicated to the work setup, it becomes stressful to work remotely from home. Talking for myself being a developer I need my mental peace to concentrate properly while coding. But working from home and knowing that your baby requires your attention all the time it becomes very difficult not getting a few hours in a day to yourself. (– Mother of a 2 years kid & Project Lead).

There was news about attempts by employers to ensure that high-speed broadband connectivity is provided to remote workers, expanding their own virtual private network bandwidth by ten times and also shipping 35,000 computers to employee residences to make sure that the employees continue with their work. But working from home for a longer time makes it significant to understand the space limitations, technological constraints. While many participants of the study pointed out that work from home allowed them to be at home, taking out time for housework, no feeling of rush or reaching on time, no anxiety of traffic or travel, flexible eating timings. But these flexibilities also brought with it feelings of isolation, stress that could have been resolved by speaking to colleagues if they were at the office. Given the advantages of working from home, the need is also to understand the drawbacks and problems it withholds.



At the office, work gets done faster compared to home. Because we reach out to correct people and discuss in face to face to solve the issue. In work from home situation, we have to find a time to schedule a call and generally

the time is taken to finish the work is more compared to the office (Male 33, Business Analyst).

Working from home often brings with it different types of challenges like technical issues that you cannot resolve immediately, issues of adequate internet connection due to which I go offline many a times and miss out several important points by the time I connect back. This gives me stress and anxiety and the thought of losing my job, inability to find another job. Further, there is a drop in the knowledge growth when work from home becomes a regularity and normality. This is because we don't get the surrounding or people with whom we can sit for a cup of tea or coffee and discuss certain issues or problems. There is a lack of connectedness with others in such a situation. The relocation of work has not only changed the work-life balance but also changing roles of the family members (Lead analyst, 36, Female).

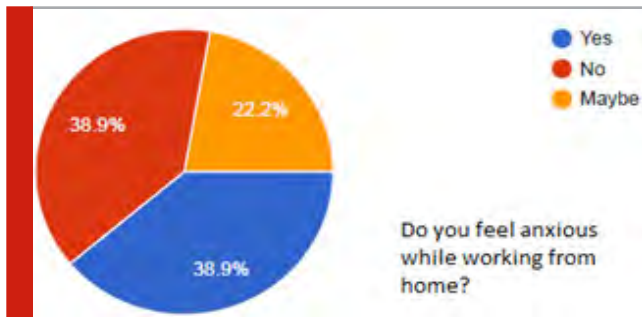
Anthony Giddens (2009) rightly remarks that sociological imagination requires us, above all, to 'think ourselves away' from the familiar routines of our daily lives in order to look at them anew. To this, he gives the example of the simple act of drinking a cup of coffee. It is not just a simple act of consuming the drink or just a refreshment (ibid. 6-8). It is not just an individual activity but holds symbolic and social values. When two people meet over coffee they are more interested in getting together, chatting or discussing over an issue rather than just to drink. Further, in every society, drinking and eating provide occasions for social interaction and the enactment of rituals. Giddens rightly remarks that our activities give shape to the social world around us and, at the same time they structured by that social world. But in a situation where these activities are disrupted, it becomes significant to understand the impact of such changes on society. It was reported by man respondents that being away from the workplace, makes them feel a loss of connection with work ethics and unconstrained interaction with colleagues to resolve an issue or get the work done.

Alan Felstead and Nickwe Jewson referred to diverse frontiers that the home-located producers confront and try to negotiate. The foremost among these is the management of boundaries between the household and the outside world. Then after is the organisation of boundaries between the household and the outside world (Felstead and Nickwe 2000: 143). Lack of proper organization and clear division of boundaries can become unwelcoming, also lead to a lack of privacy and anxiety. It is rare in case of many employees that their home is optimized into space specifically dedicated for work. As an outcome many end up locking themselves in their bedroom/guest room or their drawing rooms with a background noise of television, doorbell and utensils. These situations further aggravate when there is no fixity of work timings.

At home, workload increases and with it the level of anxiety... getting calls to finish the work even after work hours has become a real challenge. This has instead

increased personal life problems. Along with work, a person has a family that they have to look after. I and my partner are both working and have a 5 years old son. We have to take care of him and his studies. Although we do take turns there are certain times when both of us get busy and he is left all alone. This would not have been a problem if we had a 24X7 house help or living in a joint family with our parents. We do have a cook who comes, cooks and leaves. But other household chores need to be completed and we cannot expect one partner to do all the household chores.

Although we take turns to do the work, but managing work from home and household chores at the same time becomes difficult. It becomes difficult to draw boundaries and specify specific timings to each work. Night duties from home add to the difficulties when one has to talk slowly to the client or while making a presentation to ensure that the entire family's sleep is not disturbed. This would not have happened if I would have been in office. I have to think several times to make a cup of tea/coffee late night and the reason is the same. All these would not have been difficult had I been in office (Senior team lead, 37, Male). The table below shows the responses of the professionals:

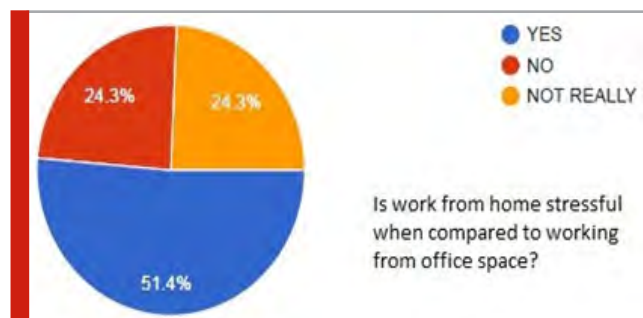


These challenges made it difficult for employees to organise themselves and their timings. Irregular working hours, no fixity of work timings led many to witness family conflicts. Maintaining work ethic, meeting the deadline along with organising one's time, space and family responsibilities led to a new precarious situation for the employees. It was noted by many that although they were not under any managerial surveillance, psychological pressure increased. This was due to the assumption that they are at home so they are available to do the work whenever required. Managers tried to reach them anytime via phone, mails or messages even at odd times.

While working from home has mitigated my commute challenges and improved my health, but on the flip side, it has also allowed my reporting managers to reach me at odd hours presuming I am always at home and always available with my laptop (Female, 34, Support Analyst). Although in a different context, Richenda Gambles et.al (2006) rightly remarks that the difficulties of combining paid work with other parts of life, family relationships and well-being is no longer personal, family, employer or even national concerns, instead they have become global challenges (2006: 5). The changing roles, identities, and

relationships in the context throw new challenges and societies as a whole need to respond to the changes in families, work, workplaces and communities in an increasingly globally connected world (ibid.).

Harmonising paid work with other parts of life that include family, friends, relatives, unpaid care and domestic work and community participation are interrelated and thus demands utmost balance (ibid. 35). Further, while the roles and responsibilities of men and women related to their work and family have evolved and have become increasingly reciprocal and dynamic, it becomes significant to overcome other deterrents in form of remorseless, unusual, odd work timings leading to strain, worry, anxiety and thus precarity. Adapting to the changing needs also entails, on the part of the authorities, adapting to certain norms, rules and standards in their working practices in order to ensure smooth functioning and lower the risk of the precarious working condition.



A report by Global Workplace Analytics had estimated a 159% increase in work from home between 2005 and 2017. The unprecedented disruption caused by Covid-19 has certainly led to an unprecedented increase in this percentage. Though many people fathom it to be an easily manageable affair by simply equipping people with laptops, what they fail to realise are the myriad challenges both personal, social and professional that it has caused by rupturing a structured routine.

Laurel Farrer, the co-founder of the Remote Work Association and CEO of Distribute Consulting, is of the opinion that in the absence of robust policies and procedures to support off-site employees, work from home is likely to have unpleasant personal and professional consequences including micromanagement, career stagnancy, isolation and mental and physical burnout. Moreover, technical difficulties associated with this work format (signal issues and internet downtime) exacerbate the stress of an IT professional. Motivating yourself and staying focussed in the comforts of home, along with its distractions, is a major challenge of remote working. Teamwork, which is considered to be a mainstay of IT work culture, has been hampered in these challenging times with video calls being the closest one can get.

Looking at the economics of remote working, an article in Economic Times (May 31, 2020) aptly pointed out that while organisations may be benefitting from the

economics of working from home amidst lockdown and virus spread scare, retail/individual power usage bills have approximately doubled with increased use of air conditioners, lights, fans and other peripheral gadgets to support uninterrupted working. With stagnant disposable incomes, and in many cases even declining incomes owing to pay cuts, and in the absence of any compensation towards inflated bills, the incidence on individuals is definitely higher and pressing. At a macro level, one must not overlook the inequalities of access and opportunity, which was quick to fizzle out the work from home euphoria. The debates on advantages and disadvantages of remote working and its long term adverse impacts became more vociferous when companies like Google, Microsoft and Facebook announced extension till end of year.

If we analyse the more minute details, the ergonomic furniture of working spaces is largely absent at home, which has impacted posture and comfort of long hours of working at the laptop. Most of the newly recruited younger professionals cannot afford to install PCs or buy laptop to support their jobs. This is apart from the free tea and coffee breaks that come as perks to all the office goers. All this discussion has, till now, been associated with tier I and II cities. The challenges related to continuous connectivity of high bandwidth increase in semi urban and rural areas which suffer from poor signals caused by lack of towers and service providers. Huge disparities between countries and sectors has emerged when employees are largely unable to work from home.

While around 60% of workers in high income countries like the US and Switzerland are unable to fully work from home, in poor nations like Bangladesh and Egypt this number is as high as 80-90% owing to digital connectivity issues and the sectors in these economies. Additionally remote working has adversely impacted productivity due to hampered flow of communication, stress caused by the spreading pandemic and increase in unpaid home care responsibilities. The focus of organisations has now shifted to maintaining and managing deteriorating mental health of employees after a UK study report found the anxiety levels to be higher in March-April 2020. (WEF article from Future of Jobs Report, 2020).

Apart from this double disruption caused by Covid 19, there are going to be some unavoidable consequences which are likely to change IT sector operations and delivery in more ways than one by 2025, according to WEF Report. The pace and extent of mechanization will increase and the adoption of technology will now be a priority of business leaders. Consequent to technology integration, companies are estimated to prune their workforce, migrate to contractual workforce hiring, shift locations and modify value chains. Number of jobs created is likely to be lesser than number of jobs created and skill gap will stay with skills like critical thinking, analysis, problem solving, emotional intelligence,

self-management and flexibility will witness a rise in demand.

As skills are highly correlated to social inequalities, this emerging skill gap of soft & basic and cross functional skills will exacerbate the need for re-skilling. It is also likely to significantly impact jobs of lower wage workers, women and young workers and further deepen the inequalities. Those in employment and those unemployed will both look for cross skilling and acquiring latest digital skills to reduce the uncertainties caused by Covid-19. So human capital investment, which was the central theme of Nobel Laureate Amartya Sen's developmental economics, will gain currency with a renewed focus. With India at the 116th position out of 15 countries in World HCI 2020, according to World Bank Report, skill development becomes central to government in order to sustain its top position as favourable destination for outsourced business. Pandemic has put at risk a decade's progress in human capital which is now vital to a more inclusive, sustainable and futuristic growth.

CONCLUSION

Over the past decades, the growth of white-collar service work has led to the end of many problems related to industrial, blue-collar services. But at the same time, the sector has also introduced new forms of precarity under the aegis of 'new normality'. It raises some significant questions about the precarity of the situation, the stress attached to it and the blurring boundaries between work & home space. While precarity has often been associated with rising unemployment, job insecurity, non-standard work conditions, low or no workplace safety, work stress and harassment and, growing risk and uncertainty.

The point here is to note that whether blurring boundaries have reduced or instead increased the precarity of the employees. Instances of no fixed work timings, lack of dedicated workplace at home for many, work stress to meet deadlines and targets, breaking of work ties, anxieties related to network issues while meeting a client and rising family conflicts still questions the efficiency of 'new normality'. The potential risk associated with the work from home situation is difficulty in establishing the boundaries and thus lack of relaxation and feeling of isolation makes us rethink the 'new' precarity associated with the 'new' normality.

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Design of a Communication System Using DSP Processor DSK C6713

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ABSTRACT

In the real world, effective DSP algorithms are required to process the data at a very fast speed as per the requirement of real time world applications like Embedded Image and Video Processing. A latest DSP processor can be used to perform various very fast operations efficiently and effectively by a digital system using different software modules. The digital system can be designed and modified by simply made few changes in the program. By using DSP processors, many parameters can be modified like error detection and correction, compression and expansion, BER etc. For hardware implementation, the performance of the system has been evaluated by using personal computer with DSP processor DSK 6713, MATLAB Simulink and Code Composer Studio. The Real Time Workshop (RTW) use DSK C6713 for generating ANSI C code. The Code Composer Studio (v 3.1) compile the machine code and download to the hardware for real time data process. The performance of the digital system is monitored by varying the SNR of the AWGN channel.

KEY WORDS: MATLAB, SIMULINK, DIGITAL SIGNAL PROCESSOR, REAL-TIME WORKSHOP (RTW), RTDX.

INTRODUCTION

The signal processing using digital techniques has many advantages as compared with the analog circuits like analog modulators, analog filters and solid-state amplifiers. There are various advantages of Digital Signal Processing as the DSP implementation is very flexible. One can easily change the system parameters by doing few modifications in the program used by the software for a specific application (W.-S. Gan, Y.-K.Chong, W. Gong, and W.-T.Tan 2000). The performance of a digital system remains the same if the same system is manufactured in bulk quantity. The reproducibility of the system using the DSP cannot degrade the performance of all the similar systems because of the digital nature of the signals that

can restore and reproduce several times by the system (FarhanManzoor, David Linton, MichaelLoughlin 2012). The reliability of the digital systems is very high because of the memory and hardware used in these devices remains unaffected for a long duration of time.

During all weather conditions either indoor or outdoor, the performance of the digital systems remains the same as compared with analog devices. Now a day, it has become possible to design sophisticated devices using DSP with less complexity such as face recognizer, digital signature analyzer and thumb expression analyzer with very less weight and low power consumption (M. Ravi, S. Siva, SankaraSai 2017; W.-S. Gan, Y.-K.Chong, W. Gong, and W.T. Tan2000). There are many functions that can be perform only by using DSP, such as error detecting and correcting codes, compression and expansion of the data sequence, interleaving and de-interleaving etc. The cost of the digital system is lower than that of an analog system due to advancements in the semiconductor technologies (VLSI). As discussed in (W.-S. Gan, Y.-K. Chong, W. Gong, and W.T. Tan2000; J. Glossner et.al 2000) the DSP processor kit TMS320C5402, Code Composer Studio, Matlab Simulink blocks are used initially.

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The processing of algorithms in real-time on host PC has many disadvantages because of tremendous load of computation. Several serial operations has to be performed for a single step computation (Jacob Fainguelernt and ArieYeredor 2004). The purpose of task allocation is to minimise the overhead of communication and synchronisation for multicore interactions and maximise the real-time processing performance. For multicore DSP chips, the algorithm tasks are implemented in parallel in cores, which can greatly reduce time (M. Ravi, S. Siva, SankaraSai 2017). The hardware implementation using DSK 6713 can be performed by using DSP toolboxes, RTW and Embedded Target.

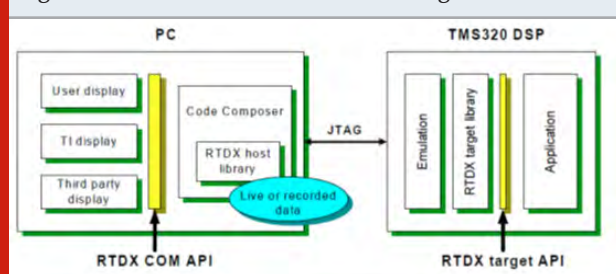
Hardware Emulation and Real -Time Data Exchange:

Texas Instruments digital signal processors have very good emulation support that enables the CCS for better control on program execution and monitoring the real-time activities. The JTAG link enables the communication with the on-chip emulation support. The JTAG link is a low intrusion way of communicating with other DSP systems.

The various capabilities of the on-chip emulation are as follows:

- To start, stop and reset the digital signal processor.
- It enables the transfer of code and data into the DSP.
- Examining the contents of registers and memory of the DSP.
- Generate break points of hardware instruction.
- It has a variety of counting capabilities.
- Data exchange between host PC and DSP processor in real-time.

Figure 1: Data transfer in real time using RTDX

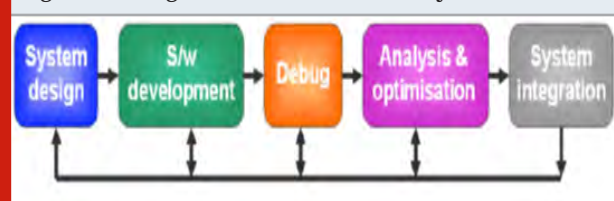


The CCS provides built-in support to perform various activities with these on-chip emulations. Real-time data exchange and the DSP Application Programming Interface (APIs) enable the bi-directional data exchange in real-time between the transmitter and receiver. In comparison with the applications of DSP in the real world, the RTDX also provide real-time and continuous visibility throughout the process. The transfer of data between the host PC and the DSK take place with the help of RTDX without stopping their target application. RTDX enable the analysis and visualization of the data on the host PC with the help of Object Linking and Embedding automation.

Hardware Design: For the design of a new digital system

in real-time, the activities must be carried out in the sequence as shown in figure no. 2. It is clear from the figure 2 that the design flow not only forward directed instead after each step it has to go back to previous step for doing the modifications and for additional tests.

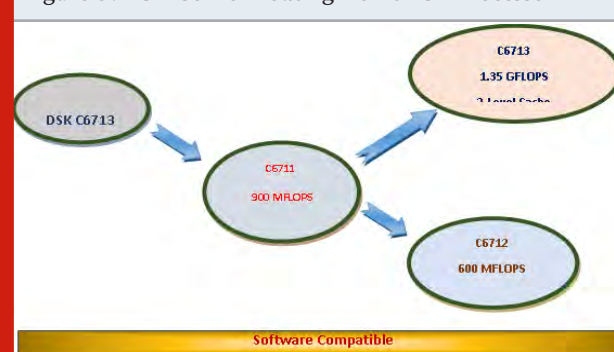
Figure 2: Design flow for a DSP based system



In digital system design using DSP Processor both hardware design and software design are required. The designer has many options in hardware design for choosing the DSP processor depending upon the requirement of architecture, interfaces, memory, speed etc. But in software design the options are code structure, data flow, data exchange interface etc. Software development many consists of generating the DSP project and actual DSP code. The critical thing for the developer is debug phase in which he has to verify that the code is working according to the requirement of the project design. To optimize the system the developer must focus more on analysis and optimization phase. To achieve the requirements like speed, memory, power consumption, bandwidth etc. The new system must be integrated with the existing infrastructure to make it fully functional for this the developer focus more on system integration.

Hardware Requirement: The high performance signal processors include the TMS320C6713 in the family of Texas Instruments TMS320C6000 series. The DSP processor C6713 is a floating point DSP with initial clock rate of 225 MHz.

Figure 3: DSK C6713 Floating-Point DSP Processor



The processor C 6713 architecture is very deterministic and have restrictions also like how to fetch the data and execute. The flexible architecture brings higher efficiency for the C6000 family of processors. Figure 3 shows the roadmap for achieving the highest performance by the floating-point C6000 DSP's platform. The Matlab Simulink has been used for the design of the digital system and DSK C 6713 of TI has been used for hardware

implementation. Digital system has been designed using the different blocks of Simulink. The random data has been generated and modulated using 16-QAM modulation technique. The DSP processor works with the code composer studio for generating the C language code. This technique is useful for real-time data transfer.

The processor DSK C 6713 has a high level of parallelism. This processor sends multiple instructions and execute them parallel at a very high clock speed. These processors use Very Long Instruction Word (VLIW) architecture in which there are eight execution units for executing up to eight instructions per cycle [8][9]. The DSK package is available with special version of Code Composer Studio (CCS). Using Universal Serial Bus (USB) JTAG emulator, the communication between the DSK and CCS takes place (The MathWorks 2003). The data transfer between the host PC and the receiver has been performed using the DSP Processor DSK C6713, Real Time Workshop (RTW), Code Composer studio and the Simulink. Figure 4 shows the set up to transfer data in real-time between the host PC and the hardware DSK 6713 kit.

Figure 4: Hardware Set up for the system

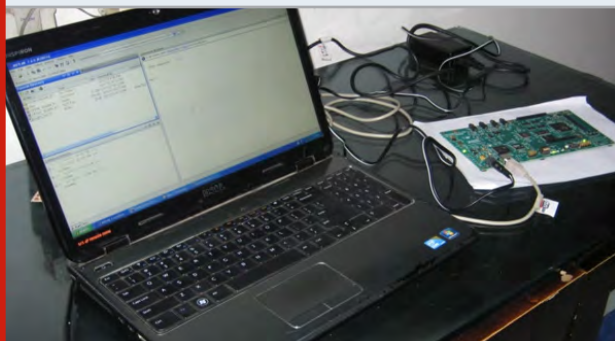
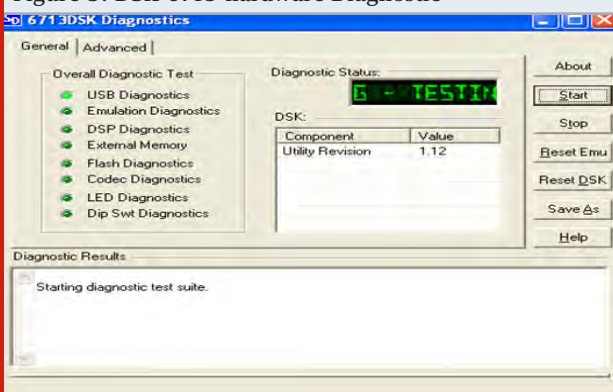


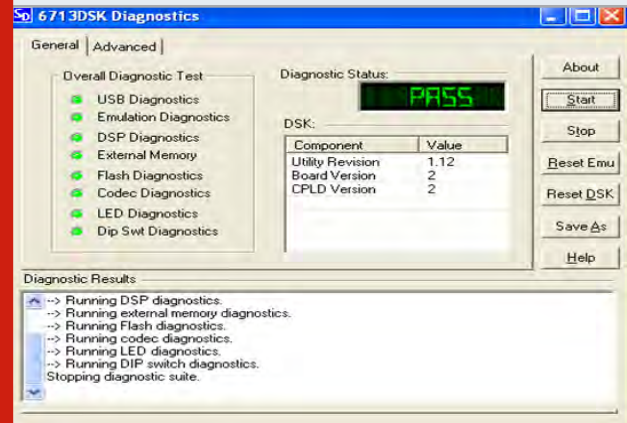
Figure 5: DSK 6713 hardware Diagnostic



The DSP processor has been used to process the baseband signal. The system model has been designed using Matlab Simulink and Real Time Workshop (RTW) transform this model for DSP implementation. The performance of the system can be monitor by changing the various parameters like SNR, digital modulation technique (FSK, QPSK, 16-QAM), quantization levels, interleaving etc. The working of each unit of the DSP processor kit can be verified by running the diagnostics. Figures 5 & 6 shows

the Diagnostics utility for the testing of USB Diagnostic, Emulation Diagnostic, DSP Diagnostic, External memory, Flash Memory, Codec Diagnostic, LED Diagnostic and Dip Switch Diagnostic of the complete system.

Figure 6: Showing Pass Status of the hardware connection



Figures 7 & 8 shows the Real - Time Workshop linking with the Code Composer Studio and generating the header file and the C file automatically. These files has been downloaded finally on DSK C6713.

Figure 7: Command window of MATLAB connecting CCS with the DSK C6713

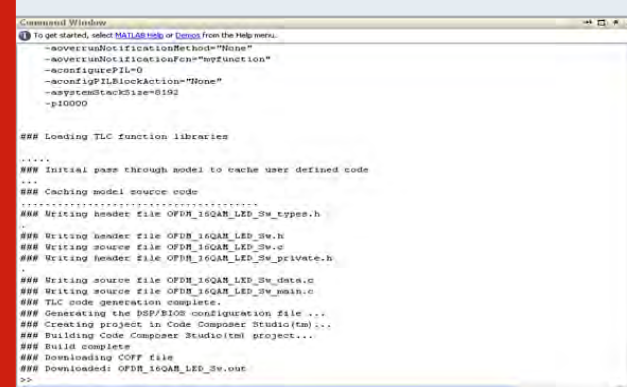


Figure 8: TLC code generations and download the C language code automatically

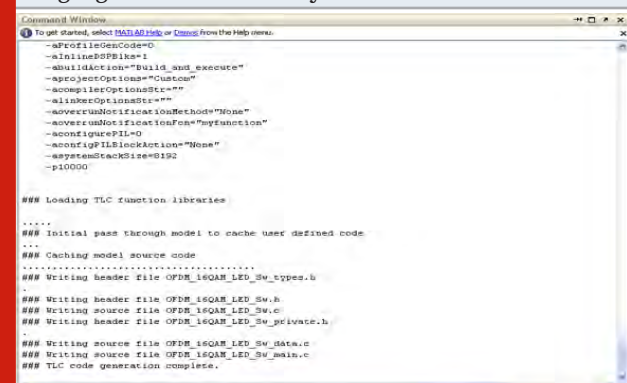


Figure 9 shows the output signals with SNR 50 dB and 25 dB of the AWGN channel. The demodulated output signal has been distorted due to reduction in SNR of the channel.

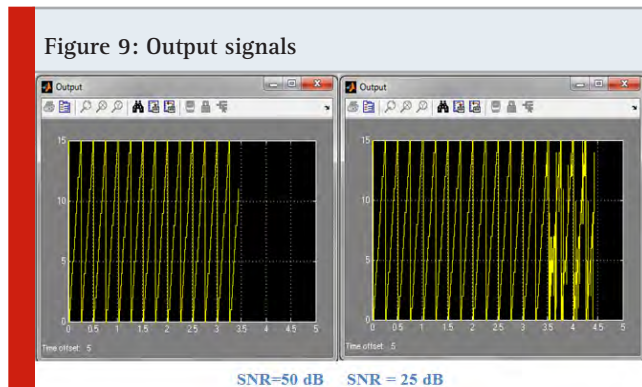
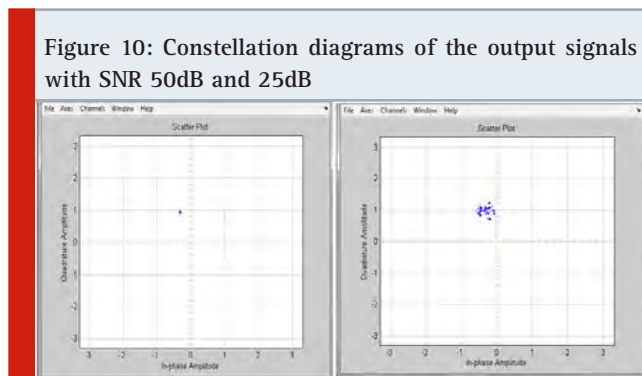


Figure 10 shows the output signals constellation diagram with SNR 50dB and 25 dB of the AWGN channel. The output signals constellation diagram has been distorted due to increase in noise.



CONCLUSION

In this paper we have implemented a digital communication system using the DSP processor DSK C6713. The system has been designed using Simulink blocks of Matlab software. Simulation and Implementation stages are done using a graphical environment by use of algorithms, which reduces the efforts in developing codes. This process of designing makes the algorithm very clear and we can be easily modified and debug. This technique can be used with the more advanced DSP processor for applications that require very high data processing like Embedded Image Processing and video processing.

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Enhancing Women Education in 21st Century in India: an Intense Women Empowerment and Gender Equality

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ABSTRACT

Great educationist Swami Vivekananda said, "There is no chance for the welfare of the world unless the condition of women is improved; it is not possible for a bird to fly on one wing." Women can play a significant role in family as well as in society for the development of nation. Education is considered as a milestone for women empowerment. According to the Government reports, women's rights, gender discriminations are encountering some barriers till 21st century. Even beyond the literacy rate, as per the Global Gender Gap Index 2020, this present paper reveals the relevant adversity that Indian women are still undergoing. But the holistic education and optimism of the new schemes and policies introduced by the Government ensures the desirable and diversified outcomes in future for women.

KEY WORDS: WOMEN EDUCATION , WOMEN EMPOWERMENT , GENDER EQUALITY, GENDER GAP, NEW EDUCATION POLICY 2020.

INTRODUCTION

With the slogan of "Women Empowerment" the question arises in our mind that " Why do women feel that they are discriminated ?" "Why do we need to discuss about women empowerment?" So first we have to understand what is Empowerment?

Empowerment is a multi dimensional process which explains the identity, authority , responsibility and power of an individual or group to make choices and transforms those choices into outcomes. Women empowerment refers to the emancipation of women from all the spheres like economical, political, social, gender-based discrimination. After a historical analysis, it proves that in Vedic Period women had equal status along with men than the downward position in the Medieval Period. But during

the British Period, women's place again gets promoted with equal rights by so many social reformers.

In India we can see that even in 21st century, there are high level of gender inequalities where women are poorly treated by their family members and ill treated by the outsiders. Still large section of women of our country are illiterate, weak and exploited by the society. Now the question has arisen that "Are women really strong?" "Has their long term struggle ended?" Though we cannot deny that our "patriarchal" society is to some extent responsible for the upliftment of women's position in the society, but both the genders have been suffering from disadvantages due to the inequality in our nation. If we critically focus on male dominating issues we can see that it will not bring any kind of progression in a nation and also restrain various kind of creative thoughts.

Women empowerment implies to the creation of an environment where women can be capable of taking their own decisions for their personal benefits as well as for the society. Education is the key factor which leads to the enlightenment in every one's life. "Education is the first step for Empowerment - Malala". Education is an important powerful tool which reduces inequality and also controls population. Education enables women to face

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so many challenges. Education can bring changes in the position of women in their family and in the outer world because when women are educated and empowered, they can guide their children, family members, society indeed. Empowerment of women brings equal rights, status, opportunity and freedom to their personal benefits as well as for the society. Empowering women are self dependent and they enhancing their position in the power of structure of the society (Dr.Madana V. 2014). RituAjvani in her article (31st March,201`9) was reported that education is milestone of women empowerment because it enables them to riposte to challenges, to resist their traditional role and change their life.

Purpose of the Study: Now-a-days India's new infrastructure is based on education, health, technology as well as policies. By providing right education to women, it ensures gender quality and women empowerment. It could bring other desirable outcomes in the society. In this considerable situation, researcher has been conducted of this present study.

Table 1. Literacy Rate in India

YEAR	PERSONS	MALE	FEMALE
1901	5.30	9.80	0.70
1911	5.90	10.60	1.10
1921	7.20	12.20	1.80
1931	9.50	15.60	2.90
1941	16.10	24.90	7.30
1951	16.70	24.90	7.30
1961	24.00	34.40	13.00
1971	29.50	39.50	18.70
1981	36.20	46.90	24.80
1991	52.10	63.90	39.20
2001	65.38	76.00	54.00
2011	74.04	82.14	65.46

Source Census of India (2011)

Table 2. State wise female literacy percentage in India as 2011 census

Sl no.	State Name	Female lit. rate	Sl.no	State Name	Female lit. rate	Sl.no	State Name	Female lit. rate
1	Andhra Pradesh	59.7%	11	Jammu & Kashmir	58.05%	21	Orissa	64.4%
2	Arunachal	59.6%	12	Jharkhand	56.2%	22	Punjab	71.3%
3	Assam	67.3%	13	Karnataka	68.1%	23	Rajasthan	52.7%
4	Bihar	53.3%	14	Kerala	92.05%	24	Sikkim	76.9%
5	Chhattishgarh	60.6%	15	Madhya Pradesh	60.0%	25	Tamil Nadu	73.9%
6	Delhi	80.90%	16	Maharashtra	75.5%	26	Tripura	83.1%
7	Goa	81.85%	17	Manipur	73.2%	27	Uttar Pradesh	59.3
8	Gujrat	70.75%	18	Meghalaya	73.8%	28	Uttarkhand	70.7%
9	Haryana	66.8%	19	Mizoram	89.4%	29	West Bengal	71.2%
10	Himachal Pradesh	76.65%	20	Nagaland	76.4%			

Table 3. Union Territory Female literacy percentage in India as 2011 Census

Sl. no	Name of the Union Territory	Female Literacy
1	Andaman & Nicobar Island	81.80%
2	Chanighar	81.40%
3	Dadra & Nagar Haveli	65.90%
4	Daman & Diu	79.60%
5	Lakshadweep	88.20%
6	Pondicherry	81.20%

Objective of the Study

1. To study the role of education in women empowerment.
2. To study the role of education in gender equality.

METHODOLOGY

The present study is descriptive and analytical in nature. The study is based on the collection of data from secondary sources like various published and unpublished books, records, research journals, magazines, news paper articles, different websites.

Status of Education and Women Empowerment: Women Empowerment itself elaborates the access to education, political rights, social rights, economic rights, judicial strength, freedom and decision making power and the other rights that taken as equal for women.

PanditJawahral Nehru – “When women move forward, the family moves, the villages moves and the nation moves.”

According to the definition provided by the United Nations, “Women’s Empowerment” has five components-

- Women’s sense of self-choice .
- Right to have and to determine choices.
- Right to have access to the opportunities and resources.
- Right to have power to control their own lives, both within and outside the home.
- Ability to influence the direction of social change.

Present age is based on “Knowledge Century Era”- and knowledge is an asset to the progress. Although education doesn’t imply only to gaining knowledge but also transforming it through the proper application for betterment and development. Literacy rate is increasing for Indian women but still there is a gap between the male and female which can be seen in the following tables.

From the Table -1 It is shown that the literacy rate of women in 1901 was 0.7% and in 2011 it is 65.46%. It has increased from 0.7% to 7.30% whereas men has risen from 9.8% to 24.90%.

In Table -2 it is shown that Kerala has the highest literacy rate of 92.05% as first and Mizoram as second of 84.4% and Tripura as third of 83.1% among all the states according to 2011 report.

In Table -3 it is shown that Union Territory has the highest rate of literacy as in Lakshadweep of 88.2% according to the 2011 report. In the above tables it shows that the overall female literacy has increased by 11.46% yet it is 16.68% less than male literacy rate in 2011. The Government of India has taken the initiatives in various welfare schemes and policies for Women Education and Women Empowerment. Some of these are - Swayamsidha Program (2001), Swadgarbh (2002), Support to training and Employment Programme for Women (2003), Kishori Shakti Yojana (2006), Pradhan Mantri Mantri Vandana (2010), Rajiv Gandhi Scheme For Empowerment Adolescence Girl Child (2011), Kanyasreepokalo (West Bengal- 2013),

National Mission For Empowerment of Women (2011), Beti Padhao Beti Bachao Scheme (2015), Women Helpline Scheme (2015), Sukanya Samridhi Yojana (2015), Pradhan Mantri Ujjwala Yojana (2016), Mahila e-Haas (2016), Pradhan Mantri Mahila Shakti Kendra Scheme (2017), Maternity Benefit Program (2017), e-Samvad Portal (2018), Nari Web Portal (2018), She Box Portal (2018), New National Policy has been implemented by the Central Government (2020). If we overcome the low rate of literacy on Women, then we can make the concept of women in positive sense as she is strong, active and independent. With the help of “Education”, an awareness can be transformed among the young generation about “Women Empowerment”.

Education and Gender Equality: Gender inequalities are still deep rooted in every society where women are segregated by the male dominating society. Equal participation in all areas of “Sustainable Development” goals on addressing to the gender quality and empower to all women and girls. International Women’s Day on 8th March 2020: The theme according to the United Nations, Women, is “I Am Generation Equality : Realizing Women’s Right.” The main aimed focus is on the Gender Quality. According to the World Economic Forum’s Global Gap Index (GGI) 2020- the gap between men and women are in four categories -political empowerment, economical participation and opportunity, health and survival, Educational attainment. Over the index the highest score is 1 (equality) and lowest score is 0 (inequality).

In the field of Educational Attainment, the India has ranked 112th among the 153 countries in 2020 whereas India’s position was relatively higher at 98th rank in 2006 Report. So India has declined its position on the basis of gender gap. And it clearly shows that the status of women in India and gender discrimination exists in all around four aspects. If the gender discrimination will be abolished in the society by providing proper education to women it would be helpful for women to access to their legal rights. Although Indian constitution has already mentioned so many Articles regarding gender equality. There are some of these -

Article no.	Provision
14	Equality before law for women
15(i)	The state not discriminate against any citizen on ground only religion, race, caste, sex, place of birth or any of them.
15 (3)	The state to make any special provision in favour of women and children
16	Equality of opportunity for all citizens in matters relating to employment or appointment to any office under the state.
39(a)	Equally the rights to and adequate means of livelihood
39(b)	Equal pay for equal work for both men and women

The constitutional mandate, the state has enacted through the various legislation to ensure equal right, counter the discriminations and to provide support service from atrocities specially to women. Some acts of special provision to safeguard women are-

An “Educated” women can remove gender inequality from the society and prevent herself from such sexual harassment, domestic violence, child marriage and so many issues.

Suggestion for upliftment of Indian Women-

Year	Act
1954	The Family Act, The Special Marriage
1961	The Maternity Benefit Act, Dowry Prohibition Act
1976	The Equal Remuneration Act
2005	The Protection of Child Marriage Act
2006	The prohibition of Child Marriage Act

- Through providing some parental motivational campaigns, it will reduce gender biasness in family and encourage them to take care of girls' education.
- Imparting amenities including toilet facilities, residential school for girls will ensure women education.
- To promote gender sensitivity through the curriculum and co-curricular activity.
- Provide counsellors in educational institutions.
- Encourage and ensure in participation of women in all the sectors collectively.
- Arranging community awareness programme by the different NGO's and voluntary organisations.
- Mass Media has an important role to play to ensure women's rights.
- To promote women education through different schemes taken by the state and central government to be properly implemented.
- Encourage positive attitude towards use ICT in education in a right manner to the women in study and in the field of research.

CONCLUSION

From the above discussion it is clearly understandable that women even in 21st century in India are still facing some obstacles in the field of education and in others areas. Although various schemes are taken by state and central government to ensure Women Empowerment. NEP-2020 policy has been accepted by the central government after 34 years to form new structures in education. The policy addresses to the diverse needs of women education. Hopefully the female literacy rate will increase day by day and we will possess a glorious

picture of pride in women like SavitriPhaiPhule (1st women teacher), Mother Teresa, the biggest name in history (as social reformer), Indira Gandhi (1st Prime Minister in India), Kalpana Chawla (1st women to go space), Arundhuti Bhattacharya (1st women become chairperson of State Bank of India), Kiran Bedi (1st women IPS officers), Medha Patkar (social reformer), Mary Kom as a strong fighter and many more with their outstanding achievements.

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Isolation and Characterization of Biofilm Forming Multiple Drug Resistance Bacterial Pathogens from the Urinary Catheters

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ABSTRACT

Lengthy urinary tract catheterization leading to the bacterial colonization of the urinary tract is a significant determinant of colonization through adherence to the catheter surface. The collection of urine and urinary catheter bacterial isolates of 55 patients was shown to be multiple catheter colonisation, while the *Escherichia coli* isolates were usually contained in high number in the urine. Kirby Bauer disc diffusion system was used to conduct antimicrobial susceptible patterns of the isolated species. Based on the morphological characterization and some specific biochemical reactions of the most resistant, intermediate and sensitive bacteria, the isolates were identified as, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Candida albicans*, *Enterococcus* Sps., *Staphylococcus epidermidis*, *Proteus mirabilis*, and *Klebsiella pneumoniae*. Nearly 67 % the isolates were high biofilm producers with strong adherence.

KEY WORDS: URINARY CATHETERS, BIOFILM PRODUCERS, ANTIMICROBIAL SUSCEPTIBLE PATTERNS.

INTRODUCTION

Urinary tract infections (UTIs) are severe health distressing complications worldwide. The most common bacterial pathogens involved UTIs in human beings *E. coli*, *E. faecalis*, *K. pneumoniae*, *S. marcescens*, *P. aeruginosa*, *S. saprophyticus*, *S. aureus* and *Proteus mirabilis*. Around 85% of the population acquired UTIs and 50% of the hospital acquired UTIs are mainly caused by *E.coli*. Different factors like age, gender, immunosuppression and urological instruments may affect prevalence of UTIs.

Catheter-associated UTIs are one of the most dangerous health risks contributing 34% of all health care associated infections. The use of antibiotics and spread of antibiotic resistance in clinical settings is a well-recognized problem, but antibiotics and antibiotic resistance as environmental problems and pollutants have largely been overlooked. As a result, the increasing incidence of resistance to a wide range of antibiotic agents by a variety of organisms is a major concern facing modern medicine.

Detection of UTI causing pathogens and resistance of these pathogens to commonly prescribed antibiotics in clinical set ups is essential and helpful in improving the efficacy of empirical treatment. Objective of the present study was to highlight the bacterial etiology of UTIs and determination of resistance pattern of *E. coli* isolates.

Biofilm formation is an important mechanism by which bacteria survive and persist despite antibiotics and host immune responses. Bacterial biofilms are responsible for the failure of many medical devices and are associated

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with many infectious and non-infectious complications¹. Catheter associated urinary tract infections (CAUTI) are among the most commonly reported hospital acquired infections. Bacteria frequently associated with CAUTI include uropathogenic *Escherichia coli* (UPEC), *Enterococcus spp.*, *Klebsiella pneumoniae*, *Proteus mirabilis* (*P. mirabilis*), *Pseudomonas aeruginosa*, etc. Intraluminal and extraluminal biofilms, caused by the attachment of bacteria to the catheter, lead to the entry and subsequent persistence of uropathogens in the bladder. Objective of the present study was to highlight the bacterial etiology of UTIs and determination of resistance pattern of biofilm forming pathogenic isolates.

MATERIAL AND METHODS

Sample collection and Isolation of Bacteria: Urinary catheter samples (n=55) were collected from patients in different wards. The catheter samples were sonicated and centrifuged with sterile phosphate buffered saline. Resultant residues were cultured mainly on blood agar and macConkey's agar by spread plate technique. Bacterial colonies with dissimilar morphology were designated, purified and known by their biochemical profiles.

Multiple drug resistance: Antibiotic sensitivity pattern of all the isolates were evaluated on Muller Hinton agar plates by Kirby-Bauer disc diffusion assay method. Isolates were stated as sensitive or resistant based on the zone of inhibition results after the measures of Clinical Laboratory standards Institute (CLSI).

Biofilm formation on abiotic surfaces

Glass surfaces: Biofilm formation was also examined in glass test tubes. The biofilms were formed by adding 0.1 mL of the culture to 5 mL Brain heart infusion broth (0.5 ×) distributed in glass test tubes. The trial was did in duplicates and the cultures were incubated at 37 °C for 72 h in immobile situation. After incubation, the medium

was detached, the tubes were eroded with sterile distilled water, air dried and biofilms were analyzed using the crystal violet staining method. Strain of *Pseudomonas aeruginosa* PA01 were used as control for the biofilm experiments.

Statistical Analysis Assessments of occurrence data were tested using Chi square (χ^2) test and Fisher's exact test with GraphPad prism (version 6) statistical software.

RESULTS

From the 55 catheter samples handled, 45 (81%) swabs produced at least five bacterial isolate and the remaining 10 (19 %) swabs did not produce any bacterial progression. Direct gram stain recovered 102 organisms from the catheters in the form of bacilli, cocci or a mixture of the two. On unique media the bacterial isolates were cultivated and the most frequent were observed and serial code numbers were given. Due to the morphological characterization of the most resistant, intermediate and vulnerable bacteria and unique biochemical reactions, isolates have been identified as, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Candida albicans*, *Enterococcus Sps.*, *Staphylococcus epidermidis*, *Proteus mirabilis*, *Klebsiella pneumoniae*. Out of 102 bacterial isolates from patients, rate of *E. coli* (33.5 %) isolation was highest followed by *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Proteus species*, *Klebsiella pneumonia* (Table 1).

Multiple drug resistance: Of the 102 isolates 63 isolates were multidrug resistant. The consequences of this study designated that some of the isolated bacterial strains (Table 2) are vulnerable to most the verified antibiotics. From the results it was observed that *Pseudomonas aeruginosa* (the most resistant isolate) was resistance to Ceftriaxone (30 µg), Cefotaxime (30 µg); Gentamicin (300 µg); while, *Staphylococcus aureus* and *Klebsiella pneumoniae* (intermediate isolates) showed resistance toward, Cefotaxime (30 µg) and Ceftriaxone (30 µg), Netilmicin (300 µg), respectively.

Table 1. Microorganisms associated with catheter mediated infection

Microorganisms	Catheter associated with colonization (%)	Catheter associated with urinary tract infection (%)
<i>Pseudomonas aeruginosa</i>	24.7	42.5
<i>Staphylococcus aureus</i>	12.3	22.5
<i>Escherichia coli</i>	33.6	Nil
<i>Candida albicans</i>	7.2	Nil
<i>Enterococcus Sps.</i>	6.5	5.17
<i>Staphylococcus epidermidis</i>	6	13.17
<i>Proteus mirabilis</i>	5.5	20
<i>Klebsiella pneumoniae</i>	4.7	7

Biofilm Formation of Isolates: All the isolates have been investigated with ideal biofilm medium and Polystyrene as base, assessed by adhesiveness, pellicle, and clumping.

Though the degree of biofilm diverse inside a species and among dissimilar species, 95% of the isolates presented at least one type of biofilm formation. *P. aeruginosa*

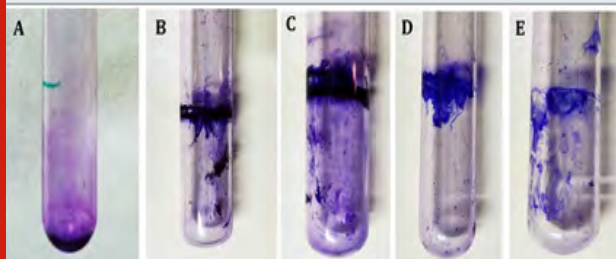
isolates showed the maximum capability to form biofilm and adherence of all tested species. Although almost all *E. coli* isolates exhibit biofilm formation, the median

amount of biofilm in this study was lower than for most isolated species (Figure 1).

Table 2. Antibiotic susceptibility profile (sensitivity test) of clinical bacterial isolates against different antibiotics drugs.

Antibiotics	Percentage of isolates showing antibiotic resistance			
	<i>Pseudomonas aeruginosa</i>	<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>	<i>Enterococcus Sps</i>
Amoxiclav	32	32	43	80
Ceftriaxone	94	93	77	82
Imipenem	55	NS	95	97
Gentamicin	61	NS	65	63
Ceftazidim	45	67	81	83
Oxacillin	NS	65	NS	NS
Netilmicin	87	88	21	NS
Clindamycin	NS	76	NS	NS
Vancomycin	NS	21	NS	NS
Cotrimoxazol	45	NS	32	42
Ciprofloxacin	56	83	81	47
Amikacin	57	62	43	47
Piperacillin	32	27	N	N
Piperacillin/tazobactam	13	14	43	41
Cefotaxim	55.7	67	52	NS

Figure 1: Representative images for the biofilm formation by the pathogens on glass surfaces when incubated at 37°C with stationary conditions. A – *Enterococcus* spp. B– *Staphylococcus aureus*, C– *Pseudomonas aeruginosa*, D– *E. coli*, E– *Pseudomonas aeruginosa* PA01



DISCUSSION

This research explores the prevalence of urinary catheter colonization and infection associated with a bacterial catheter, along with antibiotic resistance trends of isolated bacteria in tertiary care hospital in Indian countries with the quantitative and semi-quantitative techniques. The present study for isolation and identification of organism present in the catheter signifies that in the health care system now the organism which was earlier considered as nonpathogenic are now very much prevalent in a pathogenic form. The elimination of these pathogens is the highest need, as they will lead to an aggravation of already occurring diseases. In certain cases the capacity of certain pathogens to infect immune-skilled humans has been found. Their ability to build resistance scares

humans, and with those species it takes an hour to resolve. The findings of our bacterial isolates' antibiotic susceptibility showed that these species are well known to the antimicrobials tested and that they are evolving mechanisms that inhibit these antibiotics, which are completely compatible with Abdallah et al. A significant field of antibiotic science is currently the multiple resistant bacteria's search for new successful antibiotics against multi-drug pathogenic bacteria.

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Conflict of Interest: Authors does not have any conflict of interest

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Study of Contaminants Index of Musi River Command Area

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ABSTRACT

The cause of this study is to investigate the broad Contaminants Index (CCI) of the study area vicinity with a view to investigate the water pollution level of the four hundred-year-antique Musi River located in Hyderabad Telangana. The study is done in view of sustainable development. Water samples had been gathered from villages, which might be 15 km away from each other as a consequence, a complete of 60 km downstream villages belt were considered to examine the contaminants index. A composite sampling technique is used to collect samples from sampling locations following a standard way to obtain a representative samples. There were total 9 physiochemical properties had been analyzed and the facts had been seen in comparison with (WHO) and BIS standards. The complete pollution index values for the four sampling sites are 2.0, 1.61, 1.4 and 1.thirteen, respectively, indicating that the pollution in the direction of the downstream is reducing but, those areas are considered as medium polluted due to the fact these values fall into category four consistent with the CPI score. At the start of the have a look at place, CPI suggests excessive eutrophication hazard. This look at can be an alternative for determining the level of pollution, indicating pollutants, and decision making of the use of water.

KEY WORDS: CPI, MUSIRIVER, DOWNSTREAM, AND POLLUTION.

INTRODUCTION

Water is a vital commodity, both to sustain life and for the global economy. However, the quality of global water has rapidly declined for decades due to the impact of both natural and anthropogenic factors (Vadde et al. 2018). Assessing water quality for different water use purposes, such as domestic use, irrigation, conservation and industrial usage, are an important strategy for food safety and human health. Water quality evaluation aims to identify the sources of water pollution and develop

a strategy for sustainable water source management, maintaining and promoting human health and other social and economic growth (Carroll et al. 2006). Surface water quality indexes have been developed and introduced worldwide by researchers with various applications of the Nation Sanitation Foundation Water Quality Index (NSFWQI) (Carroll et al. 2006), the Water Quality Index (WQI) (Gupta et al. 2003). The Comprehensive Pollution Index (CPI) (Matta et al. 2017).

2.0 Study Area

MATERIAL AND METHODS

Actual samples collected in the bottles and filled to the surface until overflow after sampling, nitric acid (1.0 mg/L) was added to all the samples as a preservative. The water sample were tested for their physical-chemical properties. All parameters had been dissected by standardized techniques, Ph, TDS,, Alkalinity, TotalHardness, Ca,

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Nitrate, BOD, COD and Ammoniacal N in order to test the standard methodologies recommended by APHA was used.

Figure 1: Study area location



RESULTS AND DISCUSSION

The CPI is used to assess the level of pollution in a specific river by using monitoring statistics (Liu & Zhu 1999). The formula to calculate CPI is presented as follows: The interpretation of results are subjected to statistical analysis using comprehensive pollution index equation $CPI = 1/n \sum Pli$. Where CPI = Comprehensive Polluted Index; n = number of monitoring parameters; Pli = the pollution index number i. Pli is calculated according to the following equation: $Pli = Ci/Si$ where Ci = measured concentration of parameter number in water; Si = permitted limitation of parameter number according to environmental standard.

CPI is classified into five categories: 1. Category 1: CPI from 0 to 0.20 (clean); 2. Category 2: CPI from 0.21 to 0.40 (sub clean); 3. Category 3: CPI from 0.41 to 1.00 (slightly polluted); 4. Category 4: CPI from 1.01–2.00 (medium polluted); 5. Category 5: CPI more than 2.01 (heavily polluted).

Table 1. Physico-Chemical parameters Musi River command Area

Parameters	Pratapasingaram	Enkriyal	Surapally	Aroor	Water quality Standards
Ph	8.9	8.2	7.9	7.3	7
TDS	4080	860	780	750	500
Alkalinity	372	216	143	123	200
TH	368	352	338	326	100
Ca	190	186	182	175	75
Nitrate	91	87	81	73	45
B.O.D	43	36	24	5	30
COD	266	253	210	67	250
Ammoniacal N	1.55	1.27	1.12	0	1.2

Table 2. Comprehensive pollution analysis

Parameters	PliPratapasingaram	PliEnkriyala	PliSurapally	Pli (Aroor)
Ph	1.3	1.2	1.1	1.0
TDS	8.2	1.7	1.6	1.5
Alkalinity	1.9	1.1	0.7	0.6
TH	3.7	3.5	3.4	3.3
Ca	2.5	2.5	2.4	2.3
Nitrate	2.0	1.9	1.8	1.6
B.O.D	1.4	1.2	0.8	0.2
COD	1.1	1.0	0.8	0.3
Ammoniacal N	1.3	1.1	0.9	0.0
Sum of Pli	23.3	15.2	13.6	10.8
CPI	2.59	1.69	1.51	1.20

According to the CPI's classification, this river was under heavily polluted category this may be because of the dump of solid waste, untreated intrusion of industrial effluent and also untreated sewage water intrusion. The CPIs were different among the monitoring points upstream,

midstream and downstream. Now the government has taken very good action to clean the river water but the best recommendation here is to prevent the intrusion of waste into it.

CONCLUSION

Understanding the water quality is very important, it is concluded that CPI indicates a high eutrophication risk. This study may be an option for determining the current state of water quality, indicating pollution, and making water use decisions.

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Impact of Preclinical Training on Students Clinical Performance: A Cross Sectional Analysis

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ABSTRACT

Background: It is must to ensure a certain standard of knowledge and practical skills among students prior to introducing them to clinic .Over years, Dental council of India has laid down a specific curriculum for students of BDS 2nd year for their pre-clinical work. In today's world where education aims to be student centric it is important to analyze and focus on the needed changes from students perspectives for a better academic environment. The study was conducted keeping this in mind and it was also taken up as a paper presentation in a national conference to address the subject and welcome opinion from academicians in a broader platform. **Aim and objective:** To evaluate the impact of pre-clinical conservative training program on clinical performance of students as per students viewpoint and to identify areas in academic environment which require improvement. **Materials and methods:** 400 students in final year of graduation in different Delhi/ NCR institutes were given a questionnaire after taking the consent for the survey. Ethics clearance was taken from university ethics committee to conduct this survey and written permission from different institutions was also simultaneously taken to conduct the survey in specific time period. Response to each question was categorized and percentage was calculated. **Results:** In this survey most of the students conveyed the need of pre-clinical training as a necessity to help in boosting the level of confidence. Most of the students also conveyed that clinical skills with course content uptaken is adequate to start in clinics . 20% students requested to increase and repeat the no. of demonstrations .Above 60% of the students were found to ascertain the standard of knowledge based questions. **Discussion:** Students opinion should be given importance when deciding to implement an academic program. Regular motivation, understanding the attitude and learning skills of students will help in enriching the curriculum. It is also important to look forward to the need of change which is the need of an hour.

KEY WORDS: PRE-CLINICAL TRAINING PROGRAM, SKILL, ATTITUDE, KNOWLEDGE

INTRODUCTION

The present curriculum used by Dental colleges in India has been approved by Dental Council of India which

counts to 200 hours for pre-clinical training and 25 hours of lectures in second academic year of BDS. This translates to 4hours /week dedicated for preclinical training and generally no separate faculties are hired for this pre-clinical training as per DCI norms though a separate phantom head lab is a mandate for approval of the college by Dental Council of India. Dental education has overall placed little impact in raising overall health of the individual in the world .Also preclinical training in restorative procedures does not directly contribute to lower the mortality rate from preventable diseases which could be a possible reason of lack of interest to raise this concern.

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Despite enhancement of knowledge, advancements in materials and techniques potential suffering of an individual receiving treatment from a non safe dentist student must be minimized. The way to ensure this is to ascertain a standard of knowledge and practical skill along with an attitude for work among the students prior to introducing them to the dental clinics. Students play a vital role for their own education and are major stake holders. It is therefore important to evaluate the academic environment with a participant (student) centered approach. Keeping this in mind the objective of this study was to assess and evaluate the impact of pre-clinical conservative dentistry training on students clinical performance as per students view point and also to identify the areas in academic environment which require improvement.

METHODOLOGY

Dental council of India has laid down a specific quota for individual student's prior taking university examination in second academic year of BDS. This quota includes certain number of exercises on plaster mould, extracted teeth and phantom jaws. The subjects of the study were 400 students pursuing their final year of graduation and interns from four different institutes of Delhi/NCR. Ethics clearance was taken from the university to conduct this survey along with written permission from other colleges. An informed and written consent was also taken from the participants who were willing to take this survey. A questionnaire was devised. Questionnaire had 18 questions out of which some were simply given choices to mark against and some were yes/no questions after which space was given to write their opinion or suggestions. Questions were not grouped under separate headings according to the course characteristics but were thrown together as a whole.

Percentage of each response was tabulated when analyzing closed ended question. Similarly each response was categorized and percentage was calculated for open ended question. Accompanied comments of some closed ended questions were also noted. Answers to questions of relevant single responses were also noted separately. It was a cross sectional study design of single group of students with no control group.

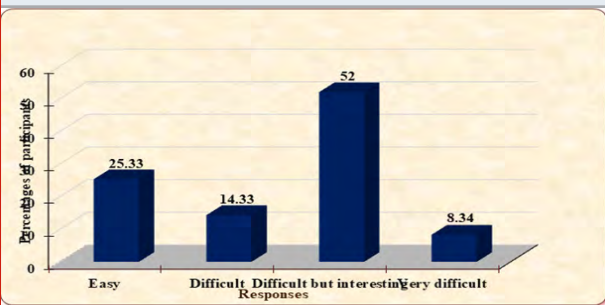
Statistical Analysis: Data was entered in Microsoft excel 2016 for Windows. Data analyses were performed using version 21.0 of the Statistical Package for Social Sciences (IBM Corporation, Armonk, New York, USA). As data was categorical; frequency and percentages of responses for various items in questionnaire were calculated.

RESULTS

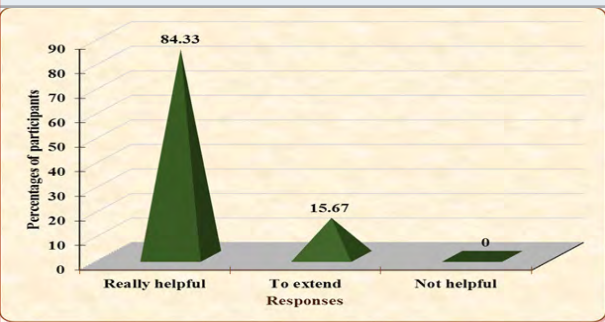
In the above survey most of the students conveyed the need of pre clinical training as a necessity. This is to help them in boosting the level of confidence and provide adequate clinical skills along with course content to start in clinic. 20% students requested to repeat and increase the number of demonstrations. Above 60% of

the students were found at par meeting the standard of knowledge based questions.

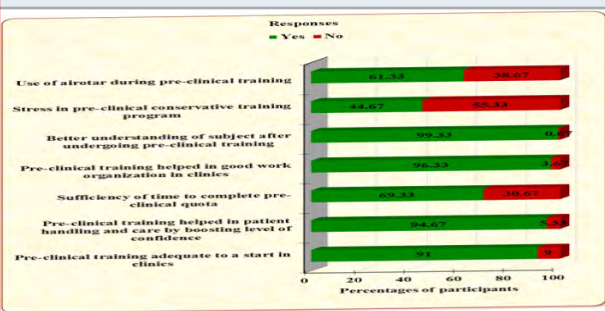
Graph 1: Responses Of Participants For Pre-Clinical Exercises When Working On Typhodont Jaws. (Q 1)



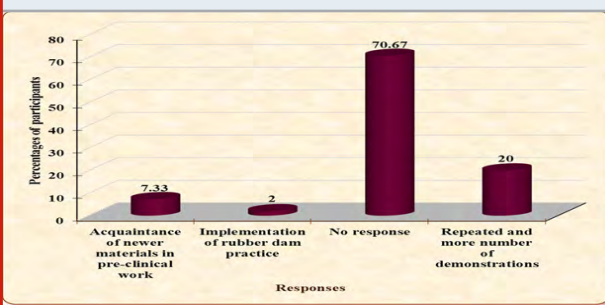
Graph 2: Responses Of Participants For Question Whether Work Performed During Pre-Clinical Training Really Helped Them In Clinical Practice. (Q 2)



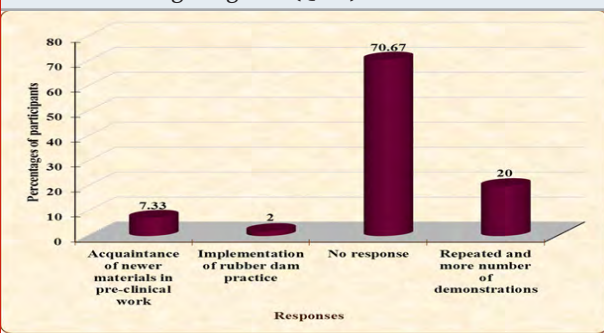
Graph 3: Responses Of Participants For Various Questions Related To Pre-Clinical Training In Conservative Dentistry. (Q 3 To Q 9)



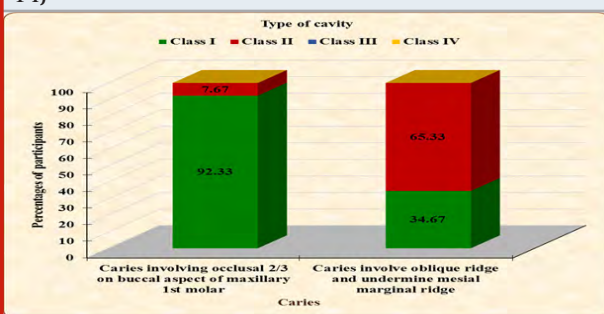
Graph 4: Suggestions By Study Subjects To Improve Pre-Clinical Training Program. (Q 10)



Graph 4a: Suggestions By Study Subjects To Improve Pre-Clinical Training Program. (Q 10)



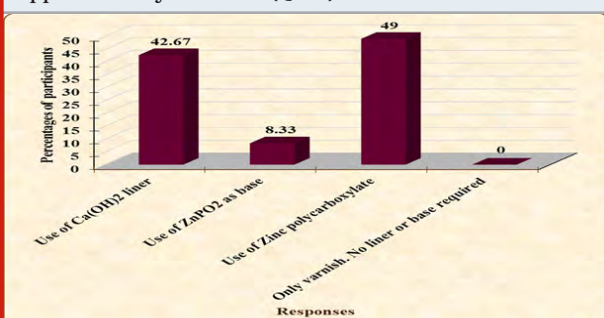
Graph 5: Responses Of Participants For G.V. Black's Classification For Various Types Of Caries (Q 11 And Q 14)



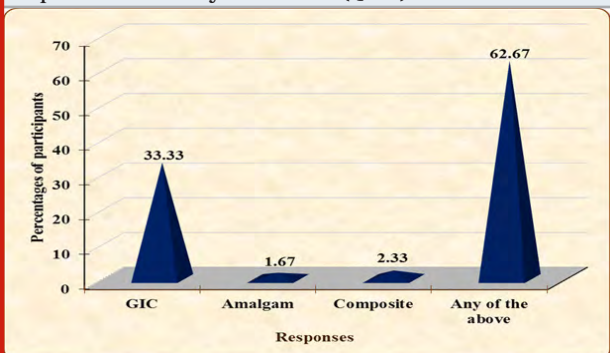
Graph 6: Responses Of Participants For Recommendation Regarding Pulp Capping Procedure When Width Of Cavity Increased To More Than 1/3 Of Intercuspal Distance. (Q 12)



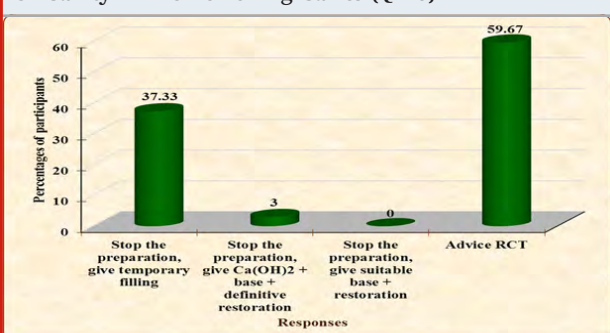
Graph 7: Responses Of Participants For The Best Mean Of Pulp Protection When Depth Of Cavity Preparation Is Approximately 2.5 Mm. (Q 13)



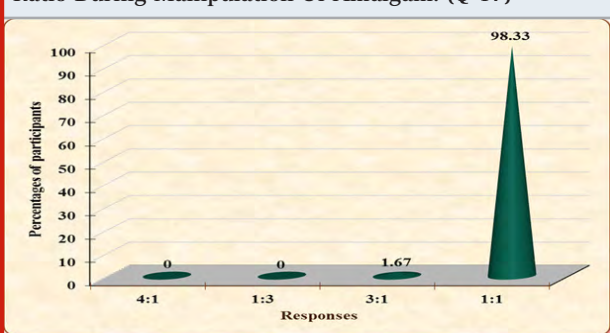
Graph 8: Responses Of Participants For Choice Of Raw Material For Caries On Gingival 1/3rd On The Buccal Aspect Of Maxillary 1st Molar. (Q 15)



Graph 9: Responses Of Participants For Their Next Proceeding When Hemorrhagic Point Is Seen On The Floor Of Cavity While Removing Caries (Q 16)



Graph 10: Responses of Participants For Alloy And Hg Ratio During Manipulation Of Amalgam. (Q 17)



DISCUSSION

Students should be given importance when deciding to implement academic programme. BDS IV students about to take their exams were taken rather than 2nd year students undergoing preclinical training program. This was done keeping in mind the usefulness of training received according to their learning need at their level. Moreover, the amount of stress undergoing to accomplish preclinical work quota could have refrained the students to give the exact feed back. Differences in opinion exist between clinical staff which supervises, and students being supervised in regards to their clinical learning

period. Thus the perception of supervising faculty cannot be reliable in ascertaining the students viewpoint.

One of the important tool is motivation among students. Positive motivation, emphasis on learning, better understanding with improved skills and knowledge Initial motivation of students to choose dentistry comes from expectation regarding their profession rather than academic courses they go through. In the current survey 52 % students were found motivated as they found preclinical exercise difficult but interesting Stress in dental students can lead to adverse symptoms hindering their ability to cope with their burden of studies. DCI has recommended 225 hrs of preclinical lab to accomplish the required quota by any student. One of the characteristics of good academic environment is having enough time to complete academic goals. 65% students agreed that this was sufficient time to complete the work.

In the survey 96% students claimed better work organization and 94% claimed better patient handling and care by boosting their level of confidence. An approach to introduce students in the dental clinic as assistants and observers during pre clinical years, can further help in gaining acquaintance with change of working environment from 'dummy' typhodonts to 'live' patients. Above 60% of the students were found to ascertain standard of knowledge based questions. Self assessment is well-established in literature as contributing to active learning. Hence students were given knowledge based questions to know the outcome of teaching, learning methods. Students who learn recognition skills can visualise successful performance prior to beginning which might improve the quality of production.

In the survey 20% of students requested for repeat and increase in number of demonstrations. This can be attributed to the fact that the faculty to student ratio for teaching suturing skills should be increased. This is

to help cope with increasing demands to make students learn according to competency-based curriculum.

CONCLUSION

Students showed genuine interest in having the preclinical training program for preparing them before entering in clinics. Integration of use of teaching aids as videos and incorporation of advances in simulating technologies should be emphasized. Recognition skills in which student learns to visualize an appropriate end result should be formally taught and emphasized prior to any skill performance.

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Revenge Buying

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ABSTRACT

This is the first experience for all us, have been restricted and confined to the four walls of the houses. All people adopt themselves to live according to the pandemic situation, the person's outlook towards life. This has a direct impact on the consumer behaviour towards shopping. Retail stores in many malls are yet to open. People are all eagerly waiting to buy leather bags, luxury clothes, accessories and shoes etc but buying of groceries products, mobile phone cannot be termed as revenge buying. According to a report, during lockdown customers go for goods like blazers, precious jewelry as revenge buying. But this revenge buying can't be sustainable in the market because in COVID 19 more than 200 thousand people have lost their jobs. Only consumers having net worth and excess cash in their hand who have missed shopping in their favorite outlets go for revenge buying.

KEY WORDS: COVID 19, REVENGE, BUYING BEHAVIOUR, RETAILERS, LOCKDOWN.

INTRODUCTION

Person trip is not complete if one does not go for shopping. Luxury goods manufacturers sold up to million \$ in single day sales when the country opened up after a partial relaxation to the lockdown. Business people can get back the lost revenues through this revenge buying strategy. After this lock down people aggressively shops for products they most liked. After this COVID -19 hunger people go for bulk purchase or aggressively indulging in shopping of whatever they want especially of food products, textiles and cosmetics and the first response was to throng to the luxury stores. Consumer behaviour is undergo a major changes when the economy finally comes out of a shutdown as the country remains under a 6 months lockdown due to coronavirus pandemic.

Once the lock down opens up, the consumers will be going for revenge buying, discount seeking and bargain hunting. Consumer behaviour may take a U- turn after the lockdown gets over. Youngsters go for excessive shopping after a long time due to heavy restrictions. There may also a probability for U -turn in the consumer behaviour after the lockdown, the reason is people don't want to spend much amount on luxury items as they think that of a wasteful expenditure because they focus on saving but in other countries like china, US are prone to luxury purchasing.

Literature Review: A brief study of research work on the subject has been presented. Celik, A. and Celylan, M. (2010) states the effects of socio economic factors on the consumption of accessories, leather bags, cosmetics, shoes. People experience different perception after lifting the lock down which should affect their consumer behaviour. Questionnaire are sent through google forms with 111 respondents and collected data are evaluated using One way Anova and Independent sample t- test. The results of the evaluations showed that there are no significant difference between the two variable (revenue Redemption with age group and gender with level of purchase).

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RESEARCH METHODOLOGY

Objectives of the Study

1. To study about the revenge buying of consumers
2. To analyse the redemption of revenues by the retailers
3. To evaluate the Reciprocal changes in consumer behaviour

Many research studies have been exploring new thoughts and advocating new philosophy of marketing programs. One such new philosophy that gained impetus in the recent past is pertaining to post covid buying behaviour of consumers. People are really tired of sitting at home locked in and they really want to go out and buy. Revenge buying is expected to be dominated between the age group of 15 to 30 because they are eagerly waiting to eat out, to buy cosmetics, accessories and to visit beauty parlors and spa. Group of people will be happy to rush out to buy things that they had not been able to buy out for the last two months. Structured questionnaire has been used to collect the data. Study was based on the primary and secondary data. Convenience sampling was used to collect the opinion of the respondents. 111

is taken as taken as the sample size for further analysis. One way Anova and Independent sample t-test has been used for this study.

Data Analysis and Interpretation: Statistical tools like t- test, Anova are used to analyse the data collected through questionnaire. Data's were collected from the people residing in Chennai city.

Independent Sample T-test:

H0: The means of the two groups are not significantly different

H1: The means of the two groups are significantly different.

Inference: Here the mean value of level of purchase of female is 1.68 and that of male is 1.40 the difference between the two is 0.28 which is insignificant. Based on the result generated by SPSS, the significant value is 0.068 and it is greater than 0.05. So accept null hypothesis. Hence there is no significant difference between the two means i.e. there is no significant difference between the gender and the level of purchase made by them.

Table 1.1

	Group Statistics				
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Level of purchase	Male	55	1.40	.710	.096
	Female	56	1.68	.876	.117

Table 1.2

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Level of purchase	Equal variances assumed	9.589	0.002	-1.839	109	0.069	-0.279	0.151	-0.579 0.022
	Equal variances not assumed			-1.842	105.212	0.068	-0.279	0.151	-0.578 0.021

Table 1.3

	ANOVA				
	Revenue redemption				
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.086	3	.029	.108	.955
Within Groups	28.239	107	.264		
Total	28.324	110			

One Way Anova

H0: There is no significant difference between the Age group and Redemption.

H1: There is significant relationship between the Age group and Revenue Redemption

Table 1.4

Revenue Redemption		
Duncan ^{a,b}		
Age group	N	Subset for alpha = 0.05
		1
15-25	22	2.64
36-45	26	2.65
46 and above	6	2.67
26-35	57	2.70
Sig.		.756
Means for groups in homogeneous subsets are displayed.		
a. Uses Harmonic Mean Sample Size = 14.918.		
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.		

Inference: From the above table it is clearly stated that the significant value is 0.955 and it is higher than 0.05 so accept the Null hypothesis. Hence there is no significant relationship between Age group and Redemption of revenue by retailers.

CONCLUSION

Purchase level of consumers can be either increased or decreased after this lockdown. Customers one who between the age group of 15 to 25 is involve in greedy

purchase or revenge buying due to their age and they are not even think about the family situation, income level etc. During the lock down they collect lot of information through all means of online marketing channel. On the other hand people one who between the age group of 35 and above is involved in low level purchase, even though they are very familiar with the brand, product or service the level of involvement in a purchase can decreased due to the income level, according to their requirement, level of usage and mainly because of their maturedness. Malls and showrooms are locked since lockdown. All the organized and unorganized sector getting adversely affected. Many retailers failed to pay the recent months to mall owners and they are renegotiating the rental contracts. Retailers are facing the major revenue problems so they all depend upon the lifting of lockdown and revenge buying of consumers.

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Synthesis and Characterization of Abacavir Acetic Acid Salt Polymorphic Transition from Abacavir Free Base by Using Process Analytical Tools (PAT)

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ABSTRACT

Abacavir (ABC) is a guanosine analogue used to prevent and treat HIV/AIDS. It is a nucleoside reverse transcriptase inhibitor that inhibits viral replication and it is marketed as hemisulphate salt and with combination of lamivudine/zidovudine. Nevertheless, Abacavir succinic acid, malonic acid, sulfuric acid and HCl salts are mentioned in the literature. The novel acetic acid salt from Abacavir is mentioned here. In this study, we used Focused Beam Reflectance Measurement (FBRM) and Particle Vision Microscope (PVM) PAT tools to track the polymorphic transition from Abacavir free base to acetic acid salt, which is characterized by DSC, PXRD, FTIR, and ¹H NMR to confirm the structure.

KEY WORDS: PROCESS ANALYTICAL TOOLS, ABACAVIR, POLYMORPH, ACETIC ACID SALT.

INTRODUCTION

Process Analytical Technology (PAT) is defined as "a system for designing, analyzing and controlling output through timely measurements (i.e., during processing) of the critical quality and performance attributes of raw and in-process materials and processes, to ensure the quality of the finished product." Measurements of Process Analytical Technology (PAT) may consist

of intermediates, raw materials, products. These measurements can give valuable data for understanding how process variables affect the chemistry, bioprocess, and particle-based systems (Thumar et al., 2012). These tools include focused beam reflectance measurement (FBRM) (Sullivan et al., 2003), particle video microscope (PVM), Raman spectroscopy (Sullivan et al., 2005 and Ono et al., 2004). Fourier transform infrared spectroscopy (FTIR) (Wang et al., 2000, Liotta and Vijay 2004) near infrared spectroscopy (NIR) (Pollanen et al., 2005, Smet et al., 2005, Moes et al., 2008) etc.,

The application of these apparatus can give instant information about the process. By using these online tools we can save the time cost and repetition of experimentation. FBRM is probe based, in process tool used to monitor the chord counts and chord length distribution of particle in a crystallization mass, due to change in the particle size and shape, the chord length

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distribution will vary, based on this the user can identify the polymorph transition of the substance (Sullivan et al., 2003). It is also used to determine the solubility and metastable zone width of substance in particular solvents, it is also useful tool in formulation dissolution studies (Spong et al., 2004 and Long et al., 2009) and Polymorphic transformation is often accompanied by a change in crystal habit. PVM is probe based video microscope which captures the images of the crystals as they actually exist in the process at full process concentration. It shows distinct change in morphology of one polymorph to other. FBRM and PVM combination is powerful tool for quickly and easily characterizing polymorph and pseudo polymorphic transitions in the case where there is change in crystal habit.

In pharmaceutical industry, crystallization and isolation of suitable and stable polymorph for formulation development is very important aspect (Sullivan et al., 2003) and the bioavailability studies are depending on the polymorph, and further the selected solid form should meet the basic requirements of optimal stability, reproducibility and scalability which will eventually lead to devise a robust and reliable process for its manufacture. The existence of more than one crystal structure for a chemical substance is referred as polymorphism. The importance of polymorph screening can be visualized by a fact of sudden appearance or disappearance of a polymorphic form during manufacturing and storage (Yu et al., 2004). Such changes can lead to a variety of significant implications in terms of the patient safety, financing and brand image of company and so on. These polymorph transitions will be monitored with the help of online process analytical tools like FBRM, PVM and Raman spectroscopy etc.

The effect of parameters like temperature, agitation, cooling rate, seed point and seed quality, relative humidity, pH, solubility etc. will affect the polymorph conversion/isolation of stable form. Regulatory authorities have established several guidelines and strategies to integrate series of process analytical tools as well as analytical methods to understand polymorphism in solvate hydrate, and anhydrate types of a drug (Rathore et al., 2010). PXRD (Powder X-Ray Diffraction) regarded as the standard technique that provide polymorphism fingerprint details. Additional perspectives on polymorphism can be provided by various techniques such as thermal (DSC, TGA), spectroscopy (Raman, Near-Infrared and, Infrared). There are several in-silico instruments which, by predicting the stable polymorphs of compounds, reduce the experimental load. This ensures that problems are expected and the necessary parameters are recommended to stabilise the solid form discovered. It is notable that the task of form selection is not just for easy unit operation, it is an important aspect process of drug production. To date Abacavir succinic acid (Daluge et al., 1995), malonic acid (Narasimha R et al., 2010), sulfuric acid (Renu. Cet al., 2011) and HCl salts (Singh G P et al., 2015) are mentioned in the literature. In this study novel acetic acid salt from Abacavir is identified.

MATERIAL AND METHODS

2.1. General: All experiments were run in a automated reactor consists cryostat and Abacavir freebase compound gifted by Dr. Reddy's laboratories, reagents and solvents were purchased from commercial sources. In situ data were acquired using a FBRM (4.4 version IC software) and PVM (Standard Vseries software) from Mettler Toledo AutoChem (Columbia, SC, USA).

2.2. Instrumental Conditions: Lasentec FBRM (Models G400 by Mettler Toledo AutoChem, Columbia, MD) was used to determine the distribution profiles of chord length or to screen for the existence of crystals or solid species during operation. An in-process video microscope (Model 819 by Mettler Toledo AutoChem, Columbia, MD) was used during the processes to capture the inline morphology of crystals or solid species, particularly crystallization ones. For offline analysis PXRD, DSC, TGA and FT-IR data was used to assess the polymorphic transition.

2.2.1. Differential Scanning Calorimetry (DSC): Samples were subjected for DSC analysis on TA (Thermal Advantage) instrument with the heating of compound at a rate of 10 °C/min up to 200 °C with the constant dry nitrogen gas purging with rate of 20 mL/min.

2.2.2. Thermogravimetry Analysis (TGA): Samples were subjected to TGA Thermograms on a Thermal Advantage (TA) Q 500 series machine by heating the samples at a rate of 10 °C/min up to 300 °C with the purging of dry nitrogen gas [Balance (40 mL/min) and Furnace (60 mL/min)].

2.2.3. Powder X-Ray Diffraction (PXRD): X-ray powder diffraction data were collected on a PAN analytical X'Pert PRO diffractometer (X'cellerator detector, Cu-anode, 45KV, 40ma, Bragg-Brentano geometry) using the 2θ scan range, step size, and exposure time of 3–40°, 0.03° and 1200 s/step respectively.

2.2.4. FT-IR Spectroscopy: In the mid-IR (4000–400 cm⁻¹), FTIR spectra of Abacavir free base and Abacavir acetic acid salt were measured using the Cary 680 FTIR spectrometer (Agilent, Santa Clara, CA) coupled with a 30–200 °C room temperature detector range with a 20 °C step. 4 cm⁻¹ spectral resolutions, 16 scans, were the data collection parameters. The ATR system was preheated to the appropriate temperature, and then the sample was placed and the spectrum was measured.

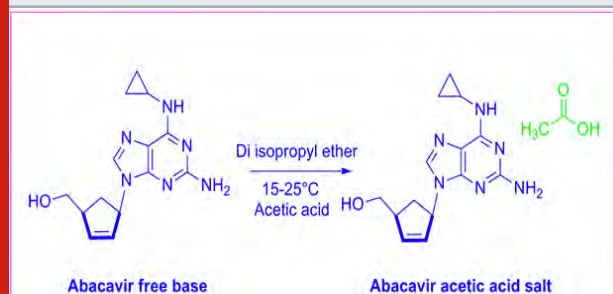
2.3. Experimental Procedure of ABC Acetic Acid Salt: ABC acetic acid salt was obtained by suspending 12 g of ABC Form-1 in mixture of 360 mL of di isopropyl ether and 3.6 mL acetic acid in 500 mL glass reactor, inserted FBRM and PVM, in to the 1 liter reactor, the reaction mixture was maintained for about 4 to 6 hours at 15–25 °C, followed by filtration and drying. Obtained as needle shape crystals was characterized using

RESULTS AND DISCUSSION

3.1. Monitoring of Abacavir free Base to Acetic Acid Salt Using Online Analysis

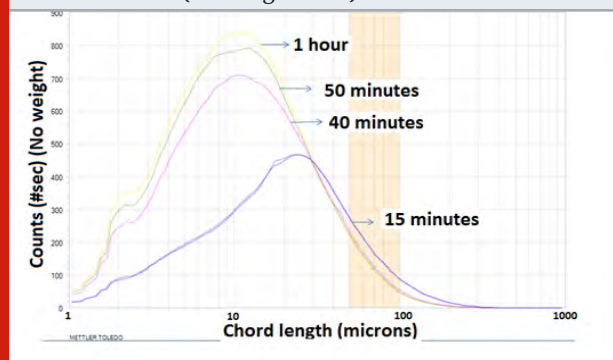
3.1.1. FBRM AND PVM: In this study we have monitored the polymorph conversion of Abacavir free base to acetic acid salt (Figure 1) with help of Focused beam reflectant measurement (FBRM) and Particle vision microscope (PVM).

Figure 1: Chemical structure of Abacavir free base and acetic acid salt



By using these process analytical tools we can avoid the offline sample analysis which is time consuming process. We have identified the novel polymorph of ABC acetic acid salt and the polymorph transition from Form-1 to salt was monitored using FBRM and PVM. It was clearly indicating the polymorph transition by change in chord length distribution and increase in counts due to variation in the particle size and morphology upon stirring with time, particle shape change from plate type crystals to needle shape crystal was monitored by using particle video microscope. The change in particle count and crystal shape indicates that the free base converted to acetic acid salt, same was analyzed using DSC, TGA, PXRD and FT-IR.

Figure 2: FBRM Chord length distribution of the Polymorph transformation (No weight #sec)



The transition from Abacavir form-1 to acetic acid salt was clearly indicating in Figure 2. At 15 minutes chord length distribution shows the coarser particles of ABC free base, whereas the distribution of 40 minutes converted to acetic acid salt which shows finer particles, further completely converted to finer side in 50 minutes and 1 hr

respectively also there was a change in particle count is clear agreement for complete conversion of free base to salt.

Figure 3(a): PVM image at 15 minutes of crystallization

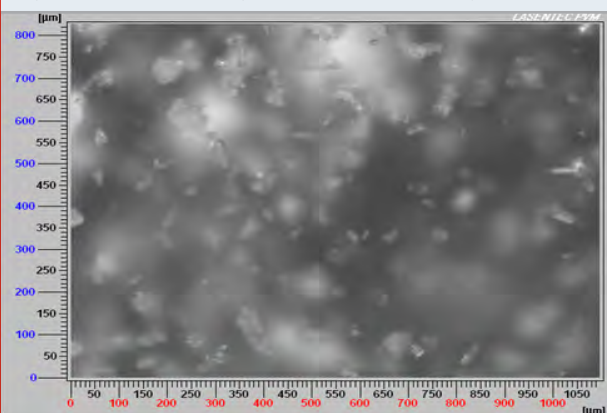
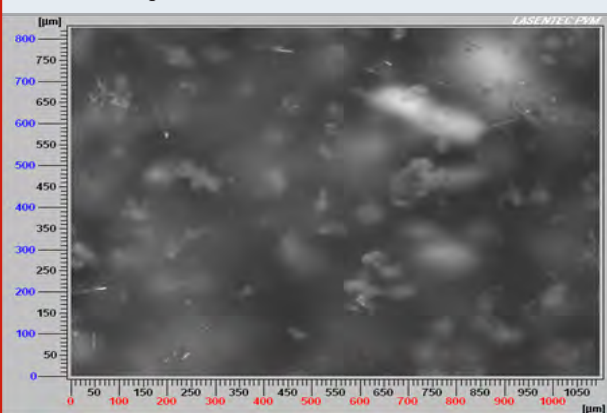


Figure 3(b): PVM image at 25 minutes of crystallization in transition phase



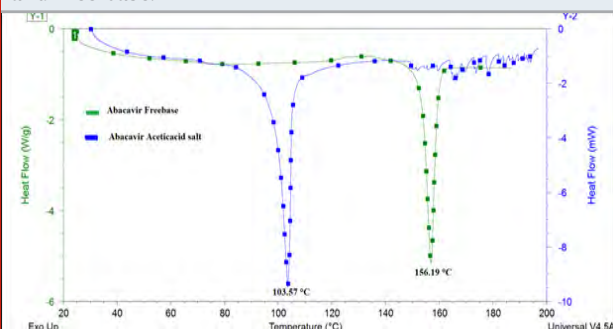
Similarly PVM provides clear evidence of the transition from Abacavir free base, the crystal shape is plate type crystal shows in figure (3a) is corresponding to Abacavir free base upon stirring, after 30 minutes in figure (3b) shows the needle shape crystals formation which indicates the conversion of Acetic acid salt and after 60 minutes in figure (3c) was completely converted to Acetic acid salt of Needle shape crystals. It is the good evidence for the conversion of acetic acid salt.

3.2. Monitoring Of Abacavir Free Base To Acetic Acid Salt Using Offline Analysis.

3.2.1. Thermal Analysis (DSC AND TGA): Differential scanning calorimetry measures the energy absorbed (endotherm) or produced (exotherm) as a function of time or temperature. It is used to characterize melting, crystallization, loss of solvents, other process involving an energy change. Differential scanning calorimetry may also be applied to process involving a change in heat capacity, such as the glass transition, providing direct details on thermodynamic parameters associated with the crystalline/amorphous process, including the ease, simplicity and speed of the

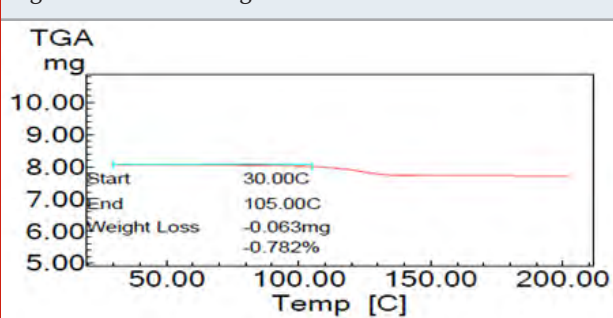
calculation. ABC Form-1 heating in DSC results in a sharp endothermic peak of 156.19 °C with an onset of 154.81 °C. This endotherm is the melting event for a $\Delta H = 165.31$ J/g and there was no sign of any phase transition before melting (Figure 4). In the same way heating of ABC acetic acid salt results sharp endotherm peak at 103.57°C with an onset at 99.17°C.

Figure 4: DSC thermogram overlay of ABC Acetic acid and free base.



In thermo gravimetric analysis sample is heated in presence of inert atmosphere at controlled rate. The change in the weight of the substance is recorded as a function of temperature or time. The temperature is increased at a constant rate for a known sample and the changes in weights are recorded as function of temperature at different interval. Abacavir acetic acid salt was subjected for thermo gravimetric analysis, weight loss is 0.782% w/w which is corresponding to melting and do not show any residual solvate. TGA thermograms of ABC acetic acid shown in Figure 5.

Figure 5: TGA thermogram of ABC Acetic acid



3.2.2. Pxrdaanalysis: Powder XRD is a non-destructive technique and it gives a unique powder pattern for each solid materials. Powder XRD has gained a important role in the pharmaceutical industry in identifying various solid forms of active pharmaceutical ingredients and also in identifying the crystallinity of materials. The changes in the resulted powder pattern when compared to the starting materials indicate the novel solid form. The characteristics peak of Abacavir free base was observed at 2θ 7.97, 10.00, 10.19, 10.60, 14.98, 16.02, 16.54, 19.46, 20.13, 23.00, 24.97, and 27.15. Whereas Abacavir acetic acid salt shows 2θ 7.31, 10.61, 14.70, 19.25, 25.00, 25.91, 26.96 and 29.89. The appearance of new peaks indicates

that the formation of new solid form i.e. Acetic acid salt shown in figure 6.

Figure 6: PXRd histogram overlay of ABC free base and ABC Acetic acid

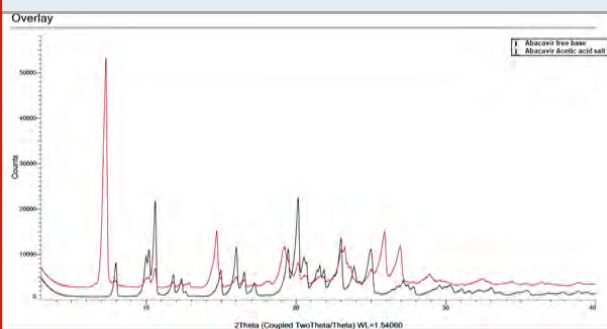
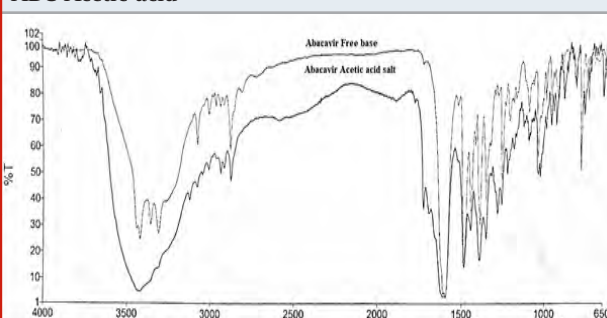


Table 1. Stretching and bending frequencies of Abacavir free base and Abacavir acetic acid salt.

S.No	Compound	Acid C=O (cm ⁻¹)	Acid OH (cm ⁻¹)	Alcohol OH (cm ⁻¹)	N-H stretch OH (cm ⁻¹)	N-H Bending (cm ⁻¹)
1	Abacavir free base	-	-	3357	3310	1609
2	Abacavir acetic acid salt	1031	3423	3012	3125	1610

Figure 7: FT-IR spectrum overlay of ABC free base and ABC Acetic acid



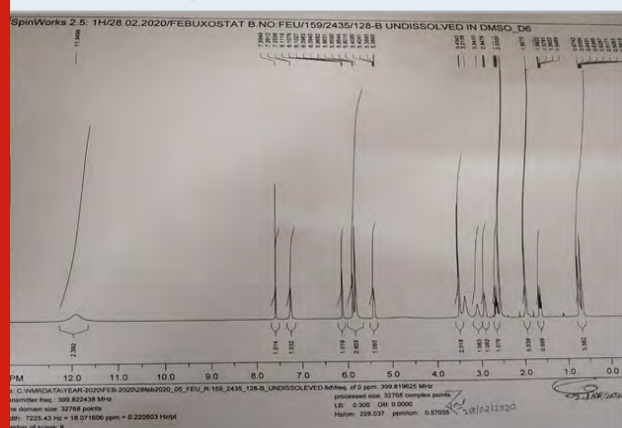
3.2.3. FT-IR Analysis: The change in FT-IR stretching values resulted in new solid form i.e., Abacavir acetic acid salt. Acid C=O stretching value observed at 1031 cm⁻¹ and acid OH stretching peak observed at 3423 cm⁻¹ the same were captured in Table 1. FT-IR spectra were shown in Figure 7.

3.2.4. H1NMR: H1NMR of Abacavir acetic acid is showing acetic acid proton at δ 11.94 ppm, which is good evidence for the formation of acetic acid salt. NMR spectra were shown in Figure 8.

3.2.5. Solubility Study: Solubility was performed in plain distilled water at 25 °C. Abacavir free base shows 1.3 mg/mL, Abacavir sulfate shows 78 mg/mL solubility,

whereas Abacavir acetic acid salt shows 158mg/mL which is highly soluble in water.

Figure 8: NMR spectra of ABC Acetic acid



CONCLUSION

In pharmaceuticals, polymorphism is a very essential characteristic, as it will rely on the polymorph's bioavailability and stability. The development of an acceptable form is a challenging work. The polymorphic conversion and stability of the particular polymorph will be influenced by various process parameters. As per literature ABC free base have four crystallinesalt polymorphs reported. During the screening study we have identified that transition of ABC free base from Form-1 to Abacavir acetate salt. It was demonstrated in multigram scale and polymorph was characterized using FBRM, PVM, DSC, TGA, PXRD and FT-IR.

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Conflict of Interest: The authors declare that there is no conflict of interests regarding the publication of this article.

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VLSI Implementation of Multiply and Accumulate Unit Using Distributed Arithmetic

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ABSTRACT

Background: DSP is used in many applications such as modems, audio broadcast, multimedia applications, cell phones, video broadcast, etc., DSP processors are concerned essentially with on-going signal processing. The “multiply and Accumulate Unit”, It is dual operand digital signal processing instructions. MAC is considered important in all DSP architectures. MAC comprises multiplier, adder, and accumulator. Speed, area and performance are the major constraints that have to be considered. Methods: On considering DA method which replaces the MAC with pre-computed results about to store in lookup tables. DA based on the memory-based method is trending engineering since of its high performance. The derivation of DA includes a mix of Boolean and ordinary algebra. DA is a bit-serial arrangement of multiply-accumulate. The most advantage of DA is consumed the low area, high speed, and low power.

Results: Implementation of actual DA with different architectures use in a traditional lookup table (LUT) based DA implementation such as DA-based implementation use in Single LUT, DA based implementation use in double LUT, DA based implementation use in four LUTs, DA based implementation use in LUT and adder, adder based DA implementation, 2BAAT DA structure with single LUT and double LUT and DA based implementation using zero detect logic. Finally, Comparing the overall performance in terms of area, power, and delay. Conclusions: Multiply and Accumulate (MAC) block design multiplier occupies more space than adder and accumulator since it consists of partial products, so area consumption of MAC block is more. So that delay increases, in this case, speed decreases. This is the main drawback of MAC. So, to overcome this drawback Distributed Arithmetic is preferred. Here an external multiplier block is not required and the multiplication is done through a look-up table. So partial product count will be reduced and delay decreases such that, area consumption also reduced and speed increases.

KEY WORDS: DISTRIBUTED ARITHMETIC, MULTIPLY-ACCUMULATE UNIT, LOOKUP TABLES(LUT), DIGITAL SIGNAL PROCESSOR, INNER PRODUCT COMPUTATION.

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INTRODUCTION

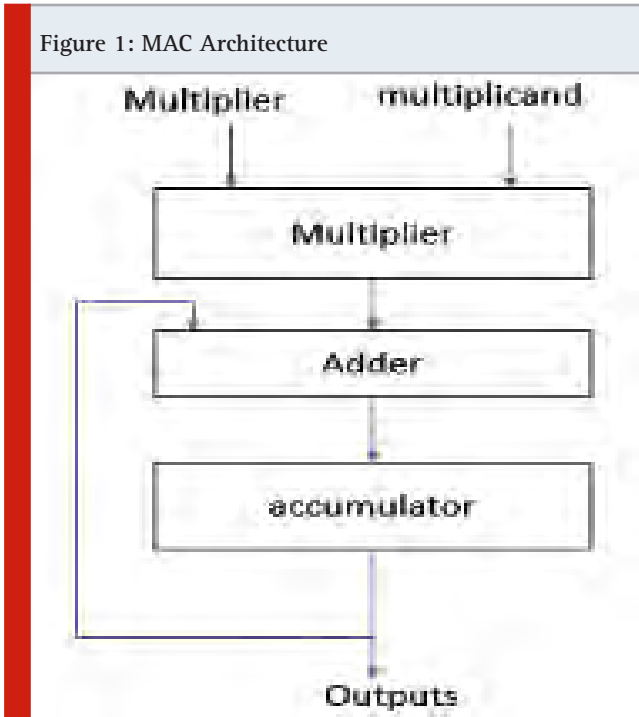
Digital Signal Processing (DSP) is used in many applications such as modems, audio broadcast, multimedia applications, cell phones, video broadcast, and biomedical applications, etc., in ASIC architectures are used when the high-performance application is designed. This process continues because we are living in the world of System on a chip image and video processing applications are also

implemented on a single chip. DSP has become a key part, in a large number of the shopper, interchanges, clinical and mechanical items which execute the sign preparing to utilize chip, Field Programmable Gate Arrays (FPGAs), Custom ICs and so on. DSP procedures have been exceptionally effective in light of the advancement of ease programming and equipment support. For instance, modems and discourse acknowledgment can be more affordable utilizing DSP systems. DSP processors are concerned essentially with ongoing signal processing.

In any DSP there will be a MAC unit. Multiply accumulate unit is also known as MAC. As the name itself, we can know that it is made up of a chain of multipliers, adders, and registers. First, inputs are passed to the multiplier and then the corresponding output will be obtained and that output will be sent to the adder and that output will be given to the accumulate register for data feedback. When speed is considered, to improve the speed of the MAC there are two ways.

1. Reduction of partial products and
2. Accumulator.

Figure 1: MAC Architecture



The above (figure1) describes the architecture of the general MAC, where multiplier and multiplicand are the two inputs to the multiplier, the operation of the multiplication is performed and that output is given to adder block as one of the input and second input is multiplier output that will be the other input to the adder. This is the way a complete MAC operation is performed. So many multipliers are used in MAC operations like Wallace, booth, modified booth, truncated and array multipliers. Implementation of multiply and accumulate unit is performed with all these types of the multiplier, adder and accumulator will be same for all MAC Units.. Among all these truncated MAC is not considered for

general applications where accuracy is needed. It is considered when Accuracy is not preferred and like image and video processing applications, this type of multiplication is performed.

METHODS

As discussed, MAC contains a multiplier, adder, and accumulator. Since for this MAC unit is more area consumption and high delay. So, we are designing various MAC's based on different multipliers. Among them, the MAC designed with modified booth multiplier consumes less area, even though it consumes less area we can decrease that. So, to reduce the area consumption, Distributed Arithmetic is preferred. In Distributed Arithmetic multiplication is done without a multiplier. It uses LUT for the multiplication process. So, there will be no need for a partial product in this area consumption is decreased.

Consider

$$z = \sum_{a=1}^a i_a j_a \quad (1)$$

is an N-bit two's complement number.

$$|j_a| < 1$$

$$J_a : \{b_{a0}, b_{a1}, b_{a2}, \dots, b_{a(n-1)}\}$$

Where b_{a0} is the sign bit

- b. We can express J_a as

$$j_a = -b_{a0} + \sum_{n=1}^{N-1} b_{an} 2^{-n} \quad \dots (2)$$

- c. Substituting (2) in (1),

$$z = \sum_{a=1}^a i_a [-b_{a0} + \sum_{n=1}^{N-1} b_{an} 2^{-n}]$$

$$z = \sum_{a=1}^a (b_{an} * i_a) + \sum_{a=1}^a \sum_{n=1}^{N-1} (i_a * b_{an}) 2^{-n} \quad \dots (3)$$

$$z = -\sum_{a=1}^a (b_{a0} * i_a) + \sum_{a=1}^a [(i_a * b_{a1}) 2^{-1} + (i_a * b_{a2}) 2^{-2} + \dots + (i_a * b_{a(N-1)}) 2^{-(N-1)}]$$

$$z = -[b_{10} * i_1 + b_{20} * i_2 + b_{a0} * i_a]$$

$$+ [(b_{11} * i_1) 2^{-1} + (b_{12} * i_1) 2^{-2} + \dots + (b_{1(N-1)} * i_1) 2^{-(N-1)}]$$

$$z = -[b_{10} * i_1 + b_{20} * i_2 + b_{a0} * i_a]$$

$$+ [(b_{11} * i_1) 2^{-1} + (b_{12} * i_1) 2^{-2} + \dots + (b_{1(N-1)} * i_1) 2^{-(N-1)}]$$

$$+ [(b_{21} * i_2) 2^{-1} + (b_{22} * i_2) 2^{-2} + \dots + (b_{2(N-1)} * i_2) 2^{-(N-1)}]$$

$$+ [(b_{a1} * i_a) 2^{-1} + (b_{a2} * i_a) 2^{-2} + \dots + (b_{a(N-1)} * i_a) 2^{-(N-1)}]$$

$$z = -[b_{10} * i_1 + b_{20} * i_2 + b_{a0} * i_a]$$

$$+ [(b_{11} * i_1) + (b_{21} * i_2) + \dots + (b_{a1} * i_a)] 2^{-1}$$

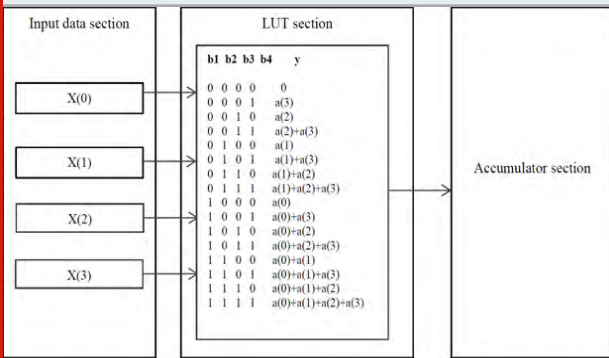
$$\begin{aligned}
& + [(b_{12} * i_1) + (b_{22} * i_2) + \dots + (b_{a2} * i_a)] 2^{-1} \\
& + [(b_{1(N-1)} * i_1) + (b_{2(N-1)} * i_2) + \dots + (b_{a(N-1)} * i_a)] 2^{-(N-1)} \\
z = & - \sum_{a=1}^a (b_{a0}) * i_a + \sum_{n=1}^{N-1} [b_{1n} * i_a + b_{2n} * i_2 + \dots + b_{an} * i_a] 2^{-n} \\
z = & - \sum_{a=1}^a i_a * (b_{a0}) + \sum_{n=1}^{N-1} \left[\sum_{a=1}^a i_a * b_{an} \right] 2^{-n} \quad \dots (4)
\end{aligned}$$

Consider the equation (4) rewritten as:

$$z = \sum_{n=1}^{N-1} \left[\sum_{a=1}^a i_a b_{an} \right] 2^{-n} + \sum_{a=1}^a i_a (-b_{a0})$$

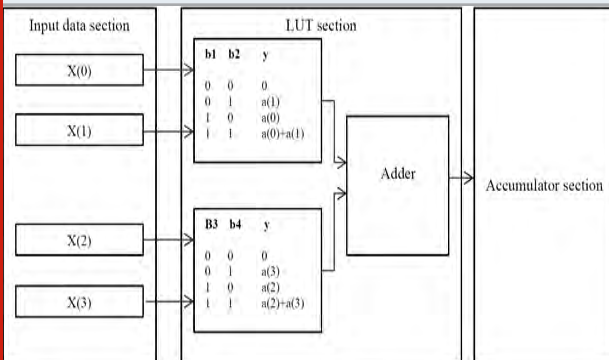
- $\left[\sum_{a=1}^a i_a b_{an} \right]$ has only 2^a possible values
- $\left[\sum_{a=1}^a i_a b_{an} \right]$ has only 2^a possible values
- With the sign bit as an input, we can store it in a ROM of size $= 2 * 2^a$

Figure 2: DA-based implementation use in Single LUT



In the above expression, since each b_{nk} sign bit takes only 0 and 1 values, the bit values of 0 and 1 selected the input data section. In the input data section is given the LUT section. The operation of the LUT section is performed and that output is given the accumulator section. The output Z cycles are (A-1) additions and no multiplication. This is a way of complete DA based MAC operation.

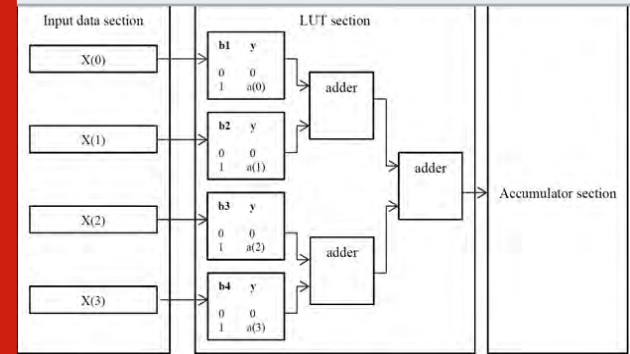
Figure 3: DA based implementation use in double LUT



The above (figure 3) DA based implementation uses double LUT, Here an extra addition is performed in every cycle, For example k-term input data section, the

number of address bits can be split into separate LUT. Each of the LUTs $2(k/2)$ rows, (figure 3) shows DA based implementation use in a single LUT, using two LUTs. The LUT size is 8 rows (4 rows per LUT).

Figure 3: DA based implementation use in double LUT



The above (figure 4) DA based implementation uses four LUTs, Here an extra addition is performed in every cycle. For example k-term input data section, the number of address bits can be split into separate LUT. Each of the LUTs $2(k/4)$ rows, (figure 4) shows DA based implementation use in a single LUT, using four LUTs. The LUT size is 8 rows (2 rows per LUT).

Figure 4: DA based implementation use in four LUTs.

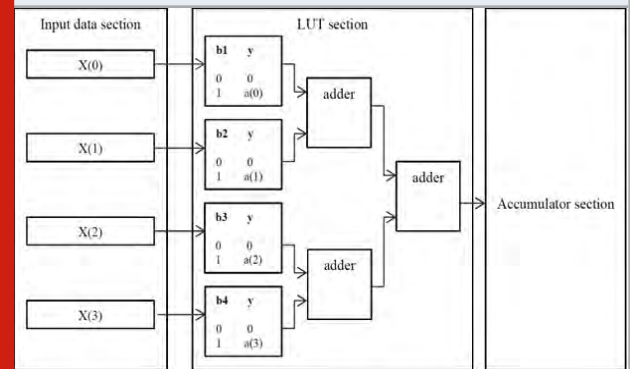
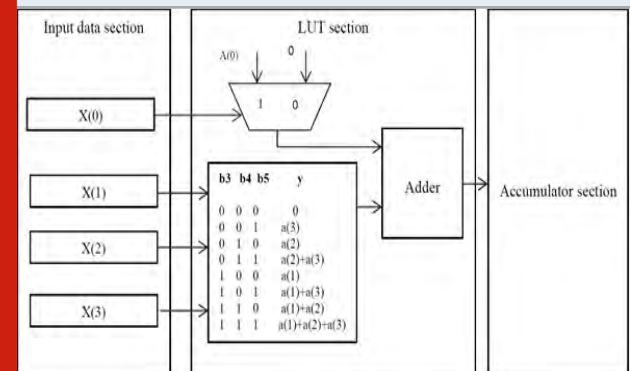


Figure 5: DA based implementation use in LUT and adder.

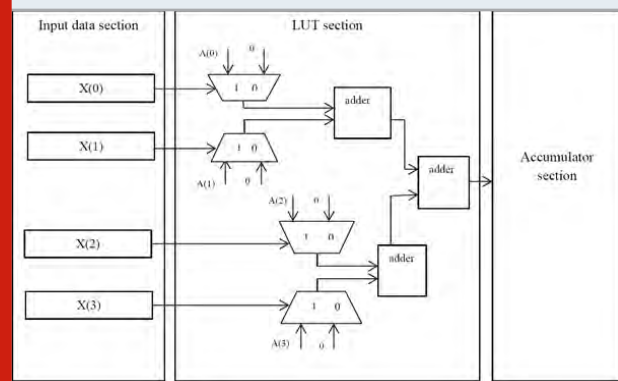


The above (figure 5) DA based implementation use in LUT and adder. It can be noted that the two contents one is the lower half of the LUT and the second one is

the upper half by adding $A[1]$. The LUT size is reduced by half. It can be stored only the upper half of LUT and adding $A[1]$ to LUT.

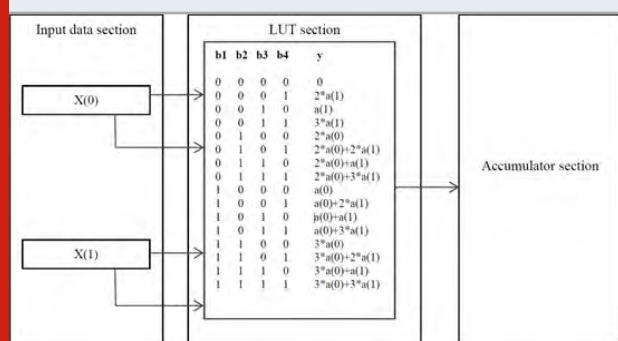
The above (figure 6) adder based DA implementation. It can be noted that the two contents one is the lower half of the LUT and the second one is the upper half by adding $\{A[2]\}$. In this adder based DA implementation is applied to completely eliminate the LUT.

Figure 6: adder based DA implementation.



The above (figure 7) 2 BAAT DA architecture use in a single LUT. It is accessing the input data one bit at a time, which requires N cycles, It is accessed in two bits at a time, If two bits of input data are accessed in each clock cycle (2 BAAT), the number of address bits for the LUT gets doubled. For a structure of single LUT, this results in an increase the size of LUT by $2N$ factor, the resultant architecture is shown in (figure 7).

Figure 7: 2 BAAT DA architecture used in a single LUT.



The above (figure 8) 2 BAAT DA architecture is used in double LUTs. Alternatively, the two LUTs are different weights. The size of LUT will be increased in two different factors. The below (figure 9) DA based implementation using zero detect logic. Since the entry of LUT is address "0" (all input bits 0) is 0, a zero detect logic on the LUT address bus can be used to disable LUT (figure 9). The amount of power reduction is dependent on the number of times the input bits at a given location are all zero.

Figure 8: 2 BAAT DA architecture used in double LUTs.

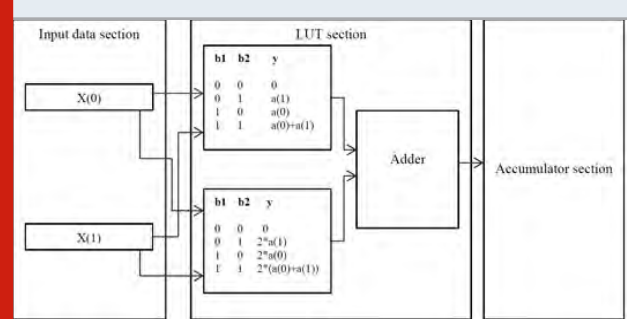
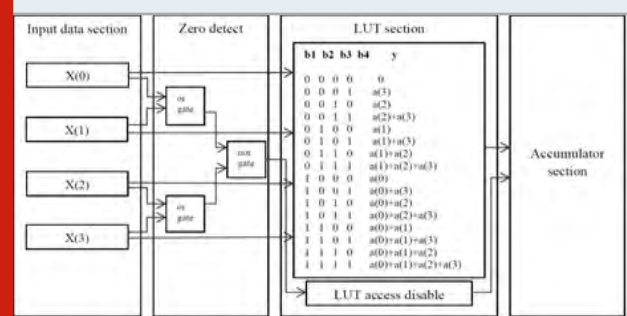
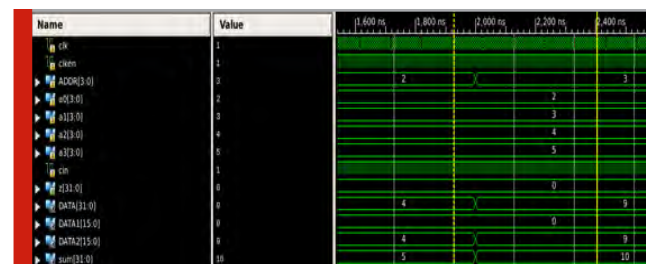
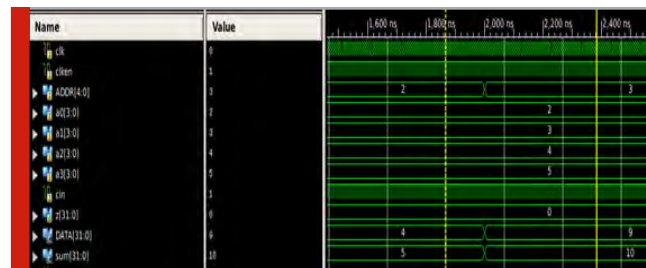


Figure 9: DA based implementation using zero detect logic.



RESULTS

In this proposed work DA based implementation structures for MAC architectures has been designed using Verilog coding and simulation has been done using Xilinx ISE 14.7.



Simulation 1: DA-based implementation use in Single LUT.

a_0, a_1, a_2, a_3 = inputs = 2,3,4,5

ADDR = 0011 = $a_2 + a_3 = 4 + 5 = 9$ = DATA

Sum = DATA + cin = $9 + 1 = 10$

Clk, clken = 1 then z = 0 else accumulation can be done

Simulation 2: DA based implementation use in double LUT.

$a_0, a_1, a_2, a_3 = \text{inputs} = 2, 3, 4, 5$

ADDR = 0011

DATA1 = $a_0 + a_1 = 0$

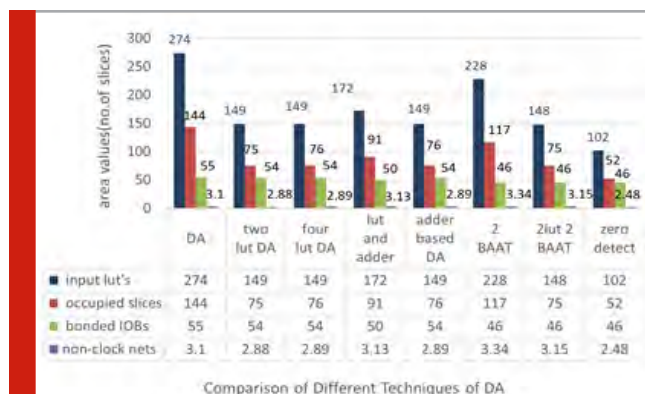
DATA2 = $a_3 + a_2 = 9$

DATA = DATA1 + DATA2 = $0 + 9 = 9$

Sum = DATA + cin = $9 + 1 = 10$

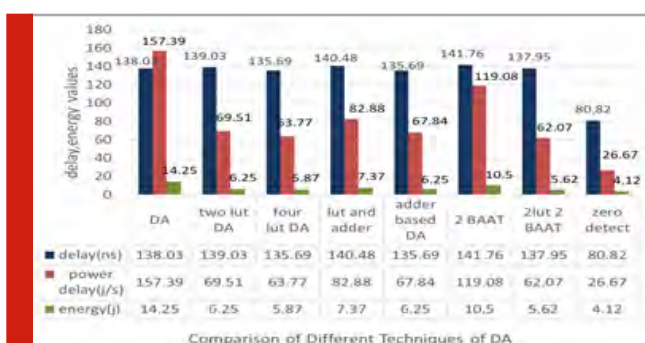
Clk, clken = 1 then z = 0 else accumulation can be done

Performance evaluation of various DA based MAC in terms of Area:



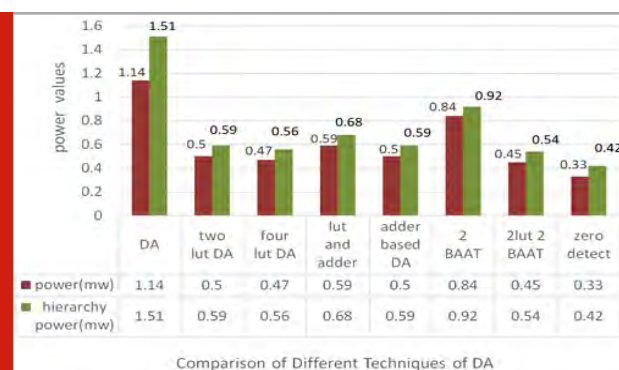
Here in DA architectures, the comparison is done with all types of DA architectures and compared. We have to give some of the DA based implementations using zero detect logic consumes less area among all types of DA architectures. From the above chart, DA consumes an area of 274 slices out of 17344 slices and DA based implementation using zero detect logic consumes an area of 102 slices, so that area consumption is decreased.

Performance evaluation of various DA based MAC in terms of delay and energy:



From the above chart, DA consumes a delay of 138.03ns DA based implementation using zero detect logic consumes delay of 80.82ns, so that delay consumption is decreased.

Performance evaluation of various DA based MAC in terms of Power:



From the above chart, DA consumed a power of 1.14 mw and DA based implementation using zero detect logic consumes a power of 0.33mw, so that power consumption is decreased.

CONCLUSION

Multiply and Accumulate unit(MAC) block plays an important role in each and every digital signal processing(DSP), which consists of multiplier, adder and accumulator. In MAC block design, the multiplier occupies more space as an adder and accumulator since it consists of partial products, so area consumption of MAC block is more. So that delay increases, in this case speed decreases. This is the main drawback of MAC. So, to overcome this drawback, Distributed Arithmetic is preferred. Here, external multiplier block is not required and the multiplication is done through the look-up table. So the partial product count will be reduced and delay decreases such as that, area consumption also reduced and speed increases. So, area consumption increases a little. To overcome this drawback, Offset Binary Coding is selected. Here the ROM size is reduced to half, so that area consumption is completely reduced to half when compared with MAC. To increase a little more speed, the implementation of offset binary coding is done by replacing a normal adder with a floating-point adder. On considering, DA based implementation using zero detect logic area consumption is decreased to 33 % and delay is decreased to 55%, but in this distributed arithmetic for each added input line ROM size grows exponentially. So, in offset binary coding, still, performance and area can also be improved. Designing Offset Binary Coding with Floating-point Adder still speed can be increased when compared with normal adder based on offset binary coding.

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Biochemical Analysis of an Indigenous Fish *Barilius bendelisis*

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ABSTRACT

Transboundary river Torsa, Raidak-1, Jaldhaka(Mansai) flowing through Cooch Behar district of West Bengal, India. A proximate study on the biochemical contents of a commonly consumed and available popular freshwater small indigenous fish (SIS) of these rivers was done to calculate their nutritive value. Most important nutrient composition of *Barilius bendelisis* (commonly known as Boroli fish) like protein, fat, moisture, ash calculated by standard 'AOAC' procedures (AOAC, 2005). The unrefined protein content shifted somewhere in the range of 16.86% and 16.72% with the most extreme protein content found in fish collected in Jaldhaka (Mansai) and least in the Raidak-1 river. So also, the fat content was assorted from 6.54% to 6.45%. Moisture content demonstrates a variety from 73.38% to 72.99% though, the ash content changed from 3.42% to 3.34%. The present work clearly shows that 'SIS' is the economical source of quality protein which can provide nutritional security, source of revenue safety and can solve the protein need of the locality. Enhancement of the production by aquaculture and consumption of small fishes encouraged for a better way to meet protein hunger of this region.

KEY WORDS: SMALL INDIGENOUS SPECIES (SIS), PROXIMATE COMPOSITION, PROTEIN HUNGER, REVENUE SAFETY, NUTRITIVE VALUE.

INTRODUCTION

The current picture of worldwide socioeconomics reveals to us that the total populace is rising and will keep on expanding. As indicated by insights, the total populace is approximately seven billion at present and by 2050 it will reach nine billion¹. A report estimated the urgent

need to construct mass food production by over 40% by 2030 and above 70% by 2050. The small indigenous fish species (SIS) can take for granted a basic work in the avoidance of micro-nutrient inadequacies and associated diseases 2-5. All-inclusive, it is usual that animal protein consumption will be twofold in the principal half of this century. Fish as the least expensive source of efficiently digestible animal protein demonstrates a noteworthy offer in the worldwide nourishment bin and undoubtedly, the strongest progress is normal in the utilization of fish which meet the protein hunger, employment and nutritional security in the coming days⁶.

India is occupied by various freshwater fish species and around 2,246 indigenous finfish species have been recorded available till now. Around 765 species are accounted for to have from freshwater and out of those

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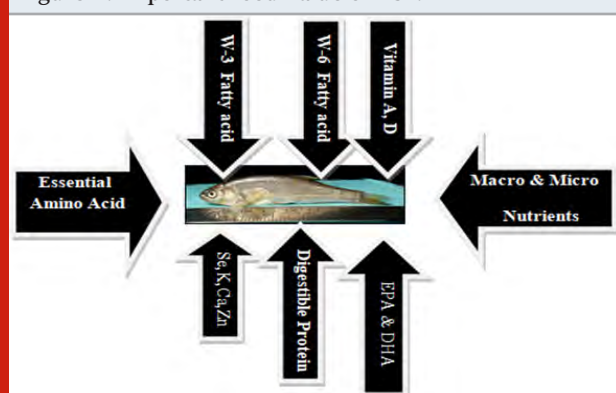
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450 species are considered as small indigenous fishes (SIS). These little fishes are an important source of micro-nutrients, inexpensive sources of high-quality animal proteins which involve a noteworthy piece of captured and cultured inland fisheries and contribute highly to the nutritional as well as the livelihood security of the rural society 7. 'SIS' are those species which can develop most extreme to a length of 25-30 cm in the development or grown-up phase of their lifecycle 8. Significant food values of fish are given in the following figure(Figure.1). West Bengal has importance for per capita fish consumers amongst the states of India with nearly 96% of the population being fish eater. Small fishes are nutrient-rich but normally overlooked in developing countries 9. On the off chance that overall population wellbeing is concerned, it is necessary to know the nutritive value of the little indigenous fishes from West Bengal to understand their nutritive value regarding food, nutritional protection, and for the betterment of economic condition.

Figure 1: Important food value of fish.



Information on the biochemical composition is essential for preparing and safeguarding fish and fishery items. Data on the biochemical constituents will make it easy for a processing technologist to define the ideal preparing and capacity conditions with the goal that the quality protected to the highest degree as fish is a well transitory product and weakening in quality is because of the progressions occurring in the proximate composition. Consciousness has already reached among the people about healthy food and fish is finding more reliable because of its sole nutritional qualities. A suitable understanding of the biochemical constituents of fish has become a primary essential for nutritionists and dieticians.

Lack of satisfactory data on biochemical composition of fish from rivers of the northern region of West Bengal, India hence the consumer and fishery workers are left with insufficient information's on the significance of few fish species in their daily diets 10. The present investigation has a justification to provide a piece of important information on the biochemical composition of some species marketed in the locality. Considering the importance of the small indigenous fishes and Very few published information is available on the biochemical

composition of the small indigenous fish species of West Bengal, this study targeted to determine the biochemical composition of popular indigenous small fish named *Barilius bendelisis* (locally popular boroli fish) found in Torsa, Raidak-1, Jaldhaka(Mansai) river of Cooch Behar District of West Bengal, India.

MATERIAL AND METHODS

Sampling Site: Fresh fish sample of *Barilius bendelisis* collected from fishermen landing at the bank of the Torsa, Raidak-1, Jaldhaka river of Cooch Behar district which is situated in the northern part of West Bengal. It is very important to check the health status of aquatic life, from the perspective of knowledge about biodiversity, because these rivers traverse a vast territory through different countries as well as to document comprehensive nutrient profiles with a specific focus on important small indigenous species (SIS) availability in Cooch Behar for pre-monsoon, monsoon and the post-monsoon period during the period of March 2019 to November 2019. Global positioning system reading of nine sampling sites(Fig.2) are Torsa river (ST1-26°21'27"N, 89°22'42"E, 158 ft), Torsa river (ST2-26°17'13"N, 89°27'33"E, 122 ft), Torsa river (ST3-26°15'5"N, 89°36'37"E, 109 ft), Raidak-1 river (SR1-26°21'07"N, 89°40'29"E, 122ft), Raidak-1 river (SR2-26°18'39"N, 89°40'14"E, 118 ft), Raidak-1 river (SR3-26°13'09"N, 89°41'37"E, 104 ft), Jaldhaka(Mansai river) (SJ1-26°21'35"N, 89°13'31"E, 146ft), Jaldhaka(Mansai river) (SJ2-26°19'10"N, 89°14'23"E, 157ft), Jaldhaka(Mansai river) (SJ3-26°15'34"N, 89°15'59"E, 137ft). The fish samples collected from fishermen from different spots (were transported in an insulated icebox with a proper identification mark to the laboratory.

Figure 2: Fish collection spots of three rivers in Google Earth.



Laboratory Study of Samples: In the laboratory, the fish samples identified using the taxonomy keys, the color, color patterns, spots, and their picture taken by a DSLR camera. The fishes were identified by studying their morphometric and meristic characters and by taking into consideration the literature of Talwar and Jhingran, 1991 and Jayaram, 1999 and 2006 11-13. The notable sample was then set apart in triplicates as Standard length, absolute length, and weight of fish sample recorded. The proximate composition of *Barilius*

bendelisis was analyzed by standard 'AOAC' procedures (AOAC, 2005) 14.

Total Moisture Determination: Triplicates of the pre-weigh samples were put into Petri dishes dried in an

air-dry spell oven. The drying was done at 100-1050 °C until a steady weight was accomplished. It was then taken out from the Oven, put in a desiccator, allowed to cool, and weighed. Moisture content was calculated from the difference in weight of the sample.

Table 1. Protein, Fat (% wet weight basis) of *Barilius bendelisis* (SIS) of Torsa river of Cooch Behar district of West Bengal, India.

River	Site	Period	Moisture(g/100g)	Crude Fat(g/100g)	Crude Protein(g/100g)	Ash(g/100g)
Torsa	ST1	Pre monsoon	72.77	6.38	16.66	3.42
	ST2	Pre monsoon	72.2	6.37	16.54	3.37
	ST3	Pre monsoon	72.38	6.4	16.88	3.46
Mean Value(Mean ±2sd)			72.45 ±0.33	6.38 ±0.0173	16.69 ±0.19	3.42 ±0.05
Torsa	ST1	Monsoon	72.45	6.31	16.6	3.41
	ST2	Monsoon	72.39	6.3	16.52	3.33
	ST3	Monsoon	72.11	6.33	16.65	3.4
Mean Value(Mean ±2sd)			72.32 ±0.20	6.31 ±0.02	16.59 ±0.07	3.38 ±0.05
Torsa	ST1	Post monsoon	73.58	6.55	16.98	3.48
	ST2	Post monsoon	74.69	6.45	16.58	3.42
	ST3	Post monsoon	74.71	6.98	17.28	3.49
		min	73.58	6.45	16.58	3.42
		max	74.71	6.98	17.28	3.49
Mean Value(Mean ±2sd)			74.33 ±0.73	6.66 ±0.32	16.95 ±0.39	3.46 ±0.04
		Approx. 95% of the data lies between ± 2 SD				

Table 2. Protein, Fat (% wet weight basis) of *Barilius bendelisis* (SIS) of Raidak-1 river of Cooch Behar district of West Bengal, India.

River	Site	Period	Moisture(g/100g)	Crude Fat(g/100g)	Crude Protein(g/100g)	Ash(g/100g)
Raidak-1	SR1	Pre monsoon	72.19	6.48	16.76	3.32
	SR2	Pre monsoon	72.15	6.5	16.68	3.35
	SR3	Pre monsoon	72.4	6.52	16.88	3.38
Mean Value(Mean \pm 2sd)			72.25 \pm 0.15	6.5 \pm 0.02	16.77 \pm 0.12	3.35 \pm 0.03
Raidak-1	SR1	Monsoon	72.38	6.34	16.6	3.4
	SR2	Monsoon	72.22	6.33	16.55	3.33
	SR3	Monsoon	72.16	6.39	16.67	3.47
Mean Value(Mean \pm 2sd)			72.25 \pm 0.13	6.35 \pm 0.03	16.61 \pm 0.06	3.4 \pm 0.07
Raidak-1	SR1	Post monsoon	74.48	6.52	16.77	3.45
	SR2	Post monsoon	74.49	6.5	16.62	3.4
	SR3	Post monsoon	74.4	6.77	16.98	3.48
Mean Value(Mean \pm 2sd)			74.46 \pm 0.05	6.59 \pm 0.17	16.79 \pm 0.20	3.44 \pm 0.04
Approx. 95% of the data lies between \pm 2 SD						

Table 3. Protein, Fat (% wet weight basis) of *Barilius bendelisis* (SIS) of Jaldhaka(Mansai) river of Cooch Behar district of West Bengal, India.

River	Site	Period	Moisture(g/100g)	Crude Fat(g/100g)	Crude Protein(g/100g)	Ash(g/100g)
Jaldhaka	SJ1	Pre monsoon	73.98	6.59	17.01	3.4
	SJ2	Pre monsoon	73.13	6.31	16.98	3.33
	SJ3	Pre monsoon	74.14	6.66	17.08	3.44
Mean Value(Mean \pm 2sd)			73.75 \pm 0.6	6.52 \pm 0.21	17.02 \pm 0.05	3.39 \pm 0.06
Jaldhaka	SJ1	Monsoon	72.3	6.42	16.59	3.32
	SJ2	Monsoon	72.28	6.4	16.22	3.3
	SJ3	Monsoon	72.33	6.49	16.7	3.38
Mean Value(Mean \pm 2sd)			72.30 \pm 0.02	6.43 \pm 0.05	16.50 \pm 0.28	3.33 \pm 0.04
Jaldhaka	SJ1	Post monsoon	74.44	6.68	17.1	3.31
	SJ2	Post monsoon	73.26	6.52	16.98	3.3
	SJ3	Post monsoon	74.56	6.78	17.12	3.35
Mean Value(Mean \pm 2sd)			74.09 \pm 0.81	6.66 \pm 0.15	17.07 \pm 0.08	3.32 \pm 0.02
Approx. 95% of the data lies between \pm 2 SD						

Total Crude Protein Determination: To calculate the protein content of the sample, a Micro-Kjeldahl Nesslerization procedure was applied. 2g of the sample was taken into three different Kjeldahl digestion flasks containing 20ml of Concentrated H₂SO₄ and a spatula

of Kjeldahl catalyst. The flask was gently heated at first till frothing stops then boiling very fast till mixture was colorless. In the wake of cooling the mixture, 100 ml water was included. From the diluted part of this solution, 1 ml is taken and with this 4 ml, Nessler's

reagent was added. The absorbance of this mixture read spectrophotometrically at 490nm against a blank. 0.01g per 100 ml of water considered as the sample. Protein content was determined by multiplying it by 6.25.

Total Crude Fat Determination: In a conical flask, 14 g finely homogenized flesh and bone were taken and chloroform and methanol mixture (1:2) was added to it. The blend was centrifuged for five minutes. The supernatant was decanted repeatedly by using a filter paper and to end with, 0.8 ml water was added with the residue. To the supernatant, Chloroform was added to make a ratio of 1:1. separating funnel was used to separate oil. The solvent was evaporated at 40°C and weighed taken. By using Soxhlet apparatus petroleum ether (boiling range 40-60°C) crude fat was determined.

Total Ash Determination: In different porcelain dishes, 1g of the triplicate sample was weighed. A 5ml solution of aluminum nitrate and calcium nitrate was added to it. The mixture was dried at 100°C. When the sample was charred, and then places it in a muffled furnace at 450°C overnight. After cooling in a desiccator, reweighed to calculate the ash content.

Statistical Analysis: The statistical investigation was finished utilizing MS-Excell Programming.

Ethical issues: The examination was as per the Declaration of Helsinki and guidelines on good clinical practice locally accessible. It was likewise endorsed by the institutional ethics board and morals committee 15.

RESULTS

The proximate composition of *Barilius bendelisis* are shown in Table 1, Table 2, and Table 3 for Torsa, Raidak-1, Mansai(Jaldhaka) river for three periods at three sites of each river respectively. The outcomes from the present examination uncovered that moisture, protein, fat, and ash showed variations in three seasons at three sites for the collected small fish species.

Total Protein Content: The muscle protein content went somewhere in the range of 16.88% and 16.54% for the fish collected in the pre-monsoon period, 16.65% and 16.52% in the monsoon period, 17.28% and 16.58% in the post-monsoon period from the fish collected from the Torsa River (Table.1). The crude protein content showed 16.88% and 16.68% for the fish collected in the pre-monsoon period, 16.67% and 16.55% in the monsoon period, 16.98% and 16.62% in the post-monsoon period from the fish collected from Raidak-1 river (Table.2). Whereas crude protein content showed the range 17.08% and 16.98% for the fish collected in the pre-monsoon period, 16.70% and 16.22% in the monsoon period, 17.12% and 16.98% in the post-monsoon period from the fish collected from Jaldhaka(Mansai) river (Table.3).

It was found from our study that crude protein content showed maximum value for the fish collected from the

sites at ST3, SR3, SJ3 and minimum value from the fish collected from the sites ST2, SR2, SJ2 (Figure.3 to Figure.10). Another remarkable feature was that the crude protein content of the fish is highest in Jaldhaka(Mansai) river and lowest in the Torsa river in the pre-monsoon period(Figure. 12). In the monsoon period, the crude protein content is highest in the Torsa river whereas lowest in Jaldaha(Mansai river) (Figure.13).

Figure 3: Variation of protein content (%) of the species collected from Torsa river in the pre-monsoon period.

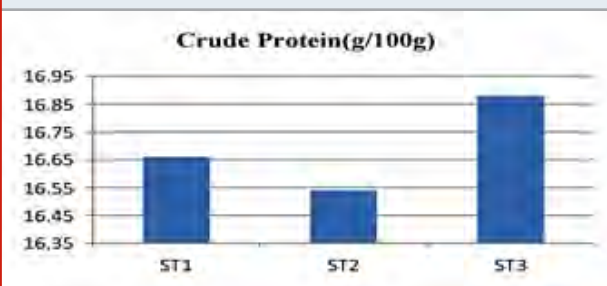


Figure 4: Variation of protein content (%) of the species collected from Torsa river in the monsoon period.

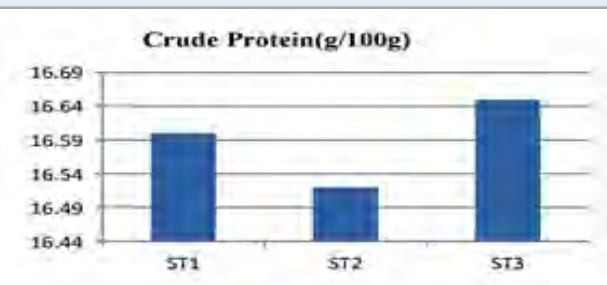
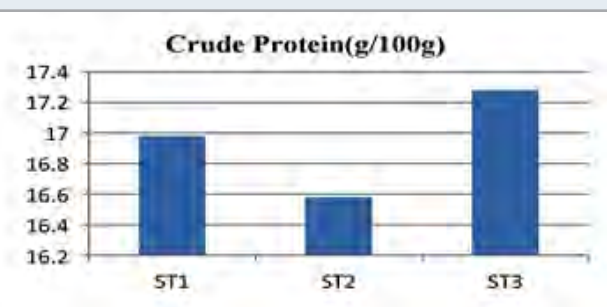


Figure 5: Variation of protein content (%) of the species collected from Torsa river in the post-monsoon period.



In the studied period, the fish crude protein content is highest in Jaldhaka(Mansai) and lowest in the Raidak-1 river during the post-monsoon period (Figure.14). It was also evident from our study that crude protein content of the studied fish was higher from the fish collected from the Jaldhaka (Mansai) river and lowest in the fish collected from Raidak-1 river when we are taking an average of three seasons i.e. pre-monsoon, monsoon, and post-monsoon period (Figure.15).

Figure 6: Variation of protein content(%) of the Species collected from Jaldhaka(Mansai) river in the pre-monsoon period.

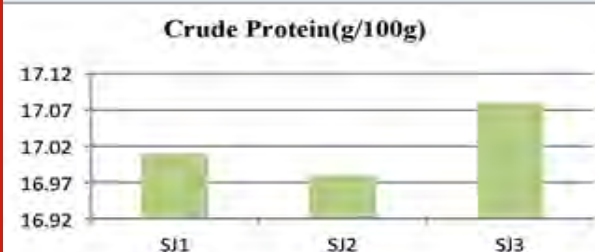


Figure 10: Variation of protein content (%) of the collected from Raidak-1 river in the pre-monsoon period.

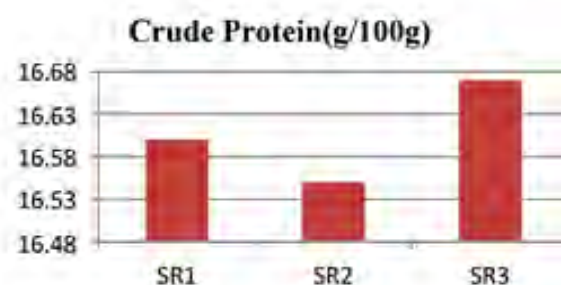


Figure 7: Variation of protein content(%) of the Species collected from Jaldhaka(Mansai) river in the monsoon period.

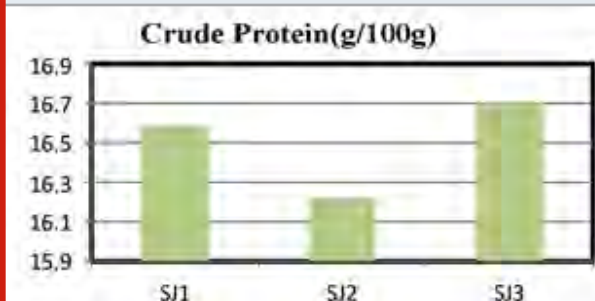


Figure 11: Variation of protein content (%) of the species collected from Torsa river in the post-monsoon period.

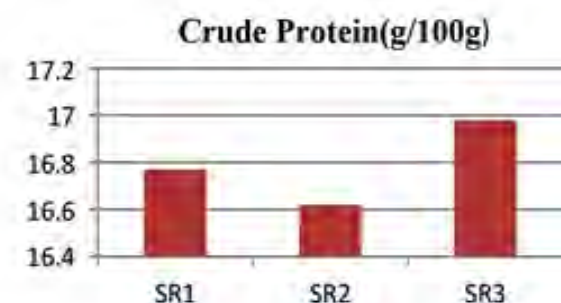


Figure 8: Variation of protein content (%) of the species collected from Mansai(Jaldhaka) in the post-monsoon period.

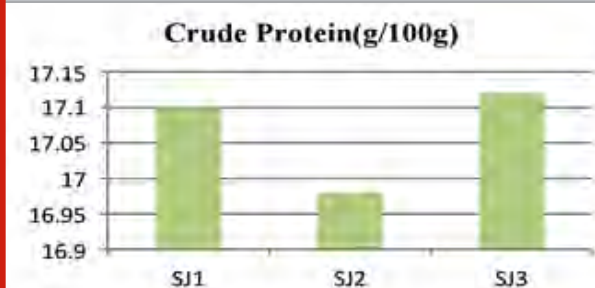


Figure 12: Variation of protein content (%) of the species collected from three rivers in the pre-monsoon period.

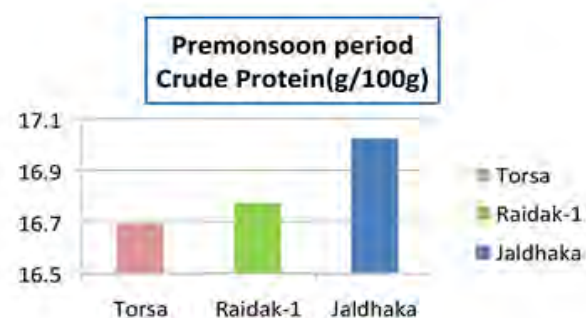


Figure 9: Variation of protein content (%) of the collected from Raidak-1 river in the pre-monsoon period.

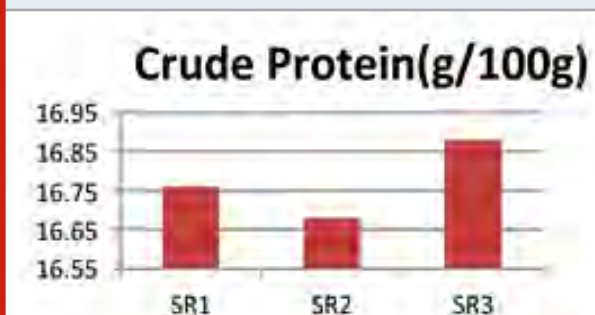


Figure 13: Variation of protein content (%) of the species collected from three rivers in the monsoon period.

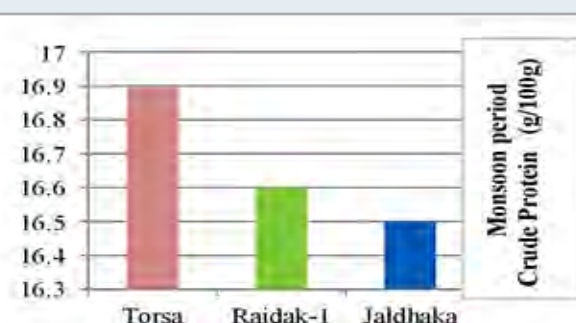


Figure 14: Variation of protein content (%) of the species collected from three rivers in the post-monsoon period.

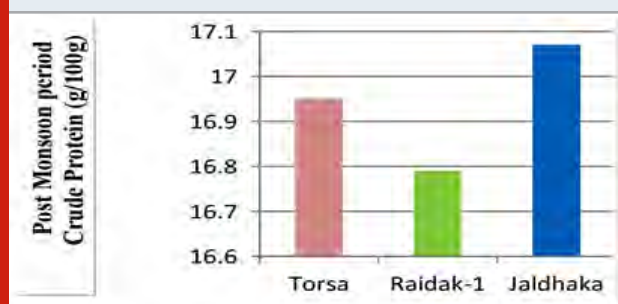
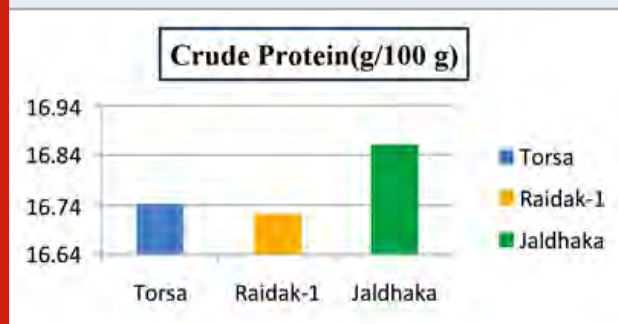


Figure 15: Variation of protein content (%) of the species collected from three rivers in three seasons.



Total Crude Fat Content: The crude fat content went somewhere in the range of 6.40% and 6.37% for the fish collected in the pre-monsoon period, 6.33% and 6.30% in the monsoon period, 6.98% and 6.45% in the post-monsoon period from the fish collected from the Torsa River (Table.1). The crude fat content showed 6.52% and 6.48% for the fish collected in the pre-monsoon period, 6.39% and 6.33% in the monsoon period, 6.77% and 6.50% in the post-monsoon period from the fish collected from Raidak-1 river (Table.2).

Whereas crude fat content showed the range 6.66% and 6.31% for the fish collected in the pre-monsoon period, 6.49% and 6.40% in the monsoon period, 6.78% and 6.52% in the post-monsoon period from the fish collected from Jaldhaka(Mansai) river (Table.3). It was found from our study that crude fat content showed maximum value for the fish collected from the Raidak-1 river and minimum value from the fish collected from the Torsa river in the pre-monsoon period (Figure.16) whereas crude fat content showed maximum value for the fish collected from the Jaldhaka(Mansai) river and minimum value from the fish collected from the Torsa river in the monsoon period (Figure.17). Crude fat content showed maximum value for the fish collected from the Raidak-1 river and minimum value from the fish collected from the Torsa river in the post-monsoon period (Figure.18).

It was also evident from our study that the crude fat content of the studied fish was higher from the fish collected from the Jaldhaka (Mansai) river and lowest in the fish collected from the Torsa river when we are taking

an average of three seasons i.e. pre-monsoon, monsoon and post-monsoon period (Figure.19).

Figure 16: Variation of crude fat content (%) of the species collected from three rivers in the pre-monsoon period.

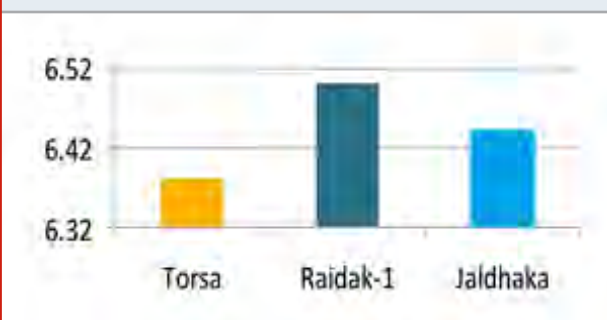


Figure 17: Variation of crude fat content (%) of the species collected from three rivers in the monsoon period.

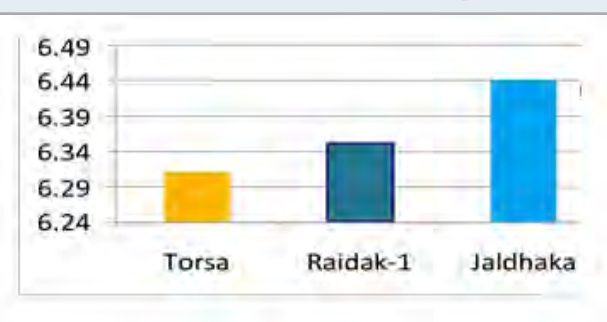


Figure 18: Variation of protein content (%) of the species collected from three rivers in the post monsoon period.

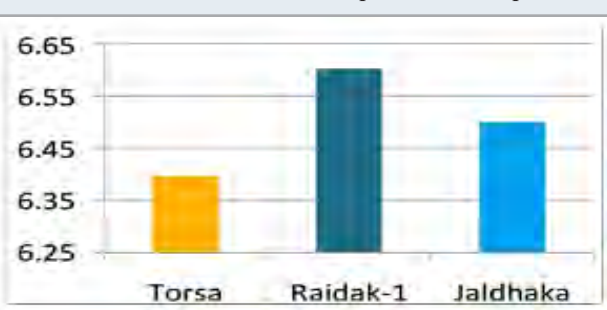
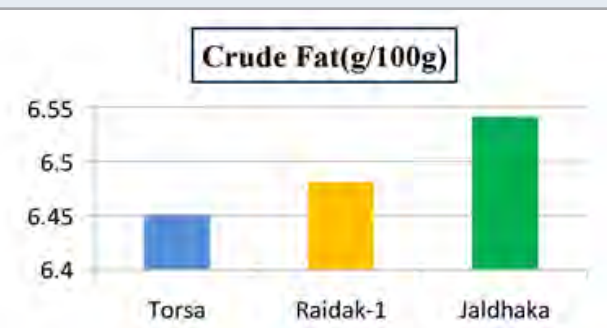


Figure 19: Variation of crude fat content (%) of the species collected from three rivers in three seasons.



Total Moisture Content: The moisture i.e. water content went somewhere in the range of 72.77 % and 72.20 % for the fish collected in the pre-monsoon period, 72.45 % and 72.11 % in the monsoon period, 74.71% and 73.58 % in the post-monsoon period from the fish collected from Torsa river (Table.1). The water content showed 72.40% and 72.15% for the fish collected in the pre-monsoon period, and 72.38% and 72.16% in the monsoon period, and 74.49% and 74.40% in the post-monsoon period from the fish collected from Raidak-1 river (Table.2). Whereas moisture content showed the range 74.14% and 73.13% for the fish collected in the pre-monsoon period, and 72.33% and 72.28% in the monsoon period, 74.56 % and 73.26% % in the post-monsoon period from the fish collected from Jaldhaka(Mansai) river (Table.3).

Total Ash Content: The ash content went somewhere in the range of 3.46% and 3.37% for the fish collected in the pre-monsoon period, 3.41% and 3.33% in the monsoon period, 3.49% and 3.42% in the post-monsoon period from the fish collected from the Torsa River (Table.1). The ash content showed 3.38% and 3.32% for the fish collected in the pre-monsoon period, and 3.47% and 3.33% in the monsoon period, and 3.48 % and 3.40 % in the post-monsoon period from the fish collected from Raidak-1 river (Table.2). Whereas ash content showed the range 3.44 % and 3.33% for the fish collected in the pre-monsoon period, and 3.38 % and 3.30 % in the monsoon period, 3.35% and 3.30 % in the post-monsoon period from the fish collected from Jaldhaka(Mansai) river (Table.3).

DISCUSSION

The biochemical analysis of principle constituents namely; protein, fat, carbohydrate, ash, and water varies greatly for different species and in between the same species depending on diverse factors like age, sex, environment condition, and also seasonal variation 16,17. The biochemical constituents of fishes are closely related to feeding intake, migratory factor, and sexual changes in the relationship with spawning 18. Fish growth is subjective by several factors such as food, space, temperature, the salinity of water, seasonal change, and different human activity. Fishes are poikilothermic and live permanently immersed in water so directly affected by alteration in their ambient medium 19.

The results obtained regarding the proximate analysis of *Barilius bendelisis* showed few similarities with the assessment made by other researchers in this field 20,21,22. However, differences with other researchers may be accredited to different physiological conditions of different locations, period, age of fish including length during the time of sampling in the study period. Generally, proteins are found in fish mussel which includes varieties like a. Sarcoplasmic proteins such as myogen, globulin, and so forth. b. myofibrillar proteins which include actin, myosin, actomyosin, tropomyosin, troponins, and so forth c. Stroma proteins include connective tissues of the muscle. Protein like collagen, present in skin, the air bladder is another type of protein

which is present in fish 23. Fish comprises a remarkable source of protein in our eating routine 24. A broad span of proteins happens which are twenty number of amino acids connected in an alternating plan.

Half of the units are named fundamental as they can't be prepared synthetically and like so fish is important in keeping up the right dietary parity 25. The protein content of fish mussel showed a range of 16.86% and 16.72% in our present study. Protein is important for the upkeep of good wellbeing 26. In fish, the muscle protein content, for the most part, stays higher than every single other supplement 26. Fish food organisms in the water may alter the protein content of the mussel. Individual agro-climatic conditions in different topographical regions have a more important impact on aquatic plankton variety, density, and accessibility to the fishes. Fish are typically sorted as lean fat when fat is under 5 % 28. The findings in our present study on a crude fat content range between 6.54% to 6.45% which is the moderate value of crude fat content have relevance with other reported data 29-32. It is a general trend that the fat content gradually increases with age and size of the small fishes 32.

Fats in fishes are significant for energy to save. It fills in as prescient evaluations of fish condition 33-36. As the fat substance increases, the water content falls and the other way around. The present study showed that the whole of fat and moisture for any of the studied fishes approximates 80% which has a close resemblance with other researchers in this field 37-39. Prior investigation archived that the fat substance of the investigated fish ran from 1.54 to 6.28% which has pertinence to our findings 40. Water is crucial for the transportation of food substances like fat, protein, etc. to the cells, organs, and different parts of the fish for proper co-ordination. Body fluids move nutrients, metabolites, etc. and water is the main component in these fluids. Water is bonded to the proteins and in the free form which has well-defined biological roles 41. In our study ash content of the studied fish ranges between 3.33% to 3.49%. A larger amount of ash prompts having an extra elevated amount of mineral in bones 42.

CONCLUSION

The taste, freshness, size, and other related outside appearances ought not to be the major attraction to be considered in settling on a choice for promoting and utilization of fishes. The outcome acquired in this analysis has given logical data and point by point learning of the proximate analysis of *Barilius bendelisis*, a significant selling fish of the area of Torsa, Raidak-1, Jaldhaka (Mansai) stream. Further specific detailed studies are required to explore the amino acid profile, fatty acid profile, and mineral quantities to set up a standard nutritional database of small indigenous fishes (SIS) of other rivers of this locality. Some local indigenous fish species have been identified that would significantly add to multiple nutrients intake of public health importance. The outcome of the present study significantly expands

the current information on the nutritional value of the indigenous fish species available in the Cooch Behar district of West Bengal. Therefore, it can be suggested that small indigenous fish species (SIS) might be a good choice for the people of rural as well as semi-urban area to meet their everyday dietary supplement prerequisites just as combat micronutrient inadequacies in connection to their health benefits.

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Awareness of University Library Services and Resources Among Postgraduate Students of Selected Universities of J&K: A Comparative Assessment

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ABSTRACT

University libraries are vital organs for universities to support academics and research related activities. Effective use of resources and services of any academic library particularly university libraries will enhance the research and academic tasks. These libraries fulfil the information needs of users associated with diverse field of studies. These libraries provide the varied sources of information and different services to the users. The efficiency of academic library depends upon the awareness and familiarity of the users with different services and resources of libraries. Therefore, the current study is an attempt to gauge the awareness of users of selected university libraries, total 4 universities were selected two state universities and two central universities from Jammu and Kashmir. Survey method was adopted to fulfil the objectives of the study and questionnaire was used as a tool for data collection. Sampling method applied was simple random sampling. The sample size was 600, equally selected from 4 universities. Data was tabulated by using widely used statistical tool SPSS. The descriptive as well as inferential statistical tests were followed to test the data, mean, median, standard deviation, comparative analysis was carried out by applying one way Anova statistical test. The major findings of the study were 48 percent library users had visited library frequently. Based on the overall mean of \bar{x} 1.92 and M 2.00, it can be concluded that the users are well aware about the services of concerned libraries. Further, based on the overall mean of \bar{x} 1.90 and M 2.00, it can be concluded that the users are well aware about the resources of the concerned libraries. While applying comparative statistical techniques on mean scores of services and resources it was found that only current awareness service (CAS) and online public access cataloguing (OPAC) awareness were statistically significant ($p < 0.05$). Furthermore, It is evident from the results that all the resource awareness parameters were statistically significant excluding Reference Books Awareness (RBA having P value greater than 0.05 ($p = 0.055 > 0.05$)).

KEY WORDS: LIBRARY SERVICES, LIBRARY RESOURCES, AWARENESS, UNIVERSITY LIBRARIES, POSTGRADUATE STUDENTS, J&K.

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INTRODUCTION

In the context of this modern learning system, the university library plays an important role. According to this modern definition of study, as a subsystem of the university institution, the university library was no longer a section that simply offered resources for studies and analysis. Instead, it has been an important knowledge technology entity of the university and an

involved partner in the research phase of the relevant study programme. The academic library aims to realise the goals along with the university departments and teaching staff. One of the possible learning spaces at the university is the library. The academic library provides learning environment in an individualised learning setting and consists of the instructional setting of the library that an individual reader describes related to his or her background, competence and personal learning objectives. However, no library is capable of pleasing all its users due to different constraints.

It is clear that libraries that offer full support to patrons can achieve greater user satisfaction (Ose and Esse, 2013). Through preserving and distributing a variety of sources of information related to user group needs, libraries facilitate analysis processes. The facilities and services which would be provided or expanded in a library are decided by many factors. User expectations and user retention are among the most important. User loyalty plays a crucial function in the library's growth and provisioning. For the availability of necessary materials and amenities in the library, future users' input on library resources, programmes and facilities should be considered (Sriram and Rajev, 2014). The provision of reliable services also plays a major role in the happiness of consumers.

The library is known as an information centre and an ocean of knowledge. To serve the knowledge needs of the students, it has countless tools. In the institutions where they represent, academic libraries play a significant role. Academic libraries' main aim is to help the parent organisation in achieving its goals. The support of a well-established library is important for every university system. The fundamental role of an academic library is to provide support activities for teaching, learning and study by offering appropriate and usable sources of information in a format. By having access to world-class digital services, libraries are seen as learning organisations promoting academic and scientific practices. Since academic libraries aim to meet and fulfil their users professional needs, it is therefore necessary to know the level of their success and how well users view their services and resources (Hussein and Islam, 2012).

Review of Related Literature: Ahmad (2011) was of the view that there is an urgent need of revision of library information sources and services as per changing information environment. Bhatti (2010) revealed that libraries should build their information sources and services as per the needs of library patrons. Mahawar, Verma and Narayan (2009) conducted a study and revealed that maximum users are moderately satisfied with the services of libraries. Further authors suggested that libraries need to embrace the technological advancements to keep user services as per the recent advancements. On the other hand Nejati and Nejati (2008) revealed that libraries have had adopted "successful customer service strategies from the corporate world".

One more study conducted by Nzivo (2012) highlighted that users were unaware about the electronic resources and lack of information retrieval skills was also witnessed. Similar study was conducted by Dhanavandan, Mohammed and Nagarajan (2012) and revealed purpose of usage of electronic resources and found that library users were using electronic resources for the purpose of research and study purposes. The study carried out earlier by Shaqouri and Daher (2010) showed that usage of electronic resources were significant among respondents. On the other hand the study of Ganaie and Rather (2014) witnessed the level of satisfaction very low among library users regarding the different sources and services.

But the results of study carried out by Pandey and Singh (2014), Motiang, Wallis and Karodia (2014) were contradictory with Ganaie and Rather (2014). The study of Idiegbeyan and Ugwuonwa (2013) revealed the status of private university libraries and found that the status was to some extent up to mark. Further, suggested few things like enhancing the services and strengthen the sources part of libraries are of utmost importance. Wani, Shiekh and Jan (2019); Wani, Shafi and Sheikh (2019) found that many library users of "Allama Iqbal Library" were not aware of sources and services of library.

The studies of Gunasekera (2010); Veena and Kotari (2016); Onifade, Ogbuiyi and Omeluzor (2013) highlighted the usage, purpose and frequency of library visits of users. Further, these studies revealed the resource usage and awareness. Similarly Arshad and Ameen (2010); Padmavathi, Ningaiah and Biradar (2017); Mostofa and Hossain (2014) conducted the studies across different times and at different places. The works of these authors deliberated upon service qualities, satisfaction level of library users towards services and resources, library visiting habits and purpose.

Objectives

1. To identify the awareness among library users regarding 'resources', and 'services'.
2. To compare the differences on the awareness among the library users of selected academic libraries of J&K.

METHODOLOGY

For achieving the objectives of current study authors used survey method. For the purpose of collection of data from sample size of 600 respondents a structured questionnaire was drafted and distributed among respondents. Sampling procedure followed by the authors was simple random sampling. The sample was selected from universities of J&K, two central and two state universities viz University of Kashmir, University of Jammu, Central University of Kashmir and Central University of Kashmir. For analyzing the results data was codified and tabulated in one of the widely used statistical software for social sciences research that is SPSS Software.

Data Interpretation and Analysis

Services Awareness among Library users: Table 1 presents the mean (\bar{x}), median (M) and the standard deviation (SD) of the scores of the Individual statements to measure the awareness of users on library services. Based on the overall mean of \bar{x} 1.92 and M 2.00, it can be concluded

that the users are well aware about the services of concerned libraries. Further it is also evident from the data that at certain services there is a negative skew, users of concerned libraries under study were slightly unaware regarding certain services.

Table 1. Services awareness among library users

University		CSA	CAS	PSA	RRA	ILL	OPAC	ISA	Ez-P	Overall
UOK	Mean	1.75	1.73	1.62	1.70	2.39	1.90	2.01	2.20	1.91
	Median	2.00	1.00	1.00	2.00	3.00	2.00	2.00	2.00	1.85
	Std. Deviation	0.787	0.858	0.800	0.702	0.767	0.749	0.760	0.769	0.77
UOJ	Mean	1.90	1.84	1.62	1.70	2.32	1.90	1.99	2.11	1.92
	Median	2.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	2
	Std. Deviation	.809	.828	.800	.702	.780	.749	.755	.756	0.77
CUK	Mean	1.89	1.92	1.67	1.78	2.25	1.90	2.01	2.15	1.94
	Median	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	1.87
	Std. Deviation	.796	.815	.815	.767	.819	.749	.764	.754	0.78
CUJ	Mean	1.85	1.99	1.65	1.69	2.22	1.90	1.95	2.14	1.92
	Median	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00	1.87
	Std. Deviation	.798	.786	.812	.704	.826	.749	.754	.777	0.77
Total	Mean	1.85	1.87	1.64	1.72	2.29	1.90	1.99	2.15	1.92
	Median	2.00	2.00	1.00	2.00	3.00	2.00	2.00	2.00	2
	Std. Deviation	.798	.826	.805	.719	.799	.747	.757	.763	0.77

Note: University of Kashmir (UOK), University of Jammu (UOJ), Central University of Kashmir (CUK), Central University of Jammu (CUJ), Circulation Service Awareness (CSA), Current Awareness Service (CAS), Photocopying Service Awareness (PSA), Reading Room Service Awareness (RRA), Inter library Loan Service Awareness (ILL), Online Public Access Catalogue Awareness (OPAC), Internet Service Awareness (ISA), Ez-Proxy Service Awareness (Ez-P), Reference Books Awareness (RBA), Electronic Resources Awareness (ERA), Newspapers and Magazines Awareness (NMA), Journal Indexes and Abstracts Awareness (JIA), Audio Visuals Awareness (AVA), Journals Awareness (JA)

Table 2. Resource awareness among library users

University		RBA	ERA	NMA	JIA	AVA	JA	Overall Mean
UOK	Mean	1.98	1.98	2.01	2.15	1.99	1.94	2.01
	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Std. Dev.	.764	.773	.764	.730	.728	.762	0.75
UOJ	Mean	1.82	1.77	1.84	2.07	1.99	1.86	1.89
	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Std. Dev	.786	.839	.795	.769	.847	.795	0.81
CUK	Mean	1.74	1.65	1.98	1.92	1.70	1.93	1.82
	Median	2.00	2.00	2.00	2.00	1.00	2.00	1.83
	Std. Dev	.806	.696	.798	.782	.792	.766	0.77
CUJ	Mean	1.81	1.83	1.73	1.91	1.69	2.22	1.86
	Median	2.00	2.00	2.00	2.00	1.50	2.00	1.92
	Std. Dev	.766	.766	.791	.772	.777	.732	0.77
Total	Mean	1.84	1.81	1.89	2.01	1.85	1.99	1.90
	Median	2.00	2.00	2.00	2.00	2.00	2.00	2.00
	Std. Dev	.784	.778	.793	.769	.799	.774	0.78

Table 3. Service Awareness by University (One way Annova)

ANOVA						
	Sum of Squares	Df	Mean Square	F	Sig.	
CSA	Between Groups	2.258	3	0.753	1.184	0.315
	Within Groups	378.94	596	0.636		
	Total	381.198	599			
CAS	Between Groups	5.632	3	1.877	2.776	0.041
	Within Groups	402.967	596	0.676		
	Total	408.598	599			
PSA	Between Groups	0.293	3	0.098	0.15	0.93
	Within Groups	387.947	596	0.651		
	Total	388.24	599			
RRA	Between Groups	0.765	3	0.255	0.492	0.688
	Within Groups	308.633	596	0.518		
	Total	309.398	599			
ILL	Between Groups	2.547	3	0.849	1.332	0.263
	Within Groups	379.827	596	0.637		
	Total	382.373	599			
OPAC	Between Groups	0	3	0	0	1
	Within Groups	334	596	0.56		
	Total	334	599			
ISA	Between Groups	0.325	3	0.108	0.188	0.904
	Within Groups	342.633	596	0.575		
	Total	342.958	599			
Ez-P	Between Groups	0.593	3	0.198	0.339	0.797
	Within Groups	347.907	596	0.584		
	Total	348.5	599			

Table 4. Comparison of resource awareness among users by concerned university

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
RBA	Between Groups	4.66	3	1.553	2.548	0.055
	Within Groups	363.333	596	0.61		
	Total	367.993	599			
ERA	Between Groups	8.645	3	2.882	4.858	0.002
	Within Groups	353.54	596	0.593		
	Total	362.185	599			
NMA	Between Groups	7.313	3	2.438	3.933	0.009
	Within Groups	369.427	596	0.62		
	Total	376.74	599			
JIA	Between Groups	6.493	3	2.164	3.713	0.011
	Within Groups	347.4	596	0.583		
	Total	353.893	599			
AVA	Between Groups	13.205	3	4.402	7.102	0.000
	Within Groups	369.38	596	0.62		
	Total	382.585	599			
JA	Between Groups	11.325	3	3.775	6.473	0.000
	Within Groups	347.593	596	0.583		
	Total	358.918	599			

Resource awareness among library users: Table 2 presents the mean (\bar{x}), median (M) and the standard deviation (SD) of the scores of the Individual statements to measure the awareness of users on library services. Based on the overall mean of $\bar{x} = 1.90$ and $M = 2.00$, it can be concluded that the users are well aware about the resources of the concerned libraries. The in-depth analysis of data showed that the mean $\bar{x} = 1.92$ was slightly lower than the median $M = 2.00$, signifying a slight negative skew.

Comparison of mean scores of services of the libraries:

Table 3 presents the mean awareness scores on the services of the libraries by selected universities under scope of present study. One way Annova was used for gauging mean tests. It is evident from the results that only CAS awareness and OPAC awareness were statistically significant ($p < 0.05$), the exact observed value of CAS ($p = 0.041 < 0.05$) and OPAC ($p = .00 < 0.05$). There it can be concluded that there was a significant difference in awareness of CAS and OPAC within the users of all four University Libraries that is UOK, UOJ, CUK, and CUJ [$F(3, 596) = 2.77, p = 0.041$]; [$F(3, 596) = 0.00, p = 1$] respectively. The rest services like CSA, PSA, RRA, ILL, ISA, and Ez-P showed the insignificant difference in such a way the p value for CSA = 0.315, PSA = 0.93, RRA = 0.688, ILL = 0.263, ISA = 0.904, Ez-P = 0.79.

Comparison of resource awareness among users by concerned university: Table 4 presents the mean comparison of resource awareness among users of the libraries by universities under the scope of present study. One way Annova was used for gauging mean comparisons. It is evident from the results that all the resource awareness parameters were statistically significant excluding RBA having P value greater than 0.05 ($p = 0.055 > 0.05$). The significant difference was present so far as awareness of diverse resources among respective users of concerned libraries are concerned. It can be concluded that there was a vivid difference in awareness of resources between and within universities (from which sample was taken).

DISCUSSION AND CONCLUSION

University libraries are vital organs for universities to support academics and research related activities. Effective use of resources and services of any academic library particularly university libraries will enhance the research and academic tasks. The efficiency of academic library depends upon the awareness and familiarity of the users with different services and resources of libraries. The author also supports the statement that more the familiarity more the usage of services and resources. Library services and resources support the overall development of the apprehension of the "university curriculum and research activities". Therefore the present study focused on awareness of services and resources of the university libraries of four selected universities that is UOK, UOJ, CUK, and CUJ.

Present era is the digital era there are lots of innovations in every sector. Therefore, libraries too should embrace the

innovations and should provide services to the end users as per the latest advancements. An investment is vital in technological aspects to bring change in the system. By strengthening decision-making, expediting solutions and eliminating needless testing, access to information yields both time and cost savings. To help understand how effective or efficient the library is, assessment of library resources is important. Assessment aims to improve the standards of organisations. Therefore, in order to assess the precise needs of the clientele, it has become necessary to regularly access the information sources, information services and information needs and enjoyment of library users.

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Comparison of Knowledge Regarding Leucorrhoea Among Women in Selected Urban and Rural Area

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ABSTRACT

Introduction: Leucorrhoea, vaginal discharge is a universal problem of all women, it is a condition of persistent and excessive vaginal discharge. Vaginal discharge is a common complaint, among women in Asia. Female genitals are very much prone to infections since they are moist, more sweaty and covered. Women may complaint of a clear white or mucoid discharge other prior to menses or at mild cycles. This is catarrhal discharge from the mucus membrane of the female genital tract. It is commonly known as white discharge. **Aim:** To comparison the knowledge regarding leucorrhoea among women in selected urban and rural area. **Materials and Methods:** Objectives of the Study 1. To assess the existing knowledge of leucorrhoea among general women in urban area. 2. To assess the existing knowledge of leucorrhoea among general women in rural area. 3. To compare knowledge regarding leucorrhoea among urban and rural area. **Assumptions** 1. Urban and rural women may have some knowledge regarding leucorrhoea. 2. Urban and rural women may have some interest to know leucorrhea. **Variables** - Demographic variables - Age, Religion, Education, Marital status, dietary pattern, family type and parity - Research variable - Knowledge among women regarding leucorrhoea **Sample Size:** Sample size consist of 100 women between 18-40 years of age residing in selected urban and rural area. **Sampling Technique** Convenient sampling technique was used to select the sample for the present study. **Inclusion Criteria** for the sampling 1. Women of 18-40 years who are willing to participate. 2. Women available during data collection. 3. Women who are able to read and write in Marathi. **Exclusion criteria** for sampling 1. Women who are critically ill. 2. Health personnel. 3. Women who attended similar workshop. **Method of Data Collection** The structured questionnaire was used to collect the data required for the study. **Result:** The study was conducted among women residing in selected urban and rural area in order to compare knowledge regarding leucorrhea. After the completion of study it has been revealed that women residing in urban area has more knowledge as compare to women residing in rural area. In this study, in comparison of urban women the mean score was 10.96 and in comparison of rural women the mean score was 8.6 respectively. Also mean percentage of knowledge score of urban and rural women was 21.96% and 17.25% respectively. The calculated 't' value was 1.978. The calculated 't' value was much higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance. In addition the calculated 'p' value for knowledge score regarding leucorrhea was 0.05 (≥ 0.05).

KEY WORDS: LEUCORRHOEA, VAGINAL DISCHARGE, WOMEN.

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INTRODUCTION

Leucorrhoea, vaginal discharge is a universal problem of all women, it is a condition of persistent and excessive vaginal discharge. 1. Vaginal discharge is a common complaint, among women in Asia. 2. Female genitals are very much prone to infections since they are moist, more sweaty and covered. Women may complaint of a clear white or mucoid discharge other prior to

menses or at mild cycles. This is catarrhal discharge from the mucus membrane of the female genital tract. It is commonly known as white discharge. It may be due to any specific pathology or due to poor health & unhygienic condition of the female genital organ. Such discharges may originate from vagina, ovaries, fallopian tubes or most probably the cervix. It represents desquamation of vaginal epithelial cells because of effects of estrogen on vaginal mucosa. Vaginal discharges may be physiological or pathological. In physiological discharge normal vaginal flora [lactobacilli] colonizes the vaginal epithelium and may have a role in defense against infection. They maintain the vaginal normal pH between 3.8 to 4.4. Although abnormal vaginal discharge often prompts women to seek screening for sexually transmitted infections.

MATERIAL AND METHODS

A Descriptive research design was used in the study. The study was conducted during January 2018 and the setting was selected in the rural and urban area of wardha after getting ethical permission Ethical clearance letter (IEC letter no. Ref. no: DMIMS(DU)/IEC/2017-18/70462019-20/436). The sample size was calculated to include 100 respondents. Objectives Of The Study 1. To assess the existing knowledge of leucorrhoea among general women in urban area. 2. To assess the existing knowledge of leucorrhoea among general women in rural area. 3. To compare knowledge regarding leucorrhoea among urban and rural area. 4. To find the association between knowledge regarding leucorrhoea with selected demographic variables.

Assumptions 1. Urban and rural women may have some knowledge regarding leucorrhoea. 2. Urban and rural women may have some interest to know leucorrhea. Variables - Demographic variables - Age, Religion, Education, Marital status, dietary pattern, family type and parity - Research variable - Knowledge among women regarding leucorrhoea Sample Size: Sample size consist of 100 women between 18-40 years of age residing in selected urban and rural area. Sampling Technique Convenient sampling technique was used to select the sample for the present study. Inclusion Criteria for the sampling 1. Women of 18-40 years who are willing to participate. 2. Women available during data collection. 3. Women who are able to read and write in Marathi. Exclusion criteria for sampling 1. Women who are critically ill. 2. Health personnel. 3. Women who attended similar workshop. Method Of Data Collection The structured questionnaire was used to collect the data required for the study.

Major Findings of the Study

Organization of Findings

The data was coded and analysed as per objectives under following headings:

Section I: Distribution of women according to their demographic variable.

Section II: A] Assessment of the knowledge of women

residing in urban area

B] Assessment of the knowledge of women residing in rural area

Section III: Comparison of the knowledge score of women residing in urban and rural area.

Section I

Distribution of Sample According to their Demographic Variable

- Distribution of urban women according to their age in years shows that 6(12%), of them belongs to age group 18-22 years, 20(40%), of them belongs to age group 23-27 years, 9(18%) of them belongs to age group 28-32 years whereas 15(30%) belongs to 32 years and above. Distribution of rural women according to their age in years shows that 6(12%), of them belongs to age group 18-22 years, 18(36%), of them belongs to age group 23-27 years, 7(14%) of them belongs to age group 28-32 years whereas 19(38%) belongs to 32 years and above respectively.
- Distribution of urban women according to religion shows that 40(80%), of them belongs to hindu religion, 9(18%), of them belongs to Buddhist religion, 1(2%) of them belongs to Muslim religion whereas none were of other religion. Distribution of rural women according to religion shows that 46(92%), of them belongs to hindu religion, 2(4%), of them belongs to Buddhist religion, 2(4%), of them belongs to Muslim religion whereas none were of other religion respectively.
- Distribution of urban women according to dietary pattern shows that 31(62%), of them were vegetarian, whereas 19(38%) of them were non-vegetarian. Distribution of rural women according to dietary pattern shows that 46(92%), of them were vegetarian, whereas 4(8%) of them were non-vegetarian respectively.
- Distribution of urban women according to education shows that 2(4%), of them has completed primary education, 27(54%), of them has completed secondary education 21(42%), of them has completed graduation, whereas none has done other. Distribution of rural women according to education shows that 10(20%), of them has completed primary education, 30(60%), of them has completed secondary education 10(20%), of them has completed graduation, whereas none has done other respectively.
- Distribution of urban women according to family type shows that 32(64%), of them belongs to nuclear family, whereas 18(36%) of them belongs to joint family. Distribution of rural women according to family type shows that 24(48%), of them belongs to nuclear family, whereas 26(52%) of them belongs to joint family respectively.
- Distribution of urban women according to marital status shows that 46(92%), of them were married, whereas 4(8%) of them were unmarried. Distribution of rural women according to marital status shows that 42(84%) of them were married, and 8(16%) of

women were unmarried .

- Distribution of urban women according to parity shows that 22(44%), of them has a single child, 21(42%), of them had two child 4(8%), of them had three and more child whereas 3(6%) had none. Distribution of rural women according to parity shows that 13(26%), of them has a single child,

28(56%), of them had two child 4(8%), of them had three and more child whereas 5(10%) had none respectively.

Section II

A] Assessment of the Knowledge of Women Residing in Urban Area

Table 1. Assessment of the knowledge of women residing in urban area, where n=50

Level of knowledge score	Score range	Percentage score	Frequency	Percentage
Very Poor	0-4	0-20%	1	2%
Poor	5-8	21-40%	10	20%
Average	9-12	41-60%	23	46%
Good	13-16	61-80%	13	26%
Excellent	17-20	81-100%	3	6%
Minimum score	4			
Maximum score	19			
Mean score	10.96			
Mean %	21.92%			

Table no.1 shows frequency and percentage wise distribution of urban women according to level of knowledge regarding leucorrhea. The level of knowledge were seen in 5 categories- very poor, poor, average, good and excellent. In which 1(2%), of women were very poor, 10(20%), women were poor, 23(46%), of women were average, 13(26%), of women were were good and 3(6%) of them were excellent. The minimum score was 4 and maximum was 19, the mean score was 10.96 and mean percentage was 21.96%.

B] Assessment of the Knowledge of Women Residing in Rural Area

Figure 1: Level of knowledge score in urban area

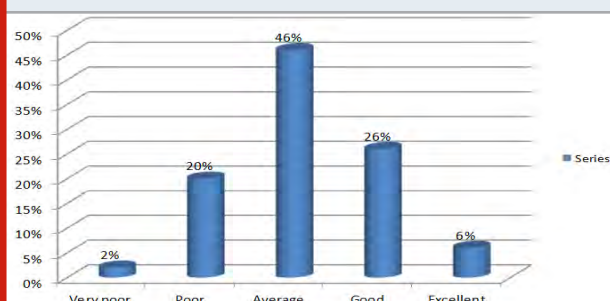


Table 2. Assessment of the knowledge of women residing in rural area

Level of knowledge score	Score range	Percentage score	Frequency	Percentage
Very Poor	0-4	0-20%	3	6%
Poor	5-8	21-40%	23	46%
Average	9-12	41-60%	16	32%
Good	13-16	61-80%	7	14%
Excellent	17-20	81-100%	1	2%
Minimum score	2			
Maximum score	15			
Mean score	8.6			
Mean %	17.2%			

Table no.2 shows frequency and percentage wise distribution of rural women according to level of knowledge regarding leucorrhea. The level of knowledge were seen in 5 categories- very poor, poor, average, good and excellent. In which 3(6%), of women were very poor,

23(46%), women were poor, 16(32%), of women were average, 7(14%), of women were were good and 1(2%) of them were excellent. The minimum score was 2 and maximum was 15, the mean score was 8.6 and mean percentage was 17.2%.

Figure 2: Level of knowledge score in rural area

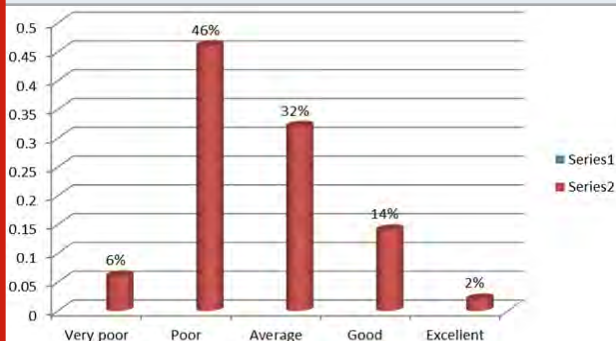
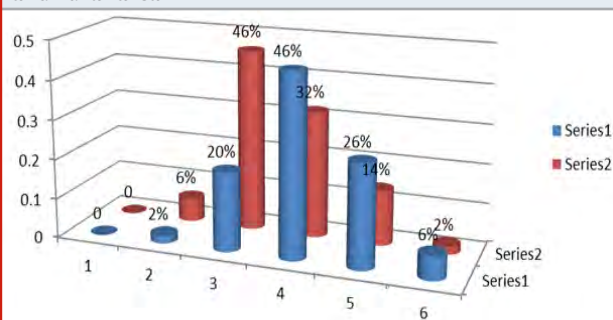


Figure 3: Assessment with Knowledge Score of urban and rural area



Section III Comparison of the Knowledge Score of Women Residing

in Urban And Rural Area

Table 3. Comparison of the knowledge score of women residing in urban and rural area

Level of knowledge score	Score	Percentage Score	Urban results		Rural results	
			Frequency	Percentage(%)	Frequency	Percentage(%)
Very Poor	0-4	0-20%	1	2%	3	6%
Poor	5-8	21-40%	10	20%	23	46%
Average	9-12	41-60%	23	46%	16	32%
Good	13-16	61-80%	13	26%	7	14%
Excellent	17-20	81-100%	3	6%	1	2%
Minimum score	4	2				
Maximum score	19	15				
Mean score	10.96	8.6				
Mean percentage	21.96%	17.25				

Significance of difference between knowledge score regarding leucorrhoea among women residing in selected urban and rural area

Area	Mean score	Calculated 't' value	df	'p' value
Urban area	10.96	1.978	50	.053
NS, $p > 0.05$				

CONCLUSION

The study was conducted among women residing in selected urban and rural area in order to compare knowledge regarding leucorrhea. After the completion of study it has been revealed that women residing in urban area has more knowledge as compare to women residing in rural area. In this study, in comparison of urban women the mean score was 10.96 and in comparison of rural women the mean score was 8.6 respectively. Also mean percentage of knowledge score of urban and rural women was 21.96% and 17.25% respectively. The calculated 't' value was 1.978. The calculated 't' value was much higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance. In addition the calculated 'p' value for knowledge score regarding leucorrhea was 0.05 (≥ 0.05).

Figure 4: Comparison of knowledge of women residing in urban and rural area



DISCUSSION

Findings of the study revealed that study subject has poor knowledge regarding leucorrhea. The finding of the study are consisted with various previous studies. In this study the knowledge is compared with the variable such as Age, Religion, Education, Dietary pattern, Marital status, Family type, Parity. However the subject who have now knowledge or higher education has shown significance compared to those who have less education. The study

has a limitation that the sample was drawn from a local urban area, which may show certain variation as the characteristics of people residing in city area may differ. Further more as it was a continental study the collected were relatively brief and concise.

The findings also shows that the knowledge score is not associated with demographic variables hypothesis, is assumed that this may be due to unavailability of women of various demographic variable components. A community based study was conducted among rural North Indian women, in three selected road side villages of Panchkula, Haryana. A total of 236 married women of 15 – 45 years were identified by a house to house survey and were interviewed by a Female Health Worker on various aspects of vaginal discharge. The prevalence of leucorrhoea was identified as 28.7%, and among them the consultation rate was 59%. A cross-sectional study was conducted in rural areas in the district of Sirmour, Himachal Pradesh. 452 married women of reproductive age group i.e of 15-44 years in villages under Primary Health Centre, Sarahan were identified by using simple random sampling method and were interviewed. This study shows the higher prevalence of leucorrhoea and it is 51.

Conflicts of interest: Nil

Financial support: Self

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Does Knowledge Management Enhance Human Resource Practices in Marketing

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ABSTRACT

Purpose- The paper was aimed to make a knowledge management design for market plan which is going to fulfill the market needs and strategies which is move on with the customers and from the customers. In this paper the dynamic and interactive marketing strategy is under the concern of human resource practices to scrutinize the methods for effective marketing. **Design/ Methodology/ approach-** Despite its importance of organizational growth, there is some lacking knowledge in the marketing field. This paper will clearly give the ideas about the knowledge centric human resource practices for the better understanding for the same. **Research implications-** This article discuss the linkages between the marketing and knowledge management which suggest the research potential for the product reach to the market. **Social implications-** This paper encourages human resource to consider the marketing needs of organization.

KEY WORDS: HUMAN RESOURCE PRACTICES, ISSUES IN MANAGEMENT, MARKETING STRATEGY, KNOWLEDGE MANAGEMENT.

INTRODUCTION

In recent views due to the rapid development in both technology and innovation, we are facing more struggles to sustain in the competitive business world. This is also due to the arrival of new born companies in the automobile business world. They are proving tough competition by implementing innovative strategies in the emerging marketing field. Even though they are implementing innovative strategies, they are unable to sustain in the emerging marketing. This is because of the poor knowledge management in both customer requirements and marketing.

Many researchers are being involved in the research to find the solution for these problems. This study is also based on the below- mentioned hypotheses. For this research, we have taken nearly 50 samples in the various automotive environments in and around the Coimbatore District based on their age and living pattern. In this study, we are in focus with ten basic issues on the basis of customer point of view. On the account of the customer evaluation, all the statement of the issues was analyzed. After the analysis, we found the solutions for the issues by correlating the issues with the data. In this paper, problem statement, objective, methodology, research hypothesis, analyzing tools, findings, suggestion have been discussed. Finally, we come to the conclusion.

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Literature Review: The important reason for knowledge management is that it gives a certification of an organization to attract and retain talented people. Secondly the engagement of employee towards their work which is subjected to the technology and benefiter (Morten, 2005). Retaining and engaging. When combined these two it acts as the important factor of the company success (Hughes & Reg, 2008). For increasing knowledge management, talent management gives more strength

(Whelan & Caracary, 2011). The important tool of competitiveness is knowledge management and also it is an extraordinary asset of an organization (Kiessling & Harvey, 2006).

Employees knowledge skills, capabilities are the main predictors of a competitive advantage of a firm (Colling & Mellahi, 2009). Youngsters always want to buy a branded product (Singh & Madan, 2020) which reveals the updated technology plays a vital role in every type of sector. Ignoring customer knowledge management may cause companies spending billions of dollars in a year. Partial knowledge of CKM strategies in many marketing persons spoiling the customer engagement. Active competences and technical resourcefulness encompassed the business. (Lomas, n.d, 2016)

Applicability of KM in marketing always motivating the employees to be engaged in work. KM process having the very stable relationship between the company performance in the market. Eminence routine and operative performance followed by pioneering act has the stoutest impact with KM process. (Al et al., 2019) Business environment has been changed continuously depending upon penetrating competition, consumer penchant, hasty technical updating, profitability and market sustaining. For the effectful marketing knowledge management is needed. It promotes innovation over knowledge procurement, sharing and application. Its impact reflects on the performance of an any organisation (Muddaha & Kheng, 2018).

Talent and Knowledge are most necessitated aspects in every organisation nowadays for every departmental functioning. Many of the firm has started well but not continuing the same appropriately. Repeated training and development for the executives provides career path for an individual as well as the prompt success of the company too. It also creates the better understanding job description and rewarded as best performers. The important rule of attaining the goal of an organisation should be tapping the right person with right knowledge at the right period which developing as self and to firm (Sanjana et al, 2020).

Giuseppe festa et al (2020) in "Knowledge management in international marketing processes-the case of Made in Italy" explained about the role of local and national entrepreneurial collaboration. They framed the factors such as history, style and talent of business aspects and found how come that been an essence and base of Italian territory capitalism. They have taken the small and medium enterprise as sample. They resulted that expanding international level was more complicated but 'glocalism' drives the potential success in strategies of internationalization. They concluded as territorial capitalism is a unique component in reputation aspect of capital worldwide.

Statement of Problem: The employees are facing many problems due to the lacking and poor knowledge management in the competitive marketing field. This

paper deals the problems which really affect the effective marketing. There are fifty employees examined for this study who working in different Automobile Industry in and around Coimbatore District. After the crystal clear analysis, we found the following statements.

- The employees are unable to understand the current marketing strategy. This is due to the poor knowledge in business management.
- They focused only to finish the target within the time frame.
- They never consider the customer needs due to the pressure given by the higher officials like team head, sales manager etc.,
- They are unable to make innovative marketing strategy due to the lacking in customer requirements.
- They are very weak in knowledge about the competing products in their field.

These are the problems which really affect the effective marketing ability of the employees.

Objectives

1. To make knowledge management design for market plan which is going to fulfill the market needs in an automobile industry in Coimbatore district.
2. To improve the ability of the employee by suggesting an innovative marketing strategies.
3. To provide modern human resource practices for the better understanding of the employee about the marketing and customer requirement.

METHODOLOGY

50 employees have been randomly selected as a sample for primary data who was in the automobile industry. Secondary data collected from various journals, net sources and book articles.

Hypotheses

H1: There is a significant relationship between the knowledge centric human resource practices with the customer needs.

H2: There is a significant relationship between existing knowledge management and customer satisfaction.

Table 1. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.807	.724	10

By doing reliability test the data reliability have been examined to proceed further of the research. Above table revealed the analysis result of Cronbach Alpha and standardized item value respectively .807 and .724 respectively which shows the data has satisfactory internal consistency.

Analysis

The below statements were used as a factors for the statistical study.

CODE	FACTORS
QS1	Market value of the vehicle.
QS2	Vehicle price range within market value
QS3	Vehicle design and structure
QS4	Low-fuel consumption engine.
QS5	Mileage of the vehicle.
QS6	Knowledge of the employee about the vehicle.
QS7	Knowledge of the employee about the other surviving products.
QS8	Promise fulfillment by the company.
QS9	Company's affable relationship with customer
QS10	Satisfactory level of customer

Factor analysis

Principal Component Analysis: Extraction Method: Each factor has explained the total variance with the result

of Eigen value. Every factor attributes the percentage of total variance. Principal Component Method, which is one of the popular methods used in EFA for considered to determine the minimum number of factors with minimum data variance.

Varimax Kaiser Normalization: Rotation Method:

Identifying statements with large loadings in same factors facilitated the factors interpretation. In terms of high loading statement the factors can be interpreted. Among 10 factors, 3 individual factors contribute more towards effective knowledge management in marketing. For all the analysis of the samples, the code of the statements was used and also those were taken for the correlation and all other factors were failed towards the same.

The factors are;

1. QS1 – Market value of the vehicle.
2. QS2 – Price of the vehicle within the market value.
3. QS4 – Low-fuel consumption engine.

The correlation among the variables Market value of the vehicle, Price of the vehicle within the market value, Design of the vehicle, Knowledge of the employee about the vehicle, Promise fulfillment by the company and Customer satisfaction has done.

Table 2. Total variance

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.801	58.008	58.008	5.801	58.008	58.008	4.265	42.652	42.652
2	1.905	19.046	77.053	1.905	19.046	77.053	3.333	33.329	75.982
3	1.570	15.705	92.758	1.570	15.705	92.758	1.678	16.777	92.758
4	.492	4.920	97.678						
5	.232	2.322	100.000						
6	1.502	1.502	100.000						
7	-1.752	-1.752	100.000						
8	-2.002	-2.002	100.000						
9	-9.272	-9.272	100.000						
10	-1.362	-1.362	100.000						

Table 3. Rotated Component Matrix (a)

	Component		
	1	2	3
Market value of the vehicle	.156	.932	.068
Vehicle price range within market value	.928	.011	-.122
Vehicle design and structure	.558	.605	.204
Low-fuel consumption engine.	.576	-.054	.764
Mileage of the vehicle.	.778	.572	.251
Knowledge of the employee about the vehicle.	-.580	-.782	.178
Knowledge of the employee about the other surviving products.	.019	.984	-.085
Promise fulfillment by the company.	.958	.192	-.054
Cordial relationship between customer and company.	.234	-.020	-.955
Customer satisfaction.	.908	.389	.126
Rotation converged in 5 iterations.			

After the correlation, we found the followings,

- Customer satisfaction and promise fulfillment: Correlation was highly significant at .957
- Customer satisfaction and knowledge level of employee : Correlation was low significant at .815.
- Customer satisfaction and Vehicle market value : Correlation was significant at .529
- Customer satisfaction and price of the vehicle : Correlation was highly significant at .807
- Market value of the vehicle and price of the vehicle : Correlation was not significant(.170)

Table 4. Correlations

		QS1	QS2	QS3	QS6	QS8	QS10
QS1	Pearson Correlation	1	.170	.570(**)	-.785(**)	.358(**)	.529(**)
	Sig. (2-tailed)		.098	.000	.000	.000	.000
	N	96	96	96	96	96	96
QS2	Pearson Correlation	.170	1	.628(**)	-.520(**)	.843(**)	.807(**)
	Sig. (2-tailed)	.098		.000	.000	.000	.000
	N	96	96	96	96	96	96
QS3	Pearson Correlation	.570(**)	.628(**)	1	-.725(**)	.530(**)	.718(**)
	Sig. (2-tailed)	.000	.000		.000	.000	.000
	N	96	96	96	96	96	96
QS6	Pearson Correlation	-.785(**)	-.520(**)	-.725(**)	1	-.730(**)	-.815(**)
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	96	96	96	96	96	96
QS8	Pearson Correlation	.358(**)	.843(**)	.530(**)	-.730(**)	1	.957(**)
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	96	96	96	96	96	96
QS10	Pearson Correlation	.529(**)	.807(**)	.718(**)	-.815(**)	.957(**)	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	
	N	96	96	96	96	96	96

** Correlation is significant at the 0.01 level (2-tailed).

Table 5

FACTOR S	Customer Responds towards the factors in current Emerging Market									
	Strongly Agree		Agree		Neutral		Disagree		Strongly Disagree	
	No. of respondent s N= 96	Percentag e (100%)	No. of respondent s N= 96	Percentag e (100%)	No. of responden ts N= 96	Percentage (100%)	No. of respondent s N= 96	Percentag e (100%)	No. of respondent s N= 96	Percentag e (100%)
QS1	32	33	40	42	24	25	0	0	0	0
QS2	8	8	32	33	32	33	0	0	24	25
QS3	0	0	24	25	32	33	24	25	16	17
QS4	0	0	16	17	24	25	56	58	0	0
QS5	0	0	48	50	8	8	40	42	0	0
QS6	48	50	32	33	16	17	0	0	0	0
QS7	16	17	56	58	24	25	0	0	0	0
QS8	0	0	48	50	24	25	0	0	24	25
QS9	32	33	64	67	0	0	0	0	0	0
QS10	0	0	48	50	8	8	16	17	24	25

In the customer satisfaction point of view, all the factors were significant but their values were totally differing from each other. According to the significant values, promise fulfillment by the company, market value of the vehicle and price of the vehicle were highly significant. But the knowledge of the employee about the vehicle has very poor significant value. This showed that, the knowledge management was the very essential factor for the current market state.

- Knowledge of the employee about particular vehicle and customer satisfaction: Correlation was low significant at .815 level.
- Knowledge of the employee and vehicle market value : Correlation was low significant level at .785
- Knowledge of the employee and price of the vehicle within market value : Correlation was low significant at .520
- Knowledge of the employee and the design of vehicle

: Correlation was low significant at .725

In the knowledge management point of view, all the factors have very poor significant values and it was not enough to survive in the emerging marketing. This proved that, all the factors were inter-related with the knowledge management, especially customer satisfaction which showed very low value.

Findings

On the basis of this study, we found the results in accordance with the statements. All the data were tabulated and we provide the analysis report. From the table it clearly showed that the followings,

- o The percentages of respondents are highly satisfied with the factors.
 - o The percentages of respondents are satisfied with the factors.
 - o The percentages of respondents have no opinion about the factors.
 - o The percentages of respondents who are not satisfied with the factors.
 - o The percentages of respondents are highly unsatisfied with the factors.
1. Only 32 percentages of respondents are highly satisfied with the Market value of the vehicle, 40 percentages of respondents are satisfied with the factor, no respondents are unsatisfied with the factor and 25 percentages of people have no opinion for the above statement.
 2. Only 8 percentages of respondents are highly satisfied with the Vehicle price range within market value, 33 percentages of respondents are satisfied with the factor, 25 percentages respondents are highly unsatisfied with the factor and 33 percentages of people have no opinion for the above statement.
 3. For Design of the vehicle, only 25 percentages of respondents are highly satisfied with the factor, 42 percentages of respondents are unsatisfied with the factor and 33 percentages of people have no opinion for the above statement.
 4. Only 17 percentages of respondents are satisfied with the Low-fuel consumption engine, 58 percentages of respondents are unsatisfied with the factor and 25 percentages of people have no opinion for the above statement.
 5. Only 50 percentages of respondents are highly satisfied with the Mileage of the vehicle, 42 percentages of respondents are unsatisfied with the factor and 8 percentages of people have no opinion for the above statement.
 6. 50 percentages of respondents are highly satisfied with the Knowledge of the employee about the vehicle, 33 percentages of respondents are satisfied with the factor, no respondents are unsatisfied with the factor and 17 percentages of people have no opinion for the above statement.
 7. Only 17 percentages of respondents are satisfied with the Knowledge of the employee about the other surviving products, 58 percentages of respondents

are satisfied with the factor, no respondents are unsatisfied with the factor and 25 percentages of people have no opinion for the above statement.

8. Only 33 percentages of respondents are highly satisfied with the Cordial relationship between customer and company, 67 percentages of respondents are satisfied with the factor, no respondents are unsatisfied with the factor.

Suggestions

On the basis of this study, we provide the following suggestions for the employee to survive in the emerging marketing environment.

- They should have enough knowledge about the product.
- It should be instructed that the company should give proper training to the employee for their better performance.
- The employee should have the updated knowledge about the competing products.
- They should also improve their soft skills.
- The company should encourage the cordial relationship between the employee and the customer.
- They should be very careful not only in sales and also in customer satisfaction.
- The company should know the customer's requirement by meeting them in regular interval.

CONCLUSION

The organization should survive in the competitive business world by monitoring the other organizations and also improving the better knowledge management. Changing HR strategy in marketing definitely improves the growth by continual knowledge development. Main purpose of the paper is to realize the needed situation of Knowledge management in automotive industry. Statistical evidence supports the view that the knowledge management will improve the marketing capability of the employee and also customer satisfaction. It will be used to improve the efficiency of human resources practices in marketing and better performance. Based on the customer requirement the importance level of knowledge management is clearly stated out in this research work.

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Evaluation of Hormonal Changes Among Saudi Females With Primary and Secondary Infertility at Tertiary Hospital in Riyadh: A Cross-Sectional Study

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ABSTRACT

Infertility is considered an emerging issue among the Saudi population in which it accounts for around 2.2% of cases in Saudi Arabia. Numerous studies examined the association between reproductive hormone changes and infertility; however, there is still a gap in the literature regarding the hormonal changes among Saudi female. Therefore, this study aimed to evaluate the reproductive hormonal changes in females with infertility. A rcross-sectional study have been carried out at King Abdulaziz Medical City (KAMC) hospital in Riyadh from 2017 through 2018. All Saudi females with primary and secondary infertility aged between 20 and 35 years were included in this study. The blood level of follicle-stimulating hormone (FSH), luteinizing hormone (LH), estrogen, prolactin, and progesterone were obtained from the medical record of those patients. A total of 81 infertile women were recruited for this study. 57(70%) of them were with primary infertility, where 24(30%) females were with secondary infertility. Patients with secondary infertility were older than patients with primary infertility ($P<0.001$). Similarly, the percentage of obese patients was higher compared to other Body Mass Index categories, and that was different between patients with primary and secondary infertility ($p=0.02$). Conclusion: This finding provides insight into infertility classification among Saudi infertile women and could be used as the first step in exploring infertility causes in all regions of Saudi Arabia in addition to other factors.

KEY WORDS: PRIMARY INFERTILITY, SECONDARY INFERTILITY, SAUDI FEMALES.

INTRODUCTION

Infertility considers one of the health problems that occurred during the reproductive age, affecting about 10-15% of couples seeking to achieve pregnancy in worldwide. It defined as a failure to achieve a natural pregnancy after 12 months or more of regular unprotected sexual intercourse. World Health Organization (WHO) has categorized infertility as primary and secondary. WHO describes primary infertility as the incapability to ever bear a baby, because of the incapability of being pregnant or the incapability to carry a pregnancy to live birth, while

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secondary infertility denotes the incapability to conceive after pregnancy. It was reported that the prevalence of infertility worldwide ranged between 5% and 25.7%, and it had been estimated that the average incidence rate of infertility in Saudi Arabia approximately more than 2.2% of the population, amounting to 30,000 couples. According to a previous study conducted in Riyadh Military Hospital in Saudi Arabia, the average of infertile patients with primary infertility was about 58.6%, while 41.4% are having secondary infertility.

Infertility causes are divided into several factors, which can be categorized as male factors, female factors, the combination of male and female factors, and unexplained or unknown infertility factors. Approximately about 50% of all infertility cases have a female infertility factors. Thus female infertility factors contributes for approximately one-third of all infertility. Biological and psychological factors play a critical role in minimizing fertility rate. Hormones such as estrogen, progesterone, prolactin, follicle stimulating hormone (FSH) and luteinizing hormone (LH) can greatly affect female fertility. Other factors that could contribute to female infertility are ovulation disorders, fallopian tubes damage, and cervical factors. Numerous studies have shown the association between reproductive hormone changes and infertility, however, there is still a gap in the literature regarding the hormonal changes among Saudi female. Therefore, this study aimed to evaluate the hormonal changes in Saudi females with primary and secondary infertility and compare reproductive hormones between the two groups.

METHODS

Study Design and Population: A retrospective cross-sectional study was conducted at Obstetrics and Gynecology Department at King Abdulaziz Medical City (KAMC) hospital in Riyadh, Saudi Arabia, during the period from September 2017 to January 2018. KAMC provides all types of care to patients, starting from primary healthcare up to specialized tertiary care, with a bed capacity of 1501. We collected information on female patients diagnosed with infertility between the ages of 20 and 35 years who attended the obstetrics and gynecology department. We excluded patients who have cancer from the study population and those patients who older than 35 years to limit the effect of those two confounders in our analysis.

Study Variables: Patients' medical records was used to collect the data on the demographic information, clinical diagnosis, and laboratory results. The following hormonal parameter was collected from each patient: the serum level of LH, FSH, estrogen, prolactin, and progesterone. Those level were analyzed using a fully automated Immunoassay analyzer that uses chemiluminescent magnetic microparticle immunoassay. We categorized the age into two age groups (≤ 30 years and > 30 years), the Body Mass Index (BMI) into (underweight, normal, overweight, and obese), and the duration into ≤ 5 years or > 5 years. For the diagnosis, we grouped the recorded diagnosis into: ovulation problems, uterine problems, male factor, and unexplained causes.

Table 1. Clinical data of all patients with infertility, those with primary, and secondary infertility.

Variables	All patients Number(%)	Patients with primary infertility Number(%)	Patients with secondary infertility Number(%)	P value*
Age categories				<0.001
≤ 30 years	41(51)	36(63)	5(21)	
> 30 years	40(49)	21(37)	19(79)	
BMI				0.022
Underweight	5(6)	5(9)	0(0)	
Normal	17(21)	14(24)	3(13)	
overweight	22(17)	10(17)	12(50)	
obese	37(46)	28(49)	9(37)	
Duration of infertility in years				0.061
≤ 5 years	41(51)	25(44)	16(67)	
> 5 years	40(49)	32(56)	8(33)	

* P-values were obtained using chi-square tests or Fisher's exact tests (for numbers less than five in each group). $P < 0.05$ was considered as significant.

Statistical Methods: Statistical analysis of study variables was carried out using SPSS software version 16. descriptive analysis was carried out in which we used the mean and standard deviation(SD) to describe the continuous variable if normally distributed otherwise we used median and interquartile range (IQR) We used an independent t-test to compare the hormonal parameter

among patients with primary and secondary infertility if normally distributed, and we used the Mann-Whitney test for skewed variables. For categorical variable comparison, we used the chi-square test, and Fisher exact test to obtain the p-values. Results with p values of < 0.05 were considered significant.

Ethical Considerations: This study was approved by the Institutional Review Board (IRB) of the National Guard Health Affairs (NGHA (Riyadh, protocol number SP17/223/R

RESULTS

In total, 81 patients were included in this study. The mean age of the study population was 30 ± 3 years. 57 (70%) of them were diagnosed with primary infertility,

where 24 (30%) were diagnosed with secondary infertility. Table 1 demonstrates the clinical variable among all patients and for those with primary and secondary infertility. Patients with secondary infertility were older than patients with primary infertility (79% patients with secondary infertility were above 30 years compared to 37% with primary infertility p value < 0.001). Similarly, the percentage of obese patients was higher compared to other BMI categories, and that was different between patients with primary and secondary infertility (p value = 0.02).

Table 2. Hormonal level among all patients with infertility, those with primary, and secondary infertility.

Parameter	All patients Median (IQR)	Patients with primary infertility Median (IQR)	Patients with secondary infertility Median (IQR)	P value
Estrogen	157(125-232)	176(125-272)	141(118-162)	0.018
Progesterone	3.4(0.7-25.9)	10(0.95-27)	0.6(0.4-16)	0.014
Follicle stimulating hormone	4.9 ± 1.3	4.7 ± 1.3	5.2 ± 1.3	0.120
Leutinizing hormone	4.8(3.2-6.8)	5.1(3.4-7)	3.9(2.7-5.4)	0.613
Prolactin	355(243-610)	373(261-655)	314(237-377)	0.108

* p -values were obtained using independent t test if normally distributed or Mann-Whitney test for skewed variables. $P < 0.05$ was considered as significant.

Figure 1: The causes of infertility across the study population and by type of infertility

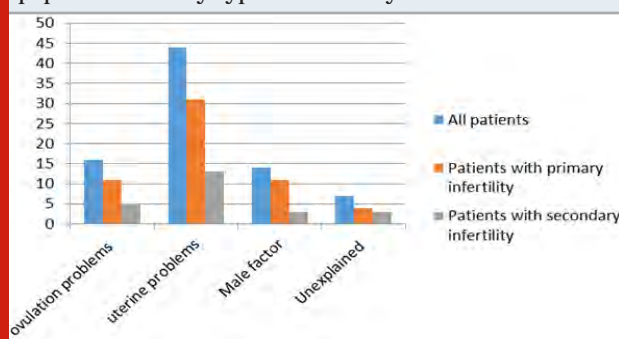


Figure 1 demonstrates the causes of infertility across the study population and by type of infertility. Uterine problem was the most common reason for infertility among all study populations, followed by ovulation problems, 54 %, and 20%, respectively. The median level of estrogen among patients with primary infertility was higher than the median estrogen level of patients with secondary infertility (Table 2). The results showed that there is a statistically significant difference between the underlying distribution of the estrogen level of patients with primary infertility and the estrogen level of patients with secondary infertility ($z=2.35$, $p=0.018$).

This was similar for progesterone level ($z=2.56$, $p=0.010$). For the FSH, the mean level among all patients was 4.9 (SD 1.3), the results indicate that there is no statistically significant difference between the mean level of FSH

for primary infertility and secondary infertility ($t=-1.57$, $p=0.12$). For the remaining hormonal parameters, the median of LH and prolactin was higher in female with primary infertility compared with median level of those hormones in women with secondary infertility.

DISCUSSION

This study provides update evidence regarding the hormonal status among infertile Saudi females. The overall rates of primary and secondary infertility were 57 (70%) and 24 (30%), respectively.

Previous studies have described the hormonal status among infertile female in different populations. The finding of those studies were similar to our finding (19, 20). We found that female with primary infertility were younger, and the duration of the marriage was, on average near five years. This suggested that there is a delay by the couples seeking the medical help which they require. The reasons for this could be multi-factorial. One which we believe is that the infertility treatment is expensive, and many patients may not be able to afford it; also, in the eastern province with a population of 4.1 million, there are no government hospitals which have IVF centers. Secondly, it was also suggested that these young couples may require pre-marital clinics, which unfortunately do not exist in Saudi Arabia.

Known that the obesity and overweight is the main health issue and is a common problem among women

of reproductive age and both obesity and overweight involves an abnormal and excessive fat accumulation that negatively affects the health of the body (22), we observed that around 70% of infertile female in this study were overweight and obese. There is an association between increased BMI and fertility among the female; therefore, weight loss could be one of the effective standard of treating infertility among obese women.

It is a well-known fact that the causes of primary and secondary infertility were not always a woman's problem, both males and females could be responsible for the causes of infertility, and most of the infertile couples have one of these three major causes including a male factor, ovulation dysfunction, or tubal-peritoneal disease (23, 20). This was consistent with our finding as we found that most reasons that led to fertility in this study caused by ovulation problem, uterine problem and male factors.

In addition, several factors can disturb the process of fertility especially among female that caused by hormonal disorders (24) and hormones such as estrogen, progesterone, prolactin, FSH and LH can greatly affect female fertility (17). Therefore the present study observed significant differences in estrogen and progesterone levels between primary and secondary infertile female ($p > 0.05$), while other hormone such as FSH, LH, and prolactin showed insignificant differences between types of infertility ($p < 0.05$).

This study is observational in nature and has some limitations that could limit the validity of the results. Firstly, the observational nature of the study can introduce bias due to unmeasured confounder. Additionally, the generalizability of this study limited because the data used for this study were from a single-center, which mainly represents the eligible people for treatment within NGH. However, this study provides a descriptive step for the hormonal changes among the Saudi female population in which further studies could be directed to explore the association between different factors and infertility.

CONCLUSION

Applying of body mass index, duration of infertility and age of infertile female, could be of great value beside the routine laboratory test and other radiological tests for the diagnosis and classification of female infertility

Disclaimers/Disclosure: Authors have no conflict of interests, and the work was not funded.

We observed that patients with primary infertility were younger and the duration of the marriage was on average near 5 years. This suggests that there is a delay by the couples in seeking the medical help which they require.

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A Comprehensive Analysis and A Case Study on the Intensity of Different Types of Crimes Committed Against Women Living in Delhi and NCR: Post Nirbhaya

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ABSTRACT

The cases of rape and other crimes committed against women are reported in media every day. The fatal gang rape of a 23 year old woman on a moving bus in the National capital of India captured media headlines not only in India but across the world due to the horrific manner in which this crime was committed. The present research attempts to understand the representation of crime against women in print media with special reference to Delhi gang rape case and also how the young Indian women feels about such representation of incidences in media. The data is collected from two newspapers, The Times of India and Amar Ujala published from Delhi from the first reporting of case till date. All the news items were read and re-read carefully and analyzed thematically. The primary data was also collected among the 100 young female students studying in Sharda University to know about their views regarding the portrayal of crime against women in Indian print media with special reference to Delhi gang rape case. Dhananjay Chatterjee was the last convict who was hanged in year 2004 for rape in Calcutta. From that time till date more than four lakhs rape cases has been reported in all over India in different police station. The Nirbhaya rape case is in final stage of hearings and we hope that culprits will be hanged soon. It can be concluded that media needs to be more sensitive towards coverage of crime against women and general public needs to be more vocal and aware to deal with these cases in more effective manner.

KEY WORDS: WOMEN; CRIME; RAPE, PRINT MEDIA.

INTRODUCTION

Rape is an unlawful sexual intercourse with a woman without her consent. It is a cross-cultural crime stemming primarily from patriarchal ideologies and gender power. It is generally used as an instrument of communication

about masculinity and powerfulness. The cases of rape and other crimes committed against women are reported in print media every day. A number of researchers have attempted to understand the portrayal of crime against women in print media. There are a number of myths related to rape in the print media .These include: rape is sex, the assailant is motivated by lust, the assailant is perverted or crazy, the assailant is usually lower class, women provoke rape, women deserve rape, only 'loose' women are victimized, a sexual attack sullies the victim, rape is punishment for past deeds and women cry rape for revenge.

The media can also play role of an activist and can generate a public opinion about the sensitive issues such as rape. The fatal gang rape of a 23 year old woman on

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a moving bus in the National capital of India captured media headlines not only in India but across the world due to the horrific manner in which this crime was committed. The present research paper attempts to understand the representation of crime against women in Indian print media with special reference to Delhi gang rape case and also how the young Indian women feels about representation of such incidences in media. The present study highlighted the gender bias in the use of language for rape.

Objective

1. To study changing trends in the quantum of crimes committed against women in India.
2. To identify shifting trends in the nature of crimes committed against women in India.

Hypothesis To Be Tested

1. There are significant changing trends in the quantum of crimes committed against women in India.
2. There are significant shifting trends in the nature of crimes perpetrated on women in India.

METHODOLOGY

A key aspect of coding is its reliability. There are two forms of coding reliability, both of which are important. The first is intra-coder reliability. To deal with first kind of reliability, the data was observed again and again over a period of time to gain a deeper insight, and to arrive at the common themes. The second form of reliability is inter-coder reliability. This form of reliability was taken care of by taking help of researchers involved in similar kind of research. The themes which were commonly agreed upon are included in the present study.

Analysis and Findings: A sample size of 100 respondents mainly girls studying in Sharda University was taken up for the collection of primary data. The theme such as 'the rape', 'the victim', 'the protest', 'the after affect' and 'the verdict' emerged which are discussed in detail. The secondary data was taken up from Delhi Police website.

The Rape: In media, the Delhi gang rape incident was referred as 'capital gang rape' and 'Delhi shame' in Hindustan Times, and 'capital shame' and 'the Delhi gang rape' in The Times of India. It has been described as a 'ghastly incident', 'brutal violence', 'spine chilling incident', 'scar for life', 'shocking incident', 'matter of shame', 'aggravated sexual assault', 'brazen incidence', 'rarest of rare case', and 'unfortunate'. Rape is mentioned as a 'problem that has plagued all metropolitan cities'.

The titles such as 'Delhi rape horror' (19 December, 2012, The Times of India) appeared and the related issues such as security of women in the titles such as 'ensure sense of security' (23 December, 2012, Hindustan Times). With the background that Delhi gang rape was widely covered by the print media, the respondents were asked to define rape. The most common definition of rape appeared to be: "sexual assault with a person against

his/her will". While some respondents only mentioned the physical dimension of rape but others also mentioned about psycho-social dimensions of rape such as mental harassment, social stigma and abetment to suicide. Some respondents mentioned the seriousness of the issue and stressed upon the need for a serious action against the rapists. A respondent mentioned that "rape is worse than terrorism and destructs the social life of the victim".

The Victim: By looking at the coverage of Delhi gang rape, the one obvious question that appears in one's mind is: why this particular case gained importance in the mass media? The answer to this question can be derived from what we call as 'media selectivity' and the 'dramatic value' of a crime. As Delhi gang rape case has repeatedly been called as a 'rarest of the rare case' due to the horrific nature of the crime. In order to know how rapes are portrayed in Indian media, around 100 respondents were asked whether the media treat rape cases sensitively or sensationalize them. Except 20 respondents all other believed that media sensationalize the rape cases if it happens in Delhi and NCR. Most of them believed that a large number of rapes are happening in India and these often go unnoticed. Only a few are covered which creates hype for few days but later the issue of justice is lost.

Except 20 respondents, all other felt that media sensationalize the rape cases for various reasons which include desire for popularity, lack of sensitive training to deal with such issues and lack of concern for one who is raped. One of the respondents narrated, "media uses someone's suffering as a stepping stone to popularise their newspapers and channels". The 20 respondents who believed that media treats rape cases sensitively, argued that media creates awareness regarding sexual violence which is important to deal with such cases. One of the most important issues in rape coverage in media is anonymity.

Due to the stigma associated with rape, the identity of women raped is often not disclosed. Similar findings were made in the present study. Except 10 respondents all other believed that due to the stigma attached to rape and ways in which our society views rape victims and their families, the identity of one who is raped should not be disclosed. On contrary, one respondent narrated, "rape is not a matter of shame for the victim but for the rapist. Shout for justice and tell the identity proudly". Another respondent mentioned, "it should actually be left upto the victim and her family to decide".

In order to hide the identity of the Delhi gang rape victim, the names such as 'Nirbhaya' (fearless), 'Amanat' (treasure), 'Damini' (lightening) and 'Jagriti' (awareness) were used in the print media. The girl has been repeatedly referred to as 'gang rape victim' (27 December, 2012, Nav Bharat Times) and 'women in distress' (25 December, 2012, Hindustan). The respondents in the present study were asked whether the fictitious names should be used for those raped and does it provide any help. Except twenty respondents, all believed that such names do not

provide any kind of help. A respondent narrated, “when a person’s name is unknown to the people, use of fictitious names help to address the victim”. Another respondent mentioned, “the society use these names just as pronoun so that the victim can be specified”. Yet another argued, “providing fictitious names gives confidence to the women or girl who are rape victims”.

The Protest: The Delhi gang rape was followed by the violent protests in Delhi at Indian Gate, Jantar Mantar, Ramlila Maidan, Vijay Chowk and Rashtrapati Bhawan. These protests have been mentioned as a reaction of ‘utter shock and anguish’ which is ‘justified’. At some places, these protests have been referred to as violent, ‘goondaraj’ (hooliganism) and ‘vandalism’, and the protestors as ‘hooligans’. A number of remarks made by various politicians and others against the victim and the protestors were presented by print media. Certain Khappanchayats (local community councils) of Haryana issued a decree banning women from carrying cell phones and wearing jeans or any other clothing that might “invite trouble”.

In order to know about how the young Indian women feel about the ‘blame debate’ that was widely covered by print media, all the respondents believed that women are not responsible for rape. They mentioned a number of causes of rape which include male patriarchy, western influences, stereotype of society, access to pornographic videos, drug abuse, alcoholism, lack of education particularly sex education, treatment of women as sex objects, weak judiciary and fearlessness of laws.

The After-Effect and the Verdict: This incidence generated a lot of debate regarding the strengthening of rape laws in India. The respondents were asked about the role of police and judiciary in dealing with rape cases. The respondents suggested that speedy justice should be provided in rape cases by fast track courts and strict punishment should be given to culprits. Some others highlighted that police and judiciary should be sensitive to those who are raped and their families so that ‘victims are not victimised’ and mentioned that they should not be unduly harassed in the process. One of the respondents called Indian judiciary as ‘slow churning machinery’.

Film India's Daughter By Leslee Udwin Post Nirbhaya: INDIA'S DAUGHTER is the story of the short life, and brutal gang rape and murder in Delhi on 16th December 2012 of an exceptional and inspiring young woman. The rape of the 23 year old medical student by 6 men on a moving bus, and her death, sparked unprecedented protests and riots throughout India and led to the first glimmers of a change of mindset. Interwoven into the story line are the lives, values and mindsets of the rapists whom the film makers have had exclusive and unprecedented access to interview before they hang. The film examines the society and values which spawn such violent acts, and makes an optimistic and impassioned plea for change.

The film was scheduled to be aired on TV channels round the world on March 8, 2015 to coincide with International Women's Day. However, when excerpts of the film, which included an interview with Mukesh Singh, one of the four men convicted of the rape and murder, were broadcast, a court stay order prohibiting the broadcast was obtained by the Indian police. The BBC complied with the request and did not air the film in India. Yet it aired outside of India on 4 March, was uploaded on YouTube, and soon went viral via shares on social media. On 5 March, the Indian government directed YouTube to block the video in India.

Literature Review: Chandan Mukherjee, Preet Rustagi and N. Krishnaji (2001), “Crimes against Women in India: Analysis of Official Statistics” *Economic and Political Weekly*, Vol. 36, No. 43 (Oct. 27 - Nov. 2, 2001), pp. 4070-4080. They attempt to see what official, published data reveal, whether there are clear-cut regional patterns and if so whether they can lead to meaningful hypotheses for future work. There are some significant researches being conducted by scholars in finding important factors influencing reporting behavior of victims of violence.

Kaveri Devi Mishra, Sridhar Krishnaswami, *Citizens Journalism in India: A Case Study of Delhi*, *Journal of Education & Social Policy* Vol. 1 No. 1; June 2014. Their paper evaluates and analyzes the emergence, trend, and role of Citizen Journalism with explicit reference to Delhi Gang rape – Nirbhaya case in 2012. The paper at the end raises concerns on the ethics and to what extent unfiltered information can reach the masses and strike a balance in the society. Kriti Singh, *A Small Study On Impact Of Crime Against Women News Stories On Indian Urban*, *Imperial Journal of Interdisciplinary Research*, Vol-2, Issue-3, 2016 The research paper is an attempt to gauge the impact of crime news stories related to women on urban women based in urban areas of India. The paper tries to analyze the crime news consumption habits in urban women and what impact does these news stories create in the mind of women. Jason Burke, *The problem with crime against women in Delhi*, Vol-1 Issue-2, 2017.

Since 2012 when the Nirbhaya gang rape happened, there was a marked increase in the registration of cases relating to crimes against women across the country. A total number of 24,923 rapes were reported in 2012, this figure rose up to 33,707 in 2013, due to increase in awareness among the common people and prompt registration of FIRs by police on complaints of women. The number of rape cases again rose up to 36,735 in 2014 out of which 2346 were gang-rapes. However, the numbers came down to 34,561 in 2015 including 2,113 gang rapes. Radha and P. Govindaraju (2016) News media shapes our opinions and beliefs on issues of social importance. Especially, when it comes to issues relating to violence against women there are several studies on the discourse of the news media. This paper tries to explore the reception of news on issues relating to violence against women and if framing of such news has any influence on the news reception.

Joseph (2004) states “the manners in which such crimes are reported render them so ordinary, mundane and predictable a feature of daily life that they barely enter readers’ consciousness, let alone impinges on their conscience”. Looking further a trend of victim blaming existing where the reports try to find out what role the victim had in the crime to happen. Maham Abbasi, 2020 Crime against women in India has become an eminent topic of discussion in recent years and the issue has been brought to the foreground for concern due to the increasing trends in crimes performed against women. Most of the crimes get reported and a massive dataset is being generated every year. Analysing the crime reports can help the law enforcement section to take preventive measures for reducing the crime, but processing this voluminous data is strenuous and error-prone. So application of various text mining techniques can be of great help for visualising the crime trend.

Patowary (2014) Media’s role towards women is becoming the growing concern of the feminist writers, basically regarding participation, performance and portrayal of women. Schildkraut (2017) Crime news is an abundant

staple in modern media coverage. Nowhere is this more evident than in the newspaper medium, which often faces fewer constraints with respect to space and time compared to other formats (e.g., television), thereby enabling more stories to be generated. Reetinder Kaur (2013) The cases of rape and other crimes committed against women are reported in media every day. The fatal gang rape of a 23 year old woman on a moving bus in the National capital of India captured media headlines not only in India but across the world due to the horrific manner in which this crime was committed. The present research paper attempts to understand the representation of crime against women in print media with special reference to Delhi gang rape case and also how the young Indian women feels about representation of such incidences in media.

Justice Js Verma Committee Report: This committee was constituted to recommend amendments to the Criminal Law so as to provide for quicker trial and enhanced punishment for criminals accused of committing sexual assault against women. The committee submitted its report on 23 January 2013.

Table 1. Delhi Police Crime Chart Against Women (2012 -2019)

Crime Head	2012	2013	2014	2015	2016	2017	2018	2018 UPTO	2019 15TH NOV.
Rape(376 Ipc)	706	1636	2166	2199	2155	2146	2135	1921	1947
Assault On Women									
With Intent To Outrage Her Modesty (354 Ipc)	727	3515	4322	5367	4165	3422	3314	2956	2616
Insult To The Modesty Of Women (509 Ipc)	214	916	1361	1492	918	640	599	544	427
Kidnapping Of Women	2048	3286	3604	3738	3445	3439	3482	3067	3104
Abduction Of Women 498-A/406 Ipc	162	323	423	556	444	322	262	240	170
(Cruelty By Husband And In Laws)	2046	3045	3194	3536	3877	2745	3416	2716	3187
Dowry Death (304b)	134	144	153	122	162	120	153	133	106
Dowry Prohibition Act	15	15	13	20	18	11	15	14	16

Table 2. Data Analysis Based On Delhi Police Inputs (2012-2019) Rape (376 IPC)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto November 15
NUMBER OF CASES	706	1636	2166	2199	2155	2146	2135	1947

Reforms In Management Of Cases Related To Crime Against Women

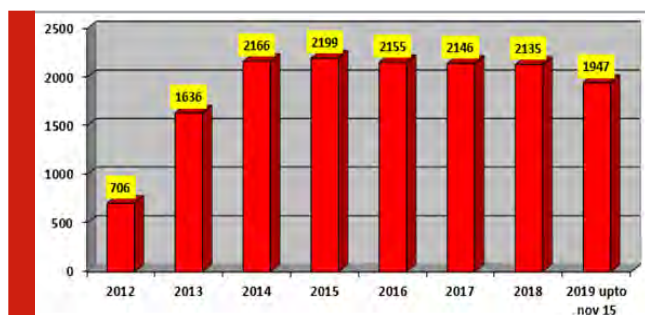
- A Rape Crisis Cell should be set up. The Cell should be immediately notified when an FIR in relation to

sexual assault is made. The Cell must provide legal assistance to the victim.

- All police stations should have CCTVs at the entrance and in the questioning room.
- A complainant should be able to file FIRs online.
- Police officers should be duty bound to assist victims of sexual offences irrespective of the crime's jurisdiction.
- Members of the public who help the victims should not be treated as wrong doers.
- The police should be trained to deal with sexual offences appropriately.
- Number of police personnel should be increased.
- Community policing should be developed by providing training to volunteers.

Delhi Police Crime Data Important Highlights Against Women

- 2,043 cases of rapes were registered in 2018 as compared to 2,059 cases in 2017
- 43% of the accused in rape cases were either friends or family friends, 16.25% were neighbours
- According to Delhi Police analysis, 43 per cent of the accused in rape cases were either friends or family friends, 16.25 per cent were neighbours, 12.04 per

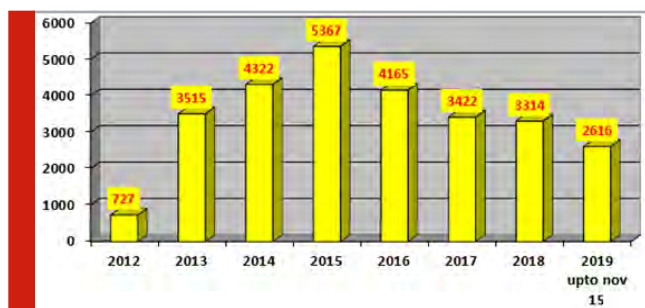


cent were relatives, 2.89 per cent were co-workers, 22.86 per cent were other known persons.

- A meagre 2.5 per cent of the accused were not known to the victim, police said, adding that this was a decline from the previous years.
- In 2017 and 2016, strangers comprised 3.36 and 3.57 per cent of those arrested for rape.
- As many as 2,290 arrests were made in rape cases last year as compared to 2,275 in 2017 and 2,072 in 2018.
- Police have requested the Delhi government for improving last mile connectivity and also requested the Social Welfare Department for initiating programmes for awareness and education in slums and places recording higher incidents of crime against women.
- Delhi Police has also requested the city government for installation of lights on dark stretches, including self-defence as part of school curriculum.
- As safety of women in the national capital continues to remain a cause of concern, police have laid emphasis on popularisation of 'Himmat Plus', creating gender sensitisation and mindset reformation as a part of 'Sashakti'. Identification of dark stretches and sharing information with civic agencies is also on the fore.
- Five women were raped and eight were molested everyday on an average in the national capital last year, Delhi Police spokes person said in press conference.
- According to Delhi Police data, 2,043 cases of rapes were registered last year as compared to 2,059 cases the year before that and 2,065 cases in 2016.
- Last year, 3,175 cases of molestation were reported as compared to 3,275 cases the year before and 4,032 cases in 2016. In most of the rape cases, the accused were known to the victim, police said.

Table 3. Assault On Women With Intent To Outrage Her Modesty (354 IPC)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto November 15
NUMBER OF CASES	727	3515	4322	5367	4165	3422	3314	2616



Here we can see that there is an increase in number of rape cases registered from year 2012 to 2015 and after that there is a slight decrease in the number of rape cases registered from year 2016 to 2019.

Here we can see that the number of assault cases registered has increased from year 2012 to 2015 and after that there is a slight decrease in number of assault cases registered from year 2016 to 2019.

Here we can see that the number of Insult to modesty cases registered has sharply increased from 2012 to 2015 whereas it has sharply decreased in numbers from year 2016 to 2019.

Here we can see that number of kidnapping of women cases registered has increased from year 2012 to 2015 and after that it has slightly decreased from year 2015 to 2017. In year 2018 it has slightly increased and in year 2019 it has come down once again.

Table 4. Insult to the Modesty of Women (509 Ipc) 214

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto November 15
NUMBER OF CASES	214	916	1361	1492	918	640	599	429

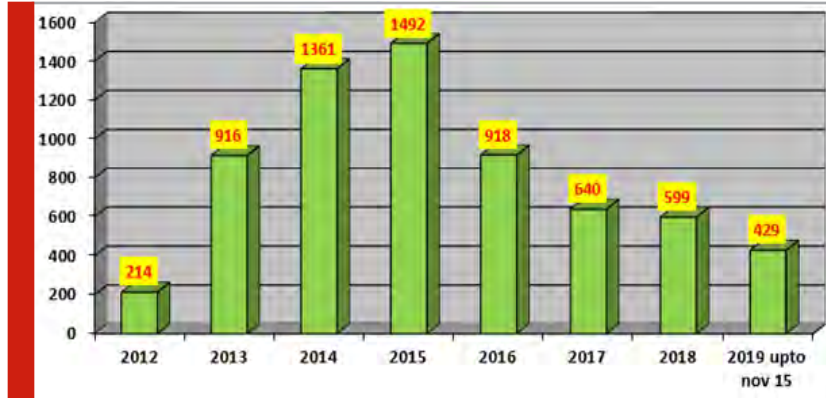


Table 5. Kidnapping Of Women (361 Ipc)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto November 15
NUMBER OF CASES	2048	3286	3604	3738	3445	3439	3482	3104

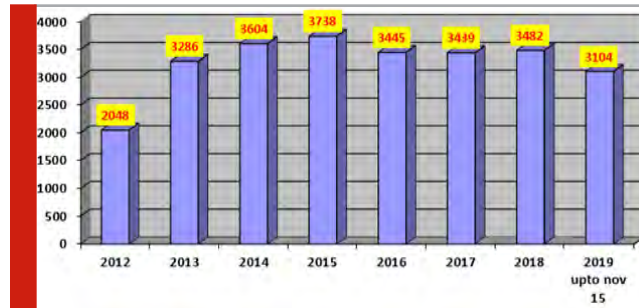
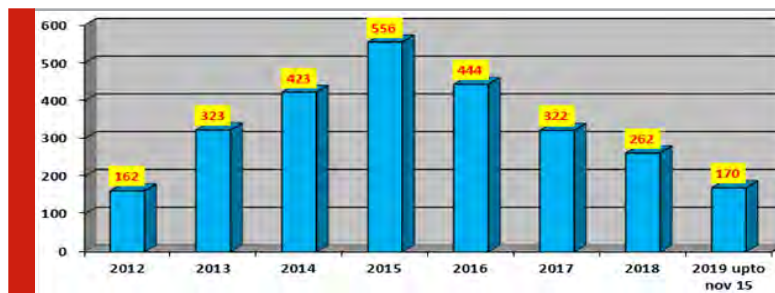


Table 6. Abduction of Women(362 IPC)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto 15 th November
NUMBER OF CASES	162	323	423	556	444	322	262	170



Here we can see that there is sharp increase in number of abduction cases from year 2012 to 2015 and after that the number of abduction cases have come down (decreased) from year 2016 to 2019.

Here we can see that the number of dowry death cases has increased from year 2012 to 2014. In year 2015 less dowry cases were registered whereas in year 2016 it again rose up and in year 2017 it again came down and

it slightly increase in year 2018 and again it decreases in year 2019.

Here we can see that the number of dowry death cases has increased from year 2012 to 2014. In year 2015 less dowry cases were registered whereas in year 2016 it again rose up and in year 2017 it again came down and it slightly increase in year 2018 and again decrease in year 2019.

Table 7. 498-A/406 IPC (Cruelty By Husband And In Laws)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto 15 th Nov
NUMBER OF CASES	2046	3045	3194	3536	3877	2745	3416	3187

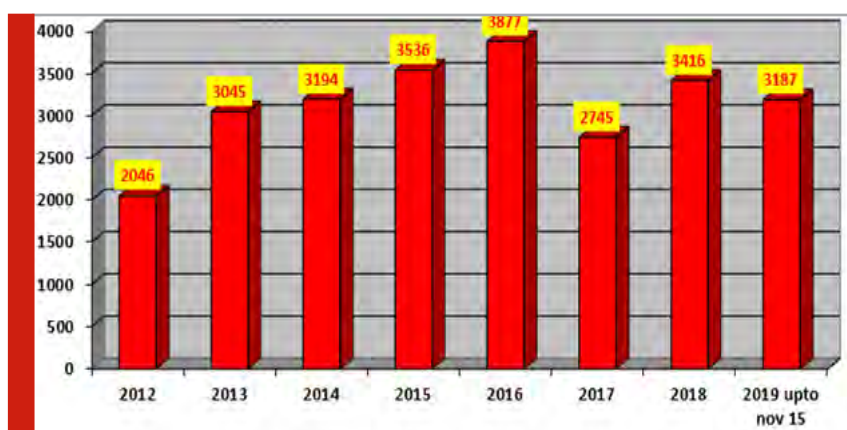
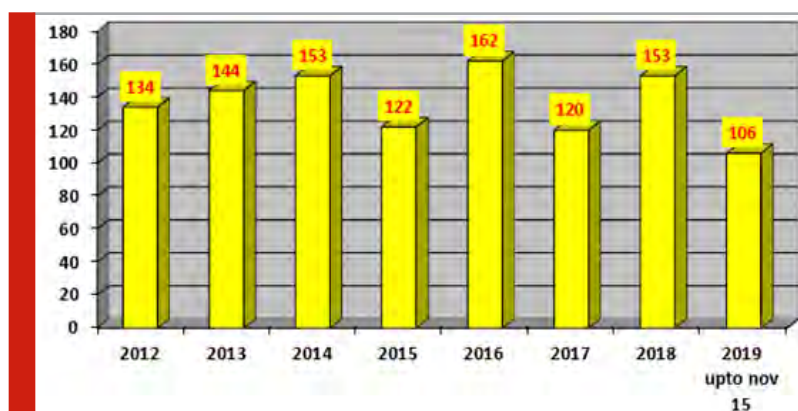


Table 8. Dowry Death (304B IPC)

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto 15 th Nov
NUMBER OF CASES	134	144	153	122	162	120	153	106

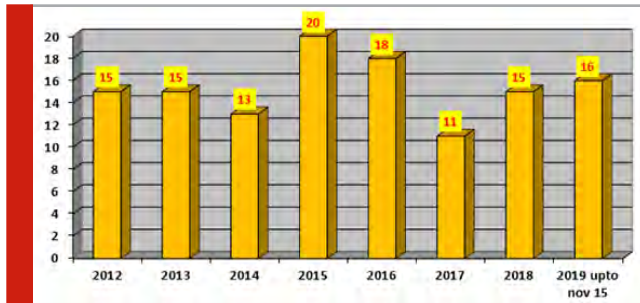


Here we can see that cases registered under the dowry prohibition act in year 2012 and 2013 remained the same where as it decreased in year 2014. In year 2015

it reached to its peak & in year 2016 to 2017 it has decreased slightly whereas from year 2018 to 2019 it has increased once again.

Table 9. Dowry Prohibition ACT 1961

YEARS	2012	2013	2014	2015	2016	2017	2018	2019 upto 15 th Nov
NUMBER OF CASES	15	15	13	20	18	11	15	16



Analysis and Findings Based On The Study Of Table And Graph:

Based on the study of these graphs it has come to light that maximum numbers of cases were registered in year 2015 and thus crime rates were highest and on its peak and from 2016 onwards the number of cases came down and again rose up. Thus we can see slight increase and decrease in number of different crime cases committed against the women.

Disha Bill: Andhra Pradesh New Law On Rape: The Andhra Pradesh Legislative Assembly has passed the Andhra Pradesh Disha Bill, 2019 (Andhra Pradesh Criminal Law (Amendment) Act 2019). The bill provides for awarding death sentence for offences of rape and gang rape and expediting trials of such cases to within 21 days. The Act envisages the completion of investigation in seven days and trial in 14 working days, where there is adequate conclusive evidence, and reducing the total judgment time to 21 days from the existing four months. The AP Disha Act also prescribes life imprisonment for other sexual offences against children and includes Section 354 F and 354 G in IPC

Recommendations: It is suggested that further studies can be conducted on the basis of the findings of this study. More newspapers, especially local newspapers should be examined to reveal different patterns of reporting of crime news. The findings obtained could be compared with the present findings. Studies of the public perception of the phenomenon of crime and the criminal justice system should also be conducted to explore the effect of the media on the audience. For this type of study, Doris Appel Graber's study may help determine the degree to which the public relies on crime news to form their opinion about crime issues and if there is fear of crime among the public that is caused by the media.

DISCUSSION

Rape coverage in the media has many effects in society. It often shapes the way in which people think about rape, as well as how they receive rape victims, rapists and

those accused of rape. Thus, the media coverage of crime against women especially rape is very important area of interest for media anthropologists. The two aspects of Delhi gang rape case were covered: optimism and struggle. The optimism, on one hand, and the struggle for survival, on the other hand, appeared to be the most common themes related to the victim's portrayal. It is due to wide-spread coverage by the media that Delhi gang rape case received attention both nationally and internationally. It also forced the law making bodies to take the crimes against women especially rape more seriously. Thus, media activation played a very important role in generating a public opinion and a nation-wide protest. Due to the rare nature of the Delhi gang rape case, it has been widely covered in Indian print media. Repeatedly in the portrayal, metropolitan cities especially Delhi have been described as unsafe for women. It has been mentioned that there is insecurity among the women about their safety.

CONCLUSION

It can be concluded that media needs to be more sensitive towards coverage of crime against women and general public needs to be more vocal and aware to deal with these cases in more effective manner. Due to the rare nature of the Delhi gang rape case, it has been widely covered in Indian print media. Repeatedly in the portrayal, metropolitan cities especially Delhi have been described as unsafe for women. It has been mentioned that there is insecurity among the women about their safety. It can be concluded that media needs to be more sensitive towards coverage of crime against women and general public needs to be more vocal and aware to deal with these cases in more effective manner.

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Analysis of Farmers' Attitudes to GM Crops in the Cameron Highlands

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ABSTRACT

The objective of this paper was to identify the factors influencing the attitudes of Malaysian farmers in the Cameron Highlands, Pahang, Malaysia, towards Genetically Modified (GM) crops. The survey was conducted between December 2019 and February 2020. Using a simple random sampling method, 348 questionnaires were distributed personally to vegetable farmers in the Cameron Highland by trained enumerators. However, only 176 complete and valid responses were retained for analysis. Descriptive and linear regression analyses were performed using the Statistical Package for Social Sciences (SPSS®) software, Version 24. The results showed that the farmers have high self-efficacy when it comes to farming GM crops, acknowledged the great benefits of GM crops, rated the cost of farming such crops as moderate, and expressed a highly positive attitudes towards GM crops. However, they were also cautious about GM crops in that they perceived them as having moderate risks and a moderate fit with existing farming practices. Additionally, they claimed that government support and market demand were low. Regression analyses indicated that six factors have a significant relationship with attitudes to GM crops, with perceived self-efficacy as the strongest predictor, followed by government support, perceived cost, perceived risks, perceived benefits, and market demand. The results have valuable implications for the future growth of agricultural biotechnology in Malaysia and in other developing countries with a similar culture.

KEY WORDS: FARMERS' ATTITUDES; PREDICTIVE FACTORS; GM CROPS; CAMERON HIGHLANDS.

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INTRODUCTION

Genetic modification is a biological technique involving the genetic modification of living organisms with regard to specific functions (Zhang et al., 2016). Today, there is a great deal of research and the production of genetically modified products, especially in the commercialization and production of agricultural products (World Bank, 2017). Agricultural production involving GM crops can

reduce the issue of malnutrition or hunger, and make the crop better and more nutritious (Hafsyah and Ristawati, 2020). Conversely, some researchers argue that GM crops can affect the environment and the socio-economy of a country (Dale, 2002), thus raising the question of its safety (Raman, 2017). However, GM crops are continuing to develop rapidly and attract controversy around the world (Deng et al., 2019; Andrew et al., 2018).

Figure 1: Research Conceptual Framework

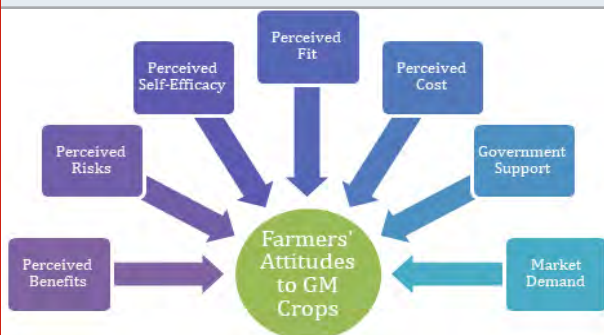


Table 1. Demographic Profiles of Respondents (n=399)

Items		Frequency (n)	Percentage (%)
Gender	Male	138	78.4
	Female	38	21.6
Race	Indian	68	38.6
	Chinese	56	31.8
	Malay	52	29.5
Religion	Hindu	52	29.5
	Buddha	51	29.0
	Islam	44	25.0
	Christian	29	16.5
Age (years old)	Above 45 years	67	38.1
	36-45 years	66	37.5
	Under 35 years	43	24.5
Level of Education	Secondary schools	106	60.2
	Diploma/	47	26.7
	Pre-University University	23	13.1

In Malaysia, the agricultural industry is one of the main features of the country's economy, especially in terms of increasing the income of farmers (Hafsyah and Ristawati, 2020). Since 1985, Malaysia has been working on the development of GM crops, inspired by the rich biodiversity of the country (Bakar, 2007; Arujanan, 2016). However, Malaysia has not planted any GM crops commercially because GM research activities is still in its early stages (Andrew et al., 2018). Therefore, this study will focus on the attitudes of Malaysian vegetable farmers in the Cameron Highlands. It intends to answer two key research questions: What are the attitudes of Malaysian farmers towards GM crops, and what are the significant predictive factors that influence such attitudes?

Research Conceptual Framework: The instrument for this study was based on the Technology Acceptance Model (TAM), which has been frequently used in technology-acceptance studies. Seven variables (predictive factors) were included in the framework, namely perceived benefits and risks (Amin et al., 2014), perceived self-efficacy (Hosseini et al., 2016; Syan et al., 2019), perceived fit (Lau and Phau, 2006; Volckner and Sattler et al., 2006), perceived cost (Mwangi and Kariuki, 2015), government support, and market demand (Deng et al., 2019). It was hypothesized that these influence farmers' attitudes to the adoption of GM crops (see Figure 1).

METHODOLOGY

This is a quantitative study of data gathered using questionnaires. The questionnaire was a multidimensional instrument that identifies the predictive factors influencing the attitudes of farmers to the adoption of GM crops. A 7-point Likert-style scale ranging from 1 (strongly disagree) to 7 (strongly agree) was used to assess all items used in this analysis. The questionnaires were administered personally by the research team members and by trained enumerators to a sample of Malaysian farmers in the Cameron Highlands, Pahang from December 2019 to February 2020. Prior to the survey, the enumerators briefly described the context of the study and introduced the respondents to the basics, and to examples of GM crops, to make it easier for them to respond appropriately.

A total of 348 questionnaires were distributed to the farmers involved, using a simple random sampling process, but only 176 complete and valid responses were retained for analysis. According to the recommendations by UCLA (2016), G*Power 3.1.9.2 software was used to calculate appropriate sample size. By using the power of 0.70 to 0.80, the effect of the size ($f = 0.0577$; large) and the significance level ($p = 0.05$), the results gave a range of sample sizes ranging from 109 to 138, depending on power. Consequently, 176 responses were deemed to be good enough for this research. Table 1 shows the demographic characteristics of the respondents.

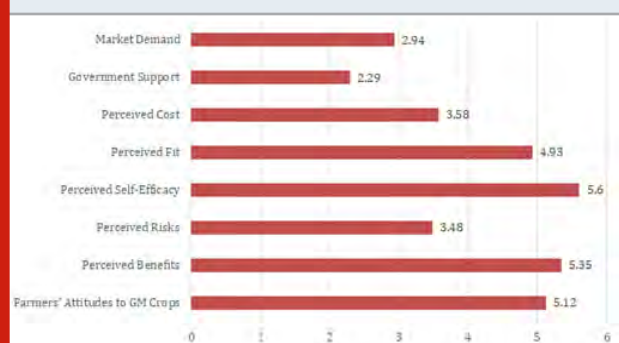
The Statistical Package for Social Sciences (SPSS®) software was used to analyse all the response data. The process of analysis begins with data reliability analysis (Cronbach's Alpha) and the validity measures (factor loadings) of the constructs. All the variables achieved more than 0.60 in terms of Cronbach's Alpha coefficients. This indicated an acceptable level of internal consistency as suggested by Hair et al. (2014). The standardized loadings of all items were greater than 0.5, indicating a good validity (Hair et al. 2010). Pearson's correlation analyses were performed prior to regression. Only those factors that have a significant correlation with attitude to GM crops were included in the regression analyses.

RESULTS AND DISCUSSION

Mean Scores and Correlation Analysis: The farmers rated themselves as possessing high levels of self-efficacy to

farm GM crops (mean score = 5.60), perceived GM crops as offering substantial benefits (mean score = 5.35) and were highly positive with regard to GM crops (mean score = 5.12) (Figure 2). Positive support with regard to the management of GM crops promises to deal with current and future problems in the commercialization of agriculture but a growing market trend has been beneficial to farmers, and offers benefits for consumers and for the national economy (Raman, 2017). Additionally they claimed that the farming of GM crops will have a moderate fit with their existing farming practices (mean score = 4.93) and will incur moderate costs (mean score = 3.58). On the other hand, they were also cautious in terms of their views with regard to GM crops in that they acknowledged the existence of moderate risks (mean score = 3.48). It is rather worrying that the farmers felt that government support was minimal (mean score = 2.29) and assumed that there was also much less market demand for the outcomes of this technology (mean score = 2.94).

Figure 2: Mean Score of Farmers' Attitudes to GM Crops



As suggested by Cheung and Chan (2005), Pearson correlation analysis was performed to establish the association between all variables and attitude to GM crops. Table 2 indicates a positive correlation between perceived benefits and attitude towards GM crops ($r =$

0.473, $p = 0.000$) and a negative relationship between perceived risks and attitude towards this technology ($r = -0.423$, $p = 0.000$). Perceived self-efficacy ($r = 0.380$, $p = 0.000$) and perceived fit ($r = 0.333$, $p = 0.000$) also indicated a positive correlation with the attitude towards GM crops. At the same time, perceived cost showed a significantly negative association with the attitude towards GM crops ($r = -0.466$, $p = 0.000$). On the other hand, government support ($r = 0.145$, $p = 0.027$) and market demand ($r = 0.347$, $p = 0.000$) have a significantly positive relationship with attitudes to GM crops.

Multiple Regression Analysis: Table 3 shows that 51.3% of the variation in attitude towards GM crops is influenced by perceived benefits, perceived cost, market demand, perceived self-efficacy, government support and perceived risk. The value of $R^2 = 0.224$ indicates that 22.4% of the change in attitude towards GM crops is due to changes caused by perceived benefits. The combination of benefits and costs is felt to contribute by 35.1% in attitudes toward this technology. Market demand and self-efficacy contributed an additional contribution of 4.6% and 6.9% variance respectively, in terms of attitudes. At the same time, government support contributed 2.0% variance and perceived risk contributed 2.7% variance.

A total of 48.7% change in criterion factors may be due to other factors not considered in this study. As suggested by Sulaiman et al. (2014), an adjusted value of R^2 smaller than R^2 (0.017 or 1.7%) describes the extent to which the model formed can be generalized to the population ideally. Meanwhile, the Standard Error of the Estimate explains that the smaller the value the better, because the model will be more accurate in anticipating the dependent variable. According to the results, perceived benefits, perceived risks, perceived self-efficacy, perceived costs, government support and market demand were found to contribute significantly to attitudes toward GM crops. At the same time, perceived fit did not contribute significantly to farmers' attitudes to GM crops.

Table 2. The Correlation Matrix among Predictive Factors with Farmers' Attitudes to GM Crops

	Attitudes	PB	PR	PSE	PF	PC	GS	MD
Attitudes	1	0.473**	-0.423**	0.380**	0.333**	-0.466**	0.145*	0.347**
		0.000	0.000	0.000	0.000	0.000	0.027	0.000
	176	176	176	176	176	176	176	176

Notes: Perceived Benefits (PB), Perceived Risks (PR), Perceived Self-Efficacy (PSE), Perceived Fit (PF), Perceived Cost (PC), Government Support (GS), Market Demand (MD); * $p < 0.05$, ** $p < 0.01$ (2-tailed)

ANOVA test was carried out to determine whether or not the combination of the six predictive factors has a direct effect on attitudes to GM crops in this study model. Based on Table 4, it would appear that the combination of six predictor factors contributes significantly to the attitude towards GM crops [$F(6, 169) = 29.657$, $p = 0.000$].

Regression Analysis: Table 5 presented the path coefficient values to determine the strength of the association between predictive factors and attitudes to GM crops. The most important factor of attitudes toward GM crops was perceived to be self-efficacy ($\beta = 0.397$, $t = 6.104$, $p = 0.000$). This result revealed that farmers

would have a more positive attitudes toward GM crops if they perceived greater self-efficacy related to the farming of GM crops. Ardekani et al. (2020) and Bimbo

et al. (2017) highlighted the importance of this factor in determining the willingness of consumers to adopt GM foods and dairy products.

Table 3. Direct effect of Predictor Factors on Farmers' Attitudes to GM Crops

Model Summary Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1: (Constant), Perceived Benefits	0.473	0.224	0.219	0.625
2: (Constant), Perceived Benefits, Perceived Cost	0.592	0.351	0.343	0.573
3: (Constant), Perceived Benefits, Perceived Cost, Market Demand	0.630	0.397	0.387	0.554
4: (Constant), Perceived Benefits, Perceived Cost, Market Demand, Perceived Self-Efficacy	0.683	0.466	0.453	0.523
5: (Constant), Perceived Benefits, Perceived Cost, Market Demand, Perceived Self-Efficacy, Government Support	0.697	0.486	0.471	0.515
6: (Constant), Perceived Benefits, Perceived Cost, Market Demand, Perceived Self-Efficacy, Government Support, Perceived Risks	0.716	0.513	0.496	0.503

Notes: Farmers' Attitudes to GM Crops (Constant)

Government support ($\beta = 0.276$, $t = 3.495$, $p = 0.001$) was listed as the second most important predictor of attitudes towards GM crops. Kikulwe et al. (2011) indicated that increasing government encouragement would effectively enhance the satisfaction related to GM crops. Perceived risks ($\beta = -0.238$, $t = -3.033$, $p = 0.003$) were the third most important predictor of attitudes toward GM crops. These results indicated that if farmers considered there were greater risks associated with GM crops, they would be less likely to adopt GM crops.

Table 4. ANOVA for Regression Analysis (Model Fit)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	44.948	6	7.491	29.615	0.000 g
Residual	42.688	169	.253		
Total	87.636	175			

Notes: g (Constant), Perceived Benefits, Perceived Cost, Market Demand, Perceived Self-Efficacy, Government Support, Perceived Risks

The next most significant predictors of attitudes to GM crops were the factor of perceived cost ($\beta = -0.194$, $t = -2.546$, $p = 0.012$), followed by perceived benefits ($\beta = 0.150$, $t = 2.190$, $p = 0.030$) and market demand ($\beta = 0.172$, $t = 2.184$, $p = 0.030$). Brown and Russell (2007) suggested that cost eventually impacts the decision to adopt any new technology. Amin et al. (2014) also confirmed the results of this study, which found that perceived benefits contribute significantly to attitudes to GM rice. Lence and Hayes (2020) clarified that when GM technology was introduced in the US in terms of corn production, it led to savings in costs, and

Table 5. Coefficients Analysis

Coefficients Factors	B	Beta (β)	t	Significant Value
Farmers' Attitudes to Adopt GM Crops (Constant)	3.547		8.490	0.000**
Perceived Self-Efficacy	0.256	0.397	6.104	0.000**
Government Support	0.117	0.276	3.495	0.001**
Perceived Risks	-0.168	-0.238	-3.033	0.003**
Perceived Cost	-0.130	-0.194	-2.546	0.012*
Perceived Benefits	0.125	0.150	2.190	0.030*
Market Demand	0.086	0.172	2.184	0.030*

Notes: * $p < 0.05$, ** $p < 0.01$ (2-tailed)

that market demand depended on consumers' concerns about GM products. Therefore, if the market demand for GM crops is higher, this will support the adoption of this technology.

CONCLUSION

The study results confirm that six factors have significant roles to play in shaping farmers' attitudes to GM crops, with perceived self-efficacy being the strongest predictor, followed by government support, perceived cost, perceived risks, perceived benefits, and market demand. By looking at the highly positive attitude on the part of the farmers in this sample towards GM crops, and their strong perceived self-efficacy to farming GM crops, there is a positive indication that the future adoption of GM crops in Malaysia will be supported by Malaysian farmers. However there is a need to look

seriously at possible hindrance factors, notably the low level of government support, low market demand as perceived by the farmers, and possible risks. By working on improving these issues, the Malaysian government could create a strong enabling environment leading to Malaysia adopting GM crops.

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Assess the Effectiveness of Breast Crawl on the Intensity of Episiotomy Pain and Behavioral Response Among Parturient Mothers During Episiotomy Suturing

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ABSTRACT

Methods to provide comfort and relieve pain are of paramount importance for the child bearing woman. Unfortunately very little importance is given to reduce the pain and discomfort of the women during episiotomy. Objectives of the study: 1) To assess the intensity of episiotomy pain and behavioural response prior to episiotomy suturing among parturient mother. 2) To assess the effectiveness of breast crawl on the intensity of episiotomy pain and behavioral response among parturient mother during episiotomy suturing. 3) To compare the effectiveness of breast crawl in experimental and control group. 4) To associate the effect of breast crawl with demographic variables among primi mother during episiotomy suturing. This study was based on experimental approach. Population was all the parturient mother admitted in the labour units of selected hospitals of Vidarbha region. True Experimental Design-Pre test- post test with experimental and control group which is a sub type of true experimental design and Probability - Simple random sampling technique was used. Sample size consists of 30 Parturient mothers 15 mothers - Experimental group (Parturient who had breast crawl) and 15 mothers - Control group (Parturient who did not have breast crawl). Findings showed that the present study findings also revealed that there is a significant difference in the mean scores of behavioural response of mothers during suturing between the experimental and control group. Also there is a significant difference in the mean scores of reduction in intensity of episiotomy pain of mothers during suturing between the experimental and control group. Hence breast crawl is effective in reducing the intensity of pain during episiotomy suturing and there is a favourable behavioural response among women who received breast crawl during episiotomy suturing. The findings concluded that breast crawl is a simple and cost effective method to reduce the intensity of episiotomy pain in women during episiotomy suturing. Nurses can co-operate this practice and thus initiate the bond of motherhood.

KEY WORDS: BEHAVIORAL RESPONSE, BREAST CRAWL, EFFECTIVENESS, EPISIOTOMY SUTURING, INTENSITY OF EPISIOTOMY PAIN AND PARTURIENT MOTHERS.

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INTRODUCTION

Introduction and background of the study: Mother, the most beautiful term on humanity's tongue, is the most talented position a woman will ever accomplish in her lifetime. There was never a great man who did not have a very good mother. Women's wellbeing has been granted utmost importance in this century. The 1990s have been called the women's health decade. Many maternity

health workers are unaware of the enforcement of the guideline for early initiation of breast feeding within one hour of birth by the Baby Friendly Hospital Initiative. Consequently, breast feeding initiation is often delayed. Even in those areas where health practitioners are well educated and keen to start the breast feeding program early, there is a lack of knowledge of Breast Crawl.

Genital tract trauma is common following channel vaginal birth, and region pain could be a frequent symptom reported by new mothers. the subsequent techniques and care measures area unit related to lower rates of medical specialty lacerations and connected pain following spontaneous channel birth: antepartum region massage for nulliparous ladies, upright or lateral positions for birth, shunning of Valsalva pushing, delayed pushing with epidural physiological state, shunning of perineotomy, controlled delivery of the baby's head, use of Dexon or Vicryl suture material, the "Fleming method" for stitching lacerations, and oral or body part Nuprin for region pain relief when delivery.

The investigator has detected throughout her clinical expertise that just about all the mothers expertise pain throughout perineotomy sewing. The investigator additionally found that completely different mothers responded otherwise to perineotomy sewing procedure because of numerous factors. therefore the investigator needed to seek out out the effectiveness of breast crawl on the intensity of perineotomy pain and activity response among ladies throughout perineotomy sewing that might showsuperior results on the reduction of pain throughout perineotomy sewing and increase within the success of infant feeding. Aim: To assess the effectiveness of breast crawl on the intensity of episiotomy pain and behavioural response among parturient mother during episiotomy suturing.

Objectives of the Study

1. To assess the intensity of episiotomy pain and behavioural response prior to episiotomy suturing among parturient mother.
2. To assess the effectiveness of breast crawl on the intensity of episiotomy pain and behavioral response among parturient mother during episiotomy suturing.
3. To compare the effectiveness of breast crawl in experimental and control group.
4. To associate the effect of breast crawl with demographic variables among parturient mother during episiotomy suturing

Assumptions

1. Mothers experience some degree of episiotomy pain prior and during episiotomy suturing.
2. Breast crawl during episiotomy suturing will divert the minds of the mother during episiotomy suturing

Hypothesis

H1: There will be significant difference in the mean scores of reduction in intensity of episiotomy pain and

a positive behavioural response of parturient mothers between the experimental and control group.

H2- There is significant association between effectiveness of breast crawl and selected demographic variables.

Variables

Independent variable: Parturient mothers who having episiotomy.

Dependent variable: Breast crawl on episiotomy pain and behavioural response.

Demographic variables: Age, education, religion, occupation

METHODOLOGY

- **Research approach:-** An evaluative quantitative research approach.
- **Research design:-** True Experimental Design-Pre test -post test with experimental and control group which is a sub type of true experimental design.
- **Setting of the study:-** The study will be conducted in AVBRH Maternity hospitals at Wardha City.
- **Sampling technique:-** Probability -Simple random sampling technique
- **Sample:-** All the primi mothers admitted in the labour room of the selected maternity hospital.
- **Sample size :-** Sample size consists of 40 Parturient mothers

20 mothers – Experimental group (Parturient who had breast crawl)

20 mothers - Control group (Parturient who did not have breast crawl)

Criteria for sample selection

Inclusion Criteria

1. Parturient who have delivered full term neonates by normal vaginal delivery.
2. Parturient who have their neonates with them..
3. Parturient who know either English or Marathi or Hindi well.
4. Parturient and newborn without complications
5. Exclusion Criteria
6. Mothers who are having complicated medical or surgical disorders.
7. Parturient who have delivered by instrumental delivery.
8. Parturient who have perineal tear.
9. Mothers who are not willing for breast crawl.
10. Newborn with high risk condition like convulsion, hypoglycemia, asphyxia etc.
11. Newborns who have delivered by the caesarean section.
12. Newborns that have an APGAR score below 9.

Discription of Tools

Part I- Demographic variables (age, education, area of residence, religion, occupation)

Part II- FLACC Scale for Pain assessment**Part III-Visual Analogous scale for behaviour assessment**

Validity: - The validity of tool will be established in consultation with the Guide & Experts from Obstetric & Gynecological nursing Department.

RESULTS

The distribution of subjects according to their age depicts that majority of the subjects in both groups, 65% of subjects in the experimental group and 75% in the control group is belongs to the age group of 19 – 23 years. The distribution of the subjects according to their education reveals that 60% from the experimental group and 65% from the control group are having secondary education. According to their religion illustrate that 60% from the experimental group and 75% from the control group are belongs to the Hindu religion and subjects according to their occupation reveals that 75% from the experimental group and 80% from the control group were house wives.

Table 1. Pain and behavioral responses during the episiotomy suturing among parturient mother in experimental group before breast crawl.

	Mean	Standard Deviation	Range
Pain	8.85	0.67	8-10
Behavioral Responses	8.70	0.65	8-10

N = 20

Table 2. Pain and behavioral responses during the episiotomy suturing among parturient mother in control group

	Mean	Standard Deviation	Range
Pain	8.95	0.68	8 - 10
Behavioral Responses	8.85	0.58	8 - 10

N = 20

Assessment of pain and behavioral responses during the episiotomy suturing among parturient mother in the experimental group shows the mean score for pain is 8.85 and standard deviation is 0.67. Mean score for behavioral responses is 8.70 and standard deviation is 0.65 and the range for both pain and behavioral responses are between 8 and 10. In control group the mean score for pain is 8.95 and standard deviation is 0.68. Mean score for behavioral responses is 8.85 and standard deviation is 0.58 and the range for both pain and behavioral responses are between 8 and 10. Statistically there is significant decrease in pain and behavioral responses in the experimental group after Breast crawl during the episiotomy suturing.

Statistically there is significant decrease in pain and behavioral responses in the experimental group after breast crawl during the episiotomy suturing. The tabulated 't' for 19 df is 2. 09 and calculated 't' value for pain is 41.03. The calculated 't' value was higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance ($p = 0.000 < 0.05$). For Behavioral responses, calculated 't' value 35.51 is higher than the tabulated 't' value at 5% level of significance which is statistically acceptable level of significance ($p = 0.000 < 0.05$). Hence research hypothesis H1 is accepted.

Table 3: Assessment of the effect of breast crawl on pain and behavioral responses during the episiotomy suturing among parturient mother in the experimental group N = 20

		Mean	Standard Deviation	Range	Mean Difference	t-value	p-value
Pain	Before t/t	8.85	0.67	8-10	5.55±0.60	41.03	0.000 S,p<0.05
	After t/t	3.30	0.47	3-4			
Behavioral Responses	Before t/t	8.70	0.65	8-10	5.45±0.68	35.51	0.000 S,p<0.05
	After t/t	3.25	0.44	3-4			

Statistically there is significant difference in comparison between the experimental and control group in pain and behavioral responses. The tabulated 't' for 19 df is 2. 09 and calculated 't' value for pain is 40. 35. The calculated 't' value was higher than the tabulated value at 5% level

of significance which is statistically acceptable level of significance ($p = 0.000 < 0.05$). For Behavioral responses, calculated 't' value 42.70 is higher than the tabulated 't' value at 5% level of significance which is statistically acceptable level of significance ($p = 0.000 < 0.05$).

There is no significant association of effect of breast crawl on pain in relation to the age, educational status, religion and occupation. Calculated 'f' value is 0.87 and 'p' value is 0.43, 'f' value is 0.42 and 'p' value is 0.66, 'f' value is 0.96 'p' value is 0.40, 'f' value is 1.19 and 'p' value is 0.32 respectively. There is no significant association of

effect of breast crawl on behavioral responses in relation to age, religion and occupation. The 'f' value is 0.34 and 'p' value is 0.71, 'f' value is 1.75 and the calculated 'p' value is 0.202, 'f' value is 2.36 and 'p' value is 0.124 respectively. There is significant association of effect of breast crawl in relation to education. Calculated 'f' value is 5.66 and the calculated 'p' value is 0.013.

Table 4. Compare between pain and behavioral responses during the episiotomy suturing in experimental and control group. N = 20 (in each group)

		Mean	Standard Deviation	Range	Mean Difference	t-value	p-value
Pain	Experimental	3.30	0.47	3-4	6.00±0.14	40.35	0.000
	Control	9.30	0.47	9-10			S,p<0.05
Behavioral Responses	Experimental	3.25	0.44	3-4	6.00±0.14	42.70	0.000
	Control						S,p<0.05

Breast crawl evokes an atmosphere of acceptance, respect for the body and being cared for. The close personal interaction implicit in breast crawl strengthens the mother – child relationship. So the present study conclude that breast crawl has an effect on pain and behavioral responses during the episiotomy suturing and reduces the pain and enable the mother to cope with the severity of pain and have a positive responses towards the episiotomy pain.

DISCUSSION

A study was conducted to assess the Impact, feasibility and acceptability of breast crawl in a busy labor room in a tertiary care hospital in Nagpur, Maharashtra in 2012. A prospective, single blinded, randomized controlled clinical trial. Impact of breastcrawl was studied in one group and the outcome was compared with the other group where breastcrawl was not performed Descriptive statistics and $\chi^2(2)$ analysis was applied to evaluate the questionnaire and to compare the outcome in the two groups. The results revealed that Breastcrawl had a significant positive impact on the onset of lactation as well as extent of neonatal weight loss on day 3. Breastcrawl results in positive short-term breast feeding outcome but acceptability of breastcrawl as a routine in a busy labor room remains a major issue.⁷

Hence the present study strongly suggests that breast crawl has a positive effect on the pain and behavioral responses during the episiotomy suturing. There was significant difference between the experimental and control group. Breast crawl has a role in reducing pain, and improving women's emotional experience of labour and a positive response to pain. Thus the findings are supported by above research studies.

The findings are supported by a study conducted to assess the effectiveness of breast crawl as a diversional therapy for reduction of pain in primipara women, during episiotomy suturing in selected maternity hospitals of a metropolitan city. The mean score obtained in the

experimental group before episiotomy suturing was 6.2 and during suturing with breast crawl intervention was 2.72 with a mean difference of 3.48 which shows a significant difference in reduction of pain. Furthermore, the comparison between the mean scores of experimental group during episiotomy suturing which was 2.72 and control group which was 6.80 with a mean difference of -4.08 shows that the data are extremely significant at $P < 0.0001$ level of significance. The findings of the study proved that breast crawl was effective as a diversional therapy for reduction of pain in primipara women, during episiotomy suturing.¹³

The present study findings also revealed that there is a significant difference in the mean scores of behavioral response of mothers during suturing between the experimental and control group ($t > 42.70$). Hence, it can be concluded that there is a favorable behavioral response among women who received breast crawl during episiotomy suturing.

The findings of the study are supported by a study conducted to assess the effectiveness of transcutaneous electric nerve stimulation on pain and behavioral responses of women during the first stage of labor. Friedman's test was used to test the significant difference among area wise behavioral responses score during the first stage of labor. The results showed that there is a significant difference between the area wise behavioral responses in experimental and control group.¹⁴

CONCLUSION

During episiotomy suturing, nurses in the delivery room can safely and reliably practice breast crawl as a procedure on the basis of maternal comfort. In the birthing units, nurse educators will update the nursing staff on the advantages of the infant's early skin-to-skin contact and its effect on physical and mental growth and development. During episiotomy suturing, the bonding advantage of breast crawl can be a useful

non-pharmacological measure in providing diversion to the mother. Nurses can introduce and promote the breast crawl initiative in maternity hospitals as health professionals, it will be beneficial for mother and baby as well as for the entire family and country.¹⁵ Therefore, the investigator takes this study to inform and encourage antenatal mothers to practice this program, which in turn will lead to our country's healthy children and thus healthy future people.

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Assess the Effectiveness of Planned Teaching on Knowledge Regarding Cervical Cancer with Human Papiloma Virus (HPV) Vaccination Among Women in Urban Area

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ABSTRACT

Cervical cancer is second only to breast cancer on the most common type of cancer found in women worldwide. It affects an estimated 500,000 women each year. In United States and other developing countries, the rates of cervical cancer are much lower, in fact, according to National Cervical Cancer Coalition, more than 80% of all cases of cervical cancer occur in developing countries. Objectives: 1. To assess the knowledge regarding cervical cancer with HPV vaccination. 2. To assess effectiveness of planned teaching on knowledge regarding cervical cancer with HPV vaccination. 3. To associate the findings with selected demographic variables. Materials and Methods: 80 samples were selected from women in urban areas by Purposive sampling technique. Pre Experimental research design one group Pre test and post test without control group design was used. Findings revealed that in pre test 32 women (40%) had poor level of knowledge and 48 (60%) of women had average level of knowledge score, no women (0%) had good level of knowledge and 0 (0%) of them had excellent level of knowledge score. The minimum score was 0 and the maximum score was 10, the mean score was 5.85 ± 2.571 with a mean percentage score of 29.25 ± 12.855 . In post test only 1 woman (1.25%) had poor level of knowledge score, 12 women (15%) had average level of knowledge score, 33 women had good level of knowledge score and 34 women had excellent level of knowledge score. The minimum score was 05 and the maximum score was 19, the mean score was 13.95 ± 3.438 with a mean percentage score of 69.75 ± 17.19 . The main aim of the study was to assess the effectiveness of planned teaching on knowledge regarding cervical cancer with Human papiloma Virus (HPV) vaccination among women in urban area of Wardha city. Information is given to the women through a planned teaching which includes various aspects like general knowledge regarding cervical cancer, epidemiology, risk factors, causes, stages, HPV vaccination, complications, prevention and treatment of cervical cancer with HPV vaccination.

KEY WORDS: CERVICAL CANCER, HUMANPAPILOMA VIRUS (HPV).

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INTRODUCTION

Cervical cancer is a major and devastating cause of mortality worldwide with an estimated global incidence of 5 lakhs new cases and 2.7 lakhs deaths annually among women. It is the second most common cancer in women between 15 and 45 years of age and the third most common cause of cancer related mortality in women. According to WHO/ICO information centre on

HPV and cervical cancer (2009) in India ,women at risk of cervical cancer is 366.58 millions,1.3 lakhs of annual cases and 74 thousand annual deaths. Statistical data reveals that the prevalence rate was highest in Mumbai(3121),Chennai(2550),Poona (1138),Trivandrum and Karunagappally 284 and 93 respectively. Unless there is a dramatic improvement in prevention of cervical cancer and the incidence of the disease falls by 2050,one million new cases of the disease will be diagnosed each year. Worldwide, cervical cancer is both the fourth- most common causes of cancer and the fourth- most common causes of death from cancer in women.In 2012, an estimated 528,000 cases of cervical cancer occurred, with 266,000 deaths. About 70% of cervical cancer occurs in developing countries. Also cervical cancer is a cancer arising from cervix.

It is due to the abnormal growth of cell that have the ability to invade or spread to other parts of the body. Early on, typically no symptoms are seen. Later symptoms may include abnormal vaginal bleeding, pelvic pain or pain during sexual intercourse. Long term infection with certain type of the HPV is now known to be the causes of almost all cervical cancer. Almost all abnormal Pap test result is caused by HPV. In 2006, "Professor Ian Frazer" and his team at the "University of Queensland" discovered a vaccine to prevent HPV, and protecting women against most types of cervical cancer. HPV is commonly spread by sexual contact as many people may not be aware of signs and/ or symptoms. HPV does not always leads to cervical cancer. However if the virus persists and is left undetected, the viral cell can become cancerous.

MATERIAL AND METHODS

Source of Data: Data collected from women in the urban area. Inclusion Criteria: Inclusion criteria:-1. Available at the time of data collection.2.Able to understand the language Marathi or Hindi.3.Age group of women 18 years to 55 years.4. Willing to participate in study. Exclusion criteria:-1.Those who are suffering from chronic illness like any type of cancer. 2.Those who are Health professionals.3.Those who have attended health educational programme regarding cervical Cancer. Research Approach: Quantitative approach Research Design: Evaluative research design Setting:Research conducted in urban area. Sampling Technique: Purposive sampling technique. Sample size: The total samples of the study consist of 80 womenTools of Research: Data collection tool is self-administered structured knowledge questionnaire which consists of following aspects. Section-I: Deals with demographic variables. Section-II: Deals with self-administered structured knowledge questionnaire on cervical cancer and HPV vaccine.Section-III:knowledge regarding cervical cancer and HPV vaccine.Independent variable: knowledge of cervical cancer with HPV vaccinationDependent variable: women.

The above table shows that in pre test32 women (40%) had poor level of knowledge and 48(60%) of women had

average level of knowledge score, no women (0%) had good level of knowledge and 0(0%) of them had excellent level of knowledge score. The minimum score was 0 and the maximum score was 10, the mean score was 5.85 ± 2.571 with a mean percentage score of 29.25 ± 12.855 . In post test only 1 woman (1.25%) had poor level of knowledge score, 12 women (15%) had average level of knowledge score, 33 women had good level of knowledge score and 34 women had excellent level of knowledge score. The minimum score was 05 and the maximum score was 19, the mean score was 13.95 ± 3.438 with a mean percentage score of 69.75 ± 17.19 .

Graph : Significance of difference between knowledge score in pre and post test of women regarding cervical cancer with HPV vaccination.



This table shows the comparison of pre test and post test knowledge scores of women regarding cervical cancer with HPV vaccination. Mean, standard deviation and mean percentage score values are compared and student's paired test is applied at 5% level of significance. The tabulated value for $n=80-1$ i.e 79 degrees of freedom was 2.68 . The calculated value was 27.778 for overall knowledge score. The calculated 't' value are much higher than the tabulated value at 5% level of significance which is statistically acceptable level of significance. Hence it is statistically interpreted that that planned teaching on knowledge regarding cervical cancer with HPV vaccinationwas effective. Thus the H1 is accepted.

DISCUSSION

Assess the effectiveness of planned teaching on knowledge regarding cervical cancer with Human papilloma Virus (HPV) vaccination among women in urban area was undertaken with the objectives to assess the knowledge regarding cervical cancer with HPV vaccination, to ascertain the relationship with selected sociodemographic variable and to find out the deficit areas. The study accessible population was women of selected urban area of wardha city. 80 women were selected by purposive sampling technique. Data was collected from women by questionnaire. Data was analyzed by descriptive and inferential statistics and presented through tables and figures. As per objectives it was found that the existing knowledge before teaching was satisfactory in pre test mean percent was 29.25 % and knowledge of women in post test mean percent was 69.75 %. Education variable was found to be associated with knowledge of women

none of the others variable were found significantly related with the knowledge of women. This study is supported to my study and education variable found

to be significant with knowledge of women and others variable are not being found significantly.

Table 1. Effectiveness of planned teaching on the knowledge regarding cervical cancer with HPV vaccination among women. n=80

Level of knowledge score	Score range	Percentage score	Knowledge Score	
			Pre Test	Post Test
Poor	0-5	1-25%	32(40%)	1(1.25%)
Average	6-10	26-50%	48(60%)	12(15%)
Good	11-15	51-75%	0(0%)	33(41.25%)
Excellent	16-20	>76%	0(0%)	34(42.5%)
Minimum score			0	5
Maximum score			10	19
Mean score			5.85 ± 2.571	13.95 ± 3.438
Mean %			29.25 ± 12.855	69.75 ± 17.19
t-value			17.743	
p-value			0.00	
			S,p<0.05	

An evaluative approach with one group Pre testPost test design was used for the study. 80 samples were selected using simple random sampling method. The present study was conducted in Arvi-naka, wardha city. The collected data were analyzed using descriptive and inferential statistics. A significant difference between Pre test and Post test knowledge was found ($t=17.743$, $S,p<0.05$). In pre test mean percent was 29.25 % and in post test mean percent was 69.75 %. There was no significant association between the level of knowledge and demographic variables such as age, educational status, family type, marital status occupational status. This study supported to my study and in my study planned teaching was effective in improving the knowledge of women regarding prevention of cervical cancer with HPV vaccination.

CONCLUSION

The main aim of the study was assess the effectiveness of planned teaching on knowledge regarding cervical cancer with Human papiloma Virus (HPV) vaccination among women in urban area of wardha city. Information is given to the women through a planned teaching which includes various aspects like general knowledge regarding cervical cancer, epidemiology, risk factors, causes, stages, HPV vaccination, complications, prevention and treatment of cervical cancer with HPV vaccination.

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Data Packet Security in MANET and VANET

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ABSTRACT

Day by Day security turns into a significant worry in delicate or confidential information transmission in Mobile Ad-hoc network (MANET) or Vehicular Ad-hoc Network (VANET). In this type of network, topology of nodes is unpredictable because of its changing nature. Without permission, participation and departure of nodes results in lack of trust relationship between nodes. In such conditions, there is no assurance that way between two nodes would be secure or free of malicious nodes. These nodes may impose variety of attacks like capturing sensitive information or modifying it for their self benefit or bad intention. In this paper we present hybrid cryptographic to upgrade protection to data packets, which is amalgamation of symmetric cryptography, asymmetric cryptography and hashing to provide shield to data packets.

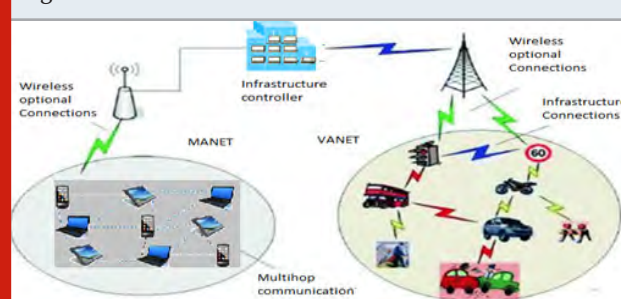
KEY WORDS: ASYMMETRIC CRYPTOGRAPHY, MANET, MALICIOUS NODES, SYMMETRIC CRYPTOGRAPHY, VANET.

INTRODUCTION

Generally, the data is extremely confident about the business or domestic environment. So information security assumes imperative part in these conditions. There are numerous cryptographic procedures accessible for information security. Every method works in its remarkable manner and has its own aces and cons. During routing of data packets, it is vital to give security to path just as data packets. This paper presents hybrid cryptography method to upgrade information security in routing protocol. It attempts to give shield to data packets. All data packets are concealed utilizing prominent security cryptographic algorithms. The proposed data packet security accomplishes all security primitives, for example, Authentication, Confidentiality, Integrity and non-repudiation and so on.

VANET is one of type of MANET as shown in figure 1. In vehicular Ad-hoc Network (VANET), vehicles are used as router to communicate and forward information to vehicles and Road Side Unit (RSU) (Sharma,2019). Without any centralized authority, instant infrastructure is built in variety of applications like weather prediction, it is used to collect information about highway railway intersection, toll collection, nearest restaurant, petrol station, availability about parking area, improve traffic efficiency etc.

Figure 1: Architecture of MANET and VANET



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Some sensitive areas like military applications, war field of ad hoc networks where security is topmost priority that requires the most highly secure routing of data messages. In this case the applications that run on top of the network are of critical importance; therefore the underlying routing process should provide a high level of protection, while possibly having less strict performance requirements.

Weakness in the security system is called vulnerability. MANET is more vulnerable than a wired network. Mobile Ad-hoc Network has very constrained network compared to the traditional computer network. It has different characteristics like imprudent structure, dynamic topology, and promiscuous behavior. Resource-constrained environment (memory, energy or battery power, CPU capacity and bandwidth) poses new challenges about security in MANET. (Ramayti, 2014)

Obstacles in MANET and VANET

- **Imprudent structure:** - MANET has lack of central authority. System allows anyone to access data without verifying authorization.
- **Scalability:** -Nodes in MANET are mobile which results in scalability of topology all the time. While concerning security, scalability is a major issue. So security mechanism must be versatile to handle a large network as well as small ones.
- **Promiscuous mode:** - When sender node transmits the packets, its neighbor nodes can overhear the transmission. If among them one node is malicious, it can corrupt the whole transmission.
- **Resource constrained:** -It is resource constrained in terms of data memory space, power supply etc. If power supply is limited, then nodes may behave selfishly.
- **Asymmetric links:** - Most of the wired networks rely on the symmetric links which are always fixed. But this does not happen in the case with VANET as the nodes are highly mobile and constantly changing their position with high speed in the network. For example, consider a MANET (Mobile Ad-hoc Network)where node B sends a signal to node A but this does not tell anything about the quality of the connection in the reverse direction.(Liang, W,2015)
- **Dynamic topology:** - Due to mobility of node, relationships between the nodes changes from time to time. Establishing of trust becomes very difficult. When nodes are compromised, trust is disturbed. Adaptive security mechanism is a solution for this dynamic behavior. It is very difficult to detect malicious attacks because of lack of centralized management and highly dynamic environment. (Gorantala, K., 2006; Goyal, P)
- **Ease of snooping data:** - While transmitting data in the MANET, other devices acknowledges about transmission of data. So it is easy for intruder to snoop data or information which is transferred over the network.
- **Routing:** - Various demands like uncasing, multicasting and geo-casting from the network

lead to performance degradation in MANET because network topology is unpredictable and dynamic.

- **Packet loss:** -In MANET packet loss occurs due to transmission error (limited transmission range) and frequently pathway breakages. There is no restriction on the nodes in network participation, so malicious nodes can capture or drop packets for its personnel benefit (Raza, N., 2016).
- **Lack of a Clear Line of Defense and Secure Communication:** - MANETs do not have a clear line of defense; attacks can come from all directions. However, cryptography and authentication are difficult tasks in a mobile wireless environment since they consume significant resources.

Cryptographic Algorithm

A. Advance Encryption Standard (AES): The core characteristics of AES are, it provides elevated security with minimum overhead, It has small key size, consumes less energy, processing speed is high, robust, simple in design . These characteristics are valuable in resource constrained environments like in VANET. In AES block and key sizes are vary. If the key size is 128 bits-10 rounds are required. If it is 192 bit-12 rounds required. 128 bit key is commonly used everywhere.

B. Dual RSA: In proposed method dual RSA is used to reduce memory consumption and achieve elevated security. It stores, public and private exponent only once, not twice for two distinct instances of RSA (Hung-Min Sun, 2007). In RSA two keys are generated public key (e, n) and private key (d, n). Now for enforcing high security, we again perform key generation operation by choosing private key d and n. Then these newly generated public and private key pairs are used in digital signature. Dual RSA used for authentication and non-repudiation.

C. Secure Hash Algorithm2 (SHA2): Hashing is cryptographic function used to map data of any size into fixed size digest. It is used to achieve integrity and digital signature. In this proposed method, SHA-256 algorithm used. Hashing is popular because of It is irreversibility.

Proposed Method: The proposed method includes hybrid architecture, which is a combo of symmetric and asymmetric cryptography. The Symmetric Key Cryptographic Technique (Advanced Encryption Standard) and hashing technique (SHA2) are used to achieve Confidentiality and Integrity, respectively. In asymmetric Key Cryptography technique Authentication is achieved by Dual RSA. The digital signature is used to achieve non-repudiation. Our goal is to guarantee confidentiality, authentication, packet integrity and non-repudiation during packet transmission.

The source side

1. The given plain text can be encrypted with the help of Advanced Encryption Standard, AES and the derived cipher text can be transferred to the destination.
2. At the same time value is calculated through SHA2 for the same encrypted plain text, which is also

converted into the cipher text by AES.

3. This encrypted text and hash value encrypted text send to the destination.
4. This Hash value of plain text has been encrypted with Dual RSA and the encrypted message of this hash value is also sent to destination.

Source Side

$$= \int_{i=0}^{PacketsN} \text{forward}(\text{aes}(i) + \text{hash}(\text{aes}(i))) + \text{forward}(\text{hash}(i)) + \text{drsa}(\text{hash}(i))$$

5. Intermediate nodes simply forward the packets to next hop.

$$\text{Intermediate Node} = \int_{i=0}^{PathN-1} i == \text{Secure} \rightarrow \text{Packet}(i) \rightarrow \text{Packet}(\text{Next Hop}(i + 1))$$

The destination side

1. The hash value of encrypted plain text by AES, is calculated and it is compare with hash digest of computed data.

Receiving Nodes(aes)

$$= \int_{i=0}^{PacketsN} \text{hash}(\text{aes}(i)) = (\text{hash}(i)) \begin{cases} \text{match} = \text{Accept Packet} & \text{aes}[i] = \text{true} \\ \text{Not match} = \text{Reject Packet} \end{cases}$$

2. At same time, the received encrypted hash value is decrypted by dual RSA to get original hash value.
3. This decrypted hash value is compared with the original Hash value H1 which is calculated initially.

Receiving Nodes(drsa) =

$$\int_{i=0}^{PacketsN} \text{decrypt}(\text{drsa}(\text{hash}(i))) == (\text{hash}(i)) \begin{cases} \text{match} = \text{Accept Packet} & \text{rsaM}[i] = \text{true} \\ \text{Not match} = \text{Reject Packet} \end{cases}$$

4. If both side's hash values match, then message is authenticated and it is not altered. So at receiver's side message is accepted.
5. Otherwise message is dropped or rejected.

$$\text{Receiving Nodes} = \int_{i=0}^{PacketsN} \text{aesM}[i] == \text{rsaM}[i] \begin{cases} \text{match} = \text{decrypt}(\text{aes}(i)) \\ \text{Not match} = \text{Reject Packet} \end{cases}$$

While considering different kind of attacks we should also look for interceptor. When data is sent in encrypted format interceptor determines plain text from encrypted data very easily. Most of the time the interceptor derives both encrypted message and also hash value for that particular message. Once it has both he easily derives the plain text from encrypted text. But in this proposed work if it gets hash value, it cannot derive plain text because we have used dual RSA to encrypt hash value and original data is encrypted by AES algorithm which is highly secure.

5. Security Analysis

Unauthorized Nodes: – Only legitimate nodes having private key are permitted to participate in network. Secrete keys are distributed prior to routing starts. Without signature generated packet is dropped by the receiver.

Modification: – For non-legitimate node or other nodes, it is very difficult to modify the message contents because messages are signed by the sender.

Fabrication:- Only those nodes having the private key can able to fabricate messages.

Impersonation:- lack of authentication leads fake nodes can become legitimate nodes and able to observe data traffic. These types of users also prohibited from sending fake routing messages. (Sharma, M,2020)

CONCLUSION

Security of data transmission becomes hot topic in digital world. There are so many cryptographic techniques are available to provide elevated security to routing protocols. These techniques are required to provide data security and users authentication. The proposed method has been designed for better security using a combo of different cryptographic techniques. In the proposed hybrid architecture of cryptographic techniques such as Advanced Encryption Standard, and SHA2 are used to achieve both the Confidentiality and Integrity. To achieve authentication, we used asymmetric Key algorithm, Dual RSA. Digital signature used to achieve non-repudiation.

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Characterisation and Analysis of Alternate Hybrid Material for two Wheeler Mud Guard

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ABSTRACT

The purpose of a mud-guard in a vehicle is to keep the tyres of the vehicle away from stones, mud and debris that causes small damages to the vehicle. If the design of the mud-guard is weak, splashing of mud and erosion of material coating of the mud-guard takes place while driving the vehicle. Therefore, it is necessary to design a robust mud-guard with desirable mechanical properties to overcome the above disadvantages. In this work, mud-guard of a motorcycle is manufactured by using a composite material made by combining fibres (hybrid) such as hemp fibres and palm fibres. The above mentioned fibres are reinforced as composite materials using epoxy as the matrix material. Initially, the composite material is fabricated and tested for its mechanical properties as per the standards. Optimum tensile strength value was observed for HP50 to be 113 Mpa. The material with optimum volume percentage was selected for the modelling of the mud-guard. The modelling was done and analysed for its mechanical properties such as stress, strain and deformation with appropriate material properties using ANSYS software. From the analysis, the maximum equivalent stress, equivalent elastic strain and the total deformation are found to be 9.417×10^6 Pa, 5.9772×10^{-6} and 6.493×10^{-7} m respectively and they are found to be better when compared with the properties of the existing mud-guard. Moreover, the composite material used is eco-friendly and inexpensive which is an advantage for commercial usage of the mud-guard.

KEY WORDS: ECO-FRIENDLY, EPOXY RESIN, HEMP FIBER, PALM FIBER, AND ROBUST MUD-GUARD.

INTRODUCTION

Focus on natural fiber composites has drawn the attention of many researchers (i.e., bio composite), basically they are composed of natural resins or synthetic resins reinforcement of natural fibers. (Ayyappa et al., 2020) has selected two sets of natural fiber reinforcements like banana/ pineapple and hemp/ flax. Samples were fabricated by hand layup method and tested. Using Universal Testing Machine (UTM) the flexural properties

were tested, the interlaminar shear strength and moisture absorption test of the fabricated composites were also tested. The combination of fibers, its effect on the flexural and the displacement on loading were analyzed from the breakup vs weight fraction results obtained from testing.

The results showed the different combinations, hybrid fibers showed improved flexural strength and flexural modulus. Pure fiber reinforcement showed lesser value. Generally, the hybridization of composites improves the mechanical properties. Usage of natural fibers has advantageous properties; they are a less dense material yielding relatively less weight composites with good specific properties. (Sathyanarayana et al., 1983) Natural fibers are economical and can be easily processed, being a good renewable resource, that has reduced the dependency on foreign and domestic petroleum oil.

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In this paper, importance of the natural fibers have attracted as a potential materials for structure. The attractive plus point of natural fibers terms of material usage has made its availability more demanding. (Padma Priya et al., 2005) has developed Waste silk fabric-reinforced epoxy laminates by varying content of silk fabric. The mechanical properties like tensile strength and flexural strength of the composites were determined. These properties were found to increase, with increase in silk fabric content. These composites also showed good chemical resistance to some acids, alkalies, and solvents. The interfacial bonding between the reinforcement and the matrix was examined using SEM technique. (Murali Mohan Rao et al., 2007) studied the tensile, flexural and dielectric properties of composites made by reinforcing vakka, date and bamboo as a new natural fiber into a

polyester resin matrix. The fibers extracted by manual processes have been used to fabricate the composites.

These composites are tested for tensile, flexural and dielectric properties and compared with those of other composites fabricated from sisal, bamboo and banana made under same conditions. Epoxy-based composite exhibit lower wear loss than polyester-based composite. From the literature review, it is found that hybrid composite prepared using natural fibres are found to be a possible source of replacement for synthetic reinforcement polymer composite. Since, they can be utilised for the various application. Hence in this work, hybrid composite of hemp and kenaf fibers were fabricated. Based on the optimum values of the mechanical properties obtained, the modelling and analysis of the mud gaurd was done. The composite are tested for the equilateral stress, equilateral strain and total deformation behaviour by providing the load and speed parameters.

Table 1. Labelling of composite materials

S.No	Label	Composite Details	Fiber Vol(%)
1.	NE	Neat Epoxy	0
2.	HP20	Hemp + Palm fiber	20
3.	HP30	Hemp + Palm fiber	30
4.	HP40	Hemp + Palm fiber	40
5.	HP50	Hemp + Palm fiber	50

Fabrication of Composite Materials: After the selection of materials, fabrication of material was done. Two categories of specimen were fabricated, untreated fibers reinforced specimen and treated fiber reinforced specimen. The treatment of fibers were done so that the surface modification is possible for the fibers that may help in improvement of adhesion properties in the fabrication. Alkali treatment was done with 4% sodium hydroxide. After the treatment the fibers are sundried 48 hours to remove the moisture in the material.

Table 2. Mechanical properties of Hybrid composite

S.No	Fiber Label	Tensile strength (Mpa)		Flexural Strength (Mpa)		Impact Strength (Joules)	
		Processed / Unprocessed	Processed / Unprocessed	Processed / Unprocessed	Processed / Unprocessed	Processed / Unprocessed	Processed / Unprocessed
1.	NE	73	73	103	103	0.63	0.63
2.	HP20	84	79	114	108	2.26	2.23
3.	HP30	97	91	138	131	2.28	2.25
4.	HP40	111	96	172	167	2.37	2.33
5.	HP50	113	101	177	169	2.44	2.48

Figure 1: Morphology of the Experimental work

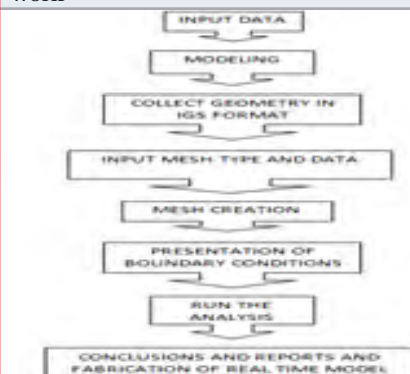


Figure 2: Modeling of Part

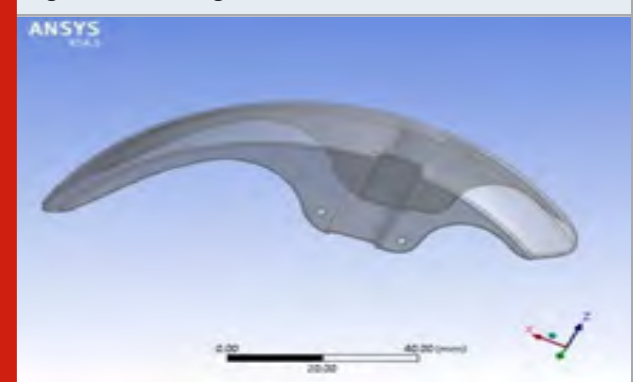
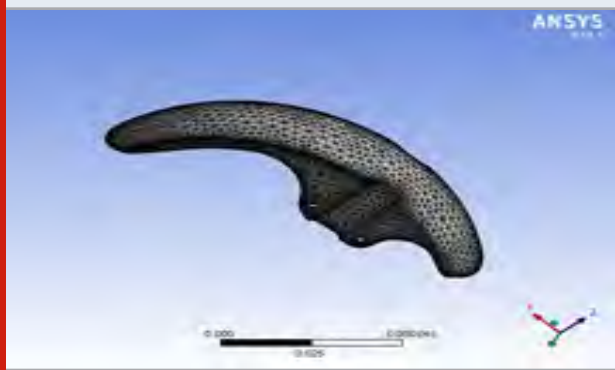


Figure 3: Mesh Generation of part



At various fiber loading conditions the fibers were fabricated. Different volume percentage like 20%, 30%, 40% and 50% of (Hemp + Palm) fiber fiber loading was done and samples were obtained for testing to know the influence of the fibers in the epoxy matrix material. Equal proportions of hemp and palm fiber were added to fabricate the hybrid composite laminate. After the resin and fiber laying was done and the material was left to cure for 24 hours. The samples obtained were tested for their tensile properties, flexural and impact properties. All the testing were carried according to the ASTM standards.

The procedure for the fabrication and preparation of the samples for the testing of the composite material are as follows.

- Surface modification of hemp and palm fiber
- Mould preparation
- Resin preparation for the composite material
- Fiber stacking in the mould
- Removal of air bubbles
- Curing the prepared material
- Specimen preparation for the testing of composite materials

Characterisation of Composite Materials: The following procedure were carried out for the preparation of the specimen to be tested under ASTM standard. The results were obtained and the observations were tabulated. From the observations it was found that the natural fibers processing have improved the mechanical properties of the material. The relation of the fiber loading as well as the treatment are clearly shown in the tabulations. The lower hemp/kenaf fiber loading showed lower values as the availability of the fibers are less hence load bearing capacity is lesser.

Morphology for Modeling of the Mud Guard: The selected materials was given as input data for the model of the mud guard. The properties were assigned for the materials. Mesh creation was performed for the analysis of the part. Additionally boundary conditions like supports and loads were provided for the analysis. The analysis was carried out for Two materials ABS and hybrid (hemp, glass and epoxy). The prototype was also fabricated on completion of the analysis.

a. Steps Involved in the Analysis of Mudguard

1. Create a model of mud guard using key points in ANSYS and provide suitable dimensions (thickness, area etc.)
2. Assign the properties of the material for the model created.
3. The model generated is meshed using triangular coarse mesh.
4. Boundary conditions were set according to the application.
5. Suitable support and load conditions were applied.
6. Direction of the load was also assigned for the better solution.
7. The model was solved using ANSYS and the following results were obtained.

Figure 4: Equivalent stress, Equivalent strain and Total deformation of the Hybrid Composite Part

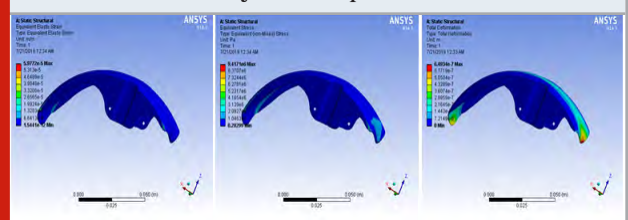


Figure 5: Prototype fabrication



b. Prototype Preparation of the Mud Guard: The hybrid composite material was fabricated by hand layup method. The agent that is used to release the component from the mould is hard wax. It is equally spread over for better release of the component from the mould and it is left to dry for about 30 minutes. The 300 gsm of woven mat glass fiber and 150 gsm of woven mat jute fiber were placed layer by layer on the mould. Epoxy resin and hardener was mixed together in the ratio of 10:1 and quickly the prepared mixture was applied between all the layers of the fiber one by one. Preparation was carried out using handlayup method and left to cure. Care was taken so that to avoid the formation of voids. The cured component was released from the mould by heating the mould for 2 minutes in the oven. The real time fabrication was carried out for the modeled component. The fabricated prototype is presented in the figure 5.

RESULTS AND DISCUSSION

From the characterisation of the tabulation it was evident that there is possibility of improvement on treatment of the fibers. The fiber loading also paved way for the increase in the mechanical properties like tensile, flexural

and impact material strength. The fiber loading has permitted the benefit of loading carrying capacity, since the addition of the fibers has favoured load distribution evenly.

The tensile value has an improved percentage of 54% considering the value of neat epoxy. The lowest improvement is found in HP20, which is 15% comparing with the neat epoxy. The treatment of the fibers showed improvement in them. This is because of the surface modification of the fibers, thereby increasing the surface area of interaction between the resin and the fiber. The minimum to maximum value of their difference were found to 5 - 12 Mpa for HP20 -HP50 on treated fiber reinforcement. The highest value of the flexural strength was found to be 177 Mpa for HP50. The improvement was found to be 72% compared with the neat epoxy. Increase in the fiber loading has improved the flexural strength, this is because concentration of fibers does not favour the fiber pull out thereby increasing the flexural strength. There is no drastic change in the impact strength of the material but there is improvement when there is the fiber loading.

Figure 6: Maximum Equivalent Stress

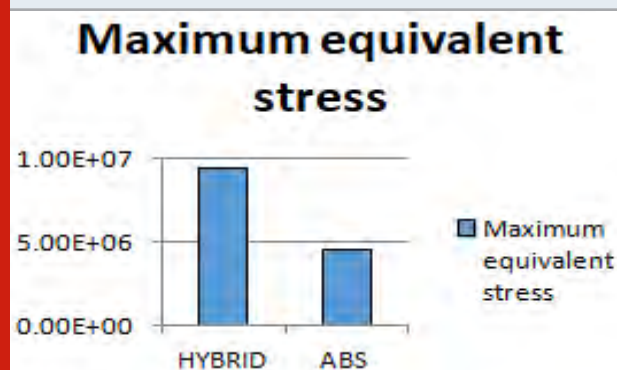
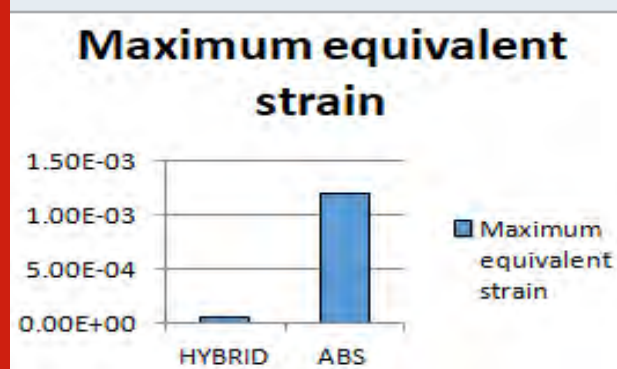


Figure 6: Maximum Equivalent Strain



From the figure 6 it is evident that the resultant maximum equivalent stress for the hybrid mud guard is found to be 9.417×10^6 Pa and for abs it is found to be 4.495×10^6 Pa. The stress for the hybrid mud guard is 210% greater than ABS material. Hence the hybrid mud guard could with stand more load than the ABS, which results in smooth functioning of tyre. From the results

obtained from figure 7, the maximum equivalent strain was found to be 5.9772×10^{-6} for the hybrid mud guard and for ABS material it was found to be 1.197×10^{-3} . The strain for the hybrid mud guard is very less when compared to the ABS and this shows that the hybrid mud guard could resist the loads with no deformation or with very little deformation of negligible value. The total deformation was found to be 6.493×10^{-7} for the hybrid material and for ABS it was found to be 8.745×10^{-1} . The deformation results shows good stability in the hybrid material. The material seems to be a best suitable material for the functional application.

CONCLUSION

From the testing of the hybrid natural material composite, it is evident that the processed fibers have better strength compared to the unprocessed fiber reinforced composites. There are similarities in the relative increase of flexural strength and the tensile strength of the composite materials as the fiber loading increases. The optimum volume percentage selected for the modelling of the mud guard was HP50.

According to the result obtained from the model analysis from the software, the equilateral stress on the mudguard has shown improved values and this is expected from the new hybrid material. The results of the mudguard has permitted only a less strain effects, showing it can take more.

The total deformation on the mudguard shown in the figure has provided that the ends of the mudguard shows little deviations. The observed deviation values provides a minimum change in the structure when compared with the values of the existing ABS materials. The analysis has shown greater difference in using the existing material and the new hybrid material. The jute-glass-epoxy hybrid material has proved to be more improved than the existing one. It is understood that it can be used in higher strength and less weight applications. Keeping the same dimensions of existing Mud-guard experimental stress analysis can be conducted for various materials. Complicated shapes and size can also be developed and tested.

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Effect of Yogasanas and Suryanamaskar on Selected Physical, Physiological and Psychological Variables Among School Girls in Chennai, Tamil Nadu, India

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ABSTRACT

The purpose of the study was to investigate the effect of yogasanas and suryanamaskar on selected physical, physiological and psychological variables among school Girls in Chennai, Tamil Nadu, India. To achieve the purpose of the study, 90 school girls randomly were selected from Chennai district level. Their age ranged between from 14 to 18 years. The subjects were divided into three equal groups of thirty subjects each. Group-I underwent yogasana, group-II underwent suryanamaskar and group-III acted as a control group. The duration of the experimental period for yogasana and suryanamaskar group is restricted to twelve weeks and the number of session per week confined to six days. For this study the following variables were selected as dependent variables. Physical variables: Flexibility. Physiological variables: BMI and Psychological variables: Anxiety, within the limitations and delimitations of this study, the following conclusions were drawn, it was concluded that there was significant improvement in flexibility due to yogasana and suryanamaskar comparing to control group and It was concluded that there was significant reduction in BMI, Anxiety due to yogasanas and suryanamaskar comparing to control group.

KEY WORDS: YOGASANAS, SURYANAMASKAR, PHYSICAL, PHYSIOLOGICAL, PSYCHOLOGICAL VARIABLES AND CHENNAI SCHOOL GIRLS.

INTRODUCTION

Yoga is considered as a full fledged science. The science of yoga consists of acquiring knowledge through observation and experiment. It is a science, which deals with the body and mind controlling the body through the practice of Yoga to achieve the rhythm of mind. The health and strength of the body and the mind are acquired, only when a state of equilibrium is attained whereby the body and the mind are balanced. Like all other arts, Yoga is

also a science as well as a philosophy too. As science is concerned with analyses Yoga too is bent on analysis. Yoga analyses the turbulent mind and shows the ways and means of reaching the ultimate goal of freedom. As any other science, yoga too conveys truth.

On a practical level, yoga keeps the body healthy the mind quite and pure, and self in beatitude. It is therefore a darsana. The practical aspect of yoga darsana conveys the artistic aspect of Yoga with its precision and beauty. The science of yoga works on physical, mental, emotional, psychic and spiritual aspects of a person, when imbalance is experienced at this level, the organs, muscles and nerves no longer function in harmony, rather they act in opposition to one another. Therefore, yoga aims at bringing the different bodily functions into perfect co-ordination so that they work for the good at the whole body. Therefore yoga develops the personality of an individual mentally, morally, spiritually and Intellectually.

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Asana: is the practice of physical postures. It is the most commonly known aspect of yoga for those unfamiliar with the other seven limbs of Patanjali's Yoga Sutra. The practice of moving the body into postures has widespread benefits; of these the most underlying are improved health, strength, balance and flexibility.

Suryanamaskar: an ancient Indian yoga is the art of solar vitalization. It is a complete meditative technique in itself as it includes Asanas, Pranayama, Mantras and Mudras. It has got three aspects: form, vital energy and rhythm. It is the easiest way for a person to get used to Yoga. It should be done along with chanting of mantras in every posture. In simple words, Suryanamaskar is a combination of 12 different postures, followed in a particular sequence with a specific breathing pattern. It helps an individual to vitalize and unblock the whole system. It reduces fat from almost all parts of the body, as it stretches each and every muscle and tones it.

Statement of the problem: The purpose of the study was to investigate the effect of yogasanas and suryanamaskar on selected physical, physiological and psychological variables among school girls.

Hypothesis: (1).It was hypothesized that there would be significant differences due to yogasanas and suryanamaskar on selected physical, physiological and psychological variables among school girls than the control group.

(2).It was hypothesized that there would be significant differences due to yogasanas on selected physical, physiological and psychological variables among school girls of yogasana group than the suryanamaskar group.

METHODOLOGY

To achieve the purpose of the study, 90 school girls were randomly selected from Chennai district level, Tamil Nadu, India. Their age ranged between from 14 to 18 years. The subjects were divided into three equal groups of thirty subjects each. Group-I underwent yogasana, group -II underwent suryanamaskar and group-III acted as a control group. For the period of twelve weeks and six days in a week. The following variables were selected as dependent variables Physical variable: flexibility. Physiological variable: BMI and Psychological variables: Anxiety.

Table 1. Computation of Analysis of Covariance of Flexibility

	YG	SMG	CG	SV	SS	df	MS	F
Pre test mean	25.2	22.80	24.77	B	98.16	2	49.078	2.61
				W	1636.97	87	18.82	
Post test mean	28.76	24.20	25.17	B	347.49	2	173.74	11.35*
				W	1332.33	87	15.31	
Adjusted mean	28.39	24.78	24.96	B	241.36	2	120.68	9.70*
				W	1069.634	86	12.44	

Table F ratio at 0.05 level of confidence for 2nd and 87 (df) = 3.1

Table 2. Scheffe's confidence interval test scores on flexibility

	M		MD	RCI
YG	SMG	CG		
28.39	24.96	-	3.43*	2.27
28.39	-	24.78	0.18	2.27
-	24.96	24.78	3.61*	2.27

*significant at .05 level of confidence

Results on Physical Variable Flexibility: As shown in table-I obtained F-value on the scores pre test means 2.61 that the random assignment of the subject was successful and their scores in flexibility. The analysis of post test means proud that the obtained F value 11.35 was greater than the required value of 3.1 to be significant at 0.05 level. Taking in to consideration of the pre test means adjusted post test means were done

Figure 1



and the obtained F value 9.70 was greater than the required value of 3.1 and hence it was accepted that the yogasana and suryanamaskar practices significantly increased the flexibility. Since significance differences were recorded, the results were subjected to post hoc analysis using scheffe's confidence interval test. The result were presented in table-II.

From the table-II, it was proved that there was significant differences between yogasana and suryanamaskar practices it was also interred that there was significant difference between yogasanas and control group. The mean values of control group and experimental group were graphically represented in Figure-1.

Discussion on the Findings of Flexibility: Flexibility was measured through sit-and reach test the result presented

in table showed significances differences in the adjusted means, as they obtained F-value was greater than the required value the post hoc analysis of obtained adjusted means proved that there was significances differences existed between control group and yogasanas. It was also proved that there was significance difference between yogasana group and suryanamaskar group and control group.

Table 3. Computation of Analysis of Covariance of BMI

	YG	SNG	CG	SV	SS	df	MS	F
Pre test mean	22.11	21.78	21.22	B	12.23	2	6.117	0.74
				W	721.05	87	8.29	
Post test mean	20.06	20.34	21.23	B	22.28	2	11.14	4.12*
				W	235.28	87	2.70	
Adjusted mean	19.87	20.30	21.46	B	39.82	2	19.91	3.24*
				w	73.679	86	0.86	

Table F-ratio at 0.05 level of confidence for 2nd and 87 (df) = 3.103

Table 4. Scheffe's confidence interval test scores on BMI

	M		MD	RCI
YG	SMG	CG		
21.46	19.87	-	1.59*	0.60
21.46	-	20.30	1.16*	0.60
-	19.87	20.30	0.43	0.60

*significant at .05 level of confidence

Figure 2

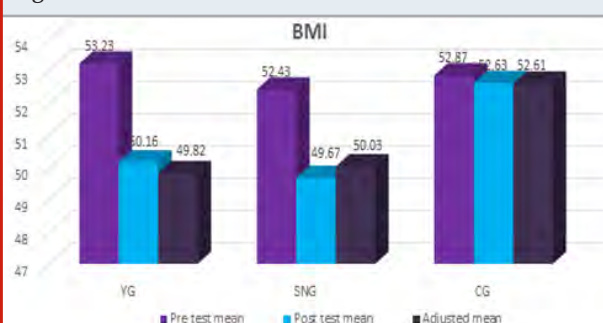


Table 5. Computation of Analysis of Covariance of Anxiety

	YG	SNG	CG	SV	SS	df	MS	F
Pre test mean	53.23	52.43	52.87	B	9.62	2	4.811	0.20
				W	2056.20	87	23.63	
Post test mean	50.16	49.67	52.63	B	151.36	2	75.68	3.51*
				W	1873.80	87	21.54	
Adjusted mean	49.82	50.03	52.61	B	145.08	2	72.54	26.96*
				W	231.381	86	2.69	

Table F ratio at 0.05 level of confidence for 2nd and 87 (df) = 3.1

Results on Physiological Variable BMI

As shown in table-III obtained F-value on the scores pre test means 0.74 that the random assignment of the subject were successful and their scores in BMI. The analysis of post test means proud that the obtained F value 4.12 was greater than the required value of 3.1 to be significant at 0.05 level taking in to consideration of

the pre test means adjusted post test means were done and the obtained F value 23.34 was greater than the required value of 3.1 and hence it was accepted that the yogasana and suryanamaskar practices significantly dicers the BMI. Since significance differences were recorded, the results were subjected to post hoc analysis using scheffe's confidence interval test. The results were presented in table-IV.

From the table IV, it was proved that there was significant differences between yogasana and suryanamaskar it was also interred that there was significant difference between yogasana and control group. The mean values of control group and experimental group were graphically represented in Figure-2.

Discussion on the Findings of BMI: BMI was measured through the basic of Height/Wight the result presented in table showed significances differences in the adjusted means, As they obtained F-value was greater than the required value the post hoc analysis of obtained adjusted means proved that there was significances differences existed between control group and suryanamaskar group. It was also proved that there was significance difference between yogasana group and suryanamaskar group and control group.

Results on Psychological Variable Anxiety

As shown in table-V obtained F-value on the scores pre test means 0.20 that random assignment of the subject were successful and their scores in anxiety. The analysis of post test means proud that the obtained F value 3.51 was greater than the required value of 3.1 to be significant at 0.05 level taking in to consideration of

Table 6. Scheffe's confidence interval test scores on Anxiety

	M		MD	RCI
YG	SMG	CG		
52.61	49.82	-	2.79	1.05
52.61	-	50.03	2.58	1.05
-	49.82	50.03	-0.21	1.05

*significance at .05 level of confidence

Discussion on Reviews: These results are found to be in good agreement with the earlier works done by different researchers. Barshankar, et.al. (2003) examined the effect of yoga on cardiovascular function in subjects above 40 yrs of age after yogasana practices study state blood pressure and heart rate has significant improved, over a period of eight weeks. These results are found to be in good agreement with the earlier works done by different researchers. Reddy and Kumar (2001) conducted a study on yogasanas and aerobic dance and their effects on selected motor fitness components in girl subjects After yogasana and suryanamaskar practices study state agility, flexibility, blood pressure, BMI has significant improved, over a period of six weeks.

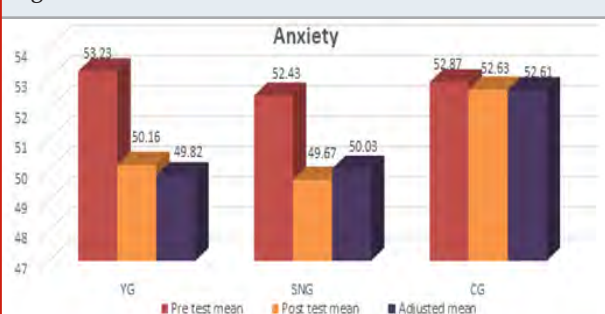
These results are found to be in good agreement with the earlier works done by different researchers. Lohan and Rajesh (2002) studied the effect of asanas and pranayama on physical and physiological components of boys between age group 12-16 years. After asana and pranayama practices study state agility, flexibility, blood

the pre test means adjusted post test means were done and the obtained F value 26.96 was greater than the required value of 3.1 and hence it was accepted that the yogasana and suryanamaskar practices significantly dicers the anxiety. Since significance differences were recorded, the results were subjected to post hoc analysis using scheffe's confidence interval test. The results were presented in table-VI.

From the table-VI, it was proved that there was significant differences between yogasana and suryanamaskar it was also interred that there was significant difference between yogasana and control group. The mean values of control group and experimental group were graphically represented in Figure-3.

Discussion on the Findings of Anxiety: Anxiety was measured through standard anxiety questionnaire the result presented in table showed significances differences in the adjusted means, as they obtained F-value was greater than the required value the post hoc analysis of obtained adjusted means proved that there was significances differences existed between control group and suryanamaskar group. It was also proved that there was significance difference between yogasana and suryanamaskar group control groups.

Figure 3



pressure, BMI has significant improved, over a period of eight weeks.

CONCLUSION

Within limitations and delimitations of this study, the following conclusions arrived at;

- It was concluded that there was significant improvement in flexibility due to yogasana and suryanamaskar when comparing to control group and
- It was concluded that there was significant reduction in BMI, Anxiety due to yogasanas and suryanamaskar when comparing to control group.
- It was concluded that there was significant reduction in Anxiety due to yogasanas and suryanamaskar when comparing to control group.

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A Novel Machine Learning Approach for Prediction of Chronic Obstructive Pulmonary Disease

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ABSTRACT

Chronic Obstructive Pulmonary Disease (COPD) is the most serious chronic disease that begins slowly and progresses to eventual lung cancer. COPD diseases must be treated early before they become serious. Our goal is to predict COPD on the basis of extracted features from region of interest of Computed Tomography (CT) images of patients. We proposed machine learning model using supervised machine learning classifiers to predict COPD. In this paper we discussed prediction of COPD using machine learning approach. The early identification and prediction of lung diseases have become a necessity in the research, as it can facilitate the subsequent clinical management of patients. The proposed prediction models predict COPD and healthy (Non-COPD) efficiently from standard derived features set from CT images of COPD machine learning dataset. Our model used derived features set and trained model using machine learning classifier are Stochastic Gradient Descent, Logistic Regression, Multilayer Perceptron, Random Forest and XG boost applied with optimal parameter selection using distinctive approach which improves the performance of proposed Machine learning classifier. Overall scenario is novel approach for the prediction of COPD using proposed supervised machine learning algorithm.

KEY WORDS: CHRONIC OBSTRUCTIVE, PULMONARY, TOMOGRAPHY.

INTRODUCTION

COPD is common disease characterized by persistent respiratory symptoms and restricted air flow. On-going COPD is a significant reason for dreariness and mortality worldwide which situates social and financial load. Cheplygina, V.(2015),The author examines the stability of instance labels supplied by a variety of Classification systems on various data bases, three of which are medical image sets in particular for CT pulmonary photographs and uses an unmonitored measuring to determine instance

stability. Cheplygina V. (2018), Gaussian texture selected and transfer learning for multicentre classification of COPD.COPD patients data tested based on knowledge graph and adaptive feature set algorithm used for feature selection and integrated model used for diagnosis. Hind J. et al.(2018), Investigate COPD cohort dataset and associative features are taken for standardization practice. These outcomes show that a normalization of training ought to be executed to guarantee the distribution of counterfeit positive outcomes is diminished and stopped and prove that as a standard practice given the subsequent data that can be furnished with its use. The proposed machine learning methods improves learning ability of model and predicts COPD or non COPD accurately.

Literature Review: Sørensen L. et al. (2009) Authors investigated the possibility of using texture metrics for on random CT samples, where the labels are based on external and with proposed texture based method can achieve 69% classification accuracy, which is much better than accuracy of area of voxels underneath threshold.

ARTICLE INFORMATION

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Alharbey R. (2016), Authors proposed effective tools to provide assistance for the elderly COPD patients. A feed forward techniques back propagation algorithm is used for prediction. Sørensen L. et al. (2010) investigated in computed tomography (CT) images to estimate chronic obstructive pulmonary disease at 0.817 AUC. Cheplygina, V. et al. (2014) This is substantially better compared to integrating regional categorizations into an overall image grade and compared with standard computerized measurement measures in pulmonary CT, The researchers analysed various hypotheses in a multiple instance in the sense of COPD and received AUC of 0.742, given the overall distribution of lung tissue plates, even though there are conceptual areas of disease trends relevant to COPD. Cheplygina V. et al. (2015) Authors evaluate instance stability using unsupervised method and demonstrate that a balance performance strength adjustment can be made when comparing MIL classifiers.

Randomly sampled Region of Interest together with a simple Machine learning classifier and uses the averaging rule is a good starting point for distinguishing COPD from non COPD scans, achieving at most 79.0. Koppad, S. H. and Kumar, A. (2016) their at most aim is to develop a health care expert for the identification of COPD by using decision tree algorithm. Cheplygina V. et al. (2018), discovered that surface based measure was basically better at isolating between subjects with and without COPD than were the two most fundamental quantitative extents of COPD in the composition, which rely upon thickness. Yang G. et al. (2018) Investigator proposed a method for predicting daily COPD exacerbation risk has been developed using the trend pattern features obtained from longitudinal physiological measurement data. Fang Y. et al. (2019), Designed COPD model based on knowledge graph and find out results by using DSA-SVM. Jain P., et al. (2019)

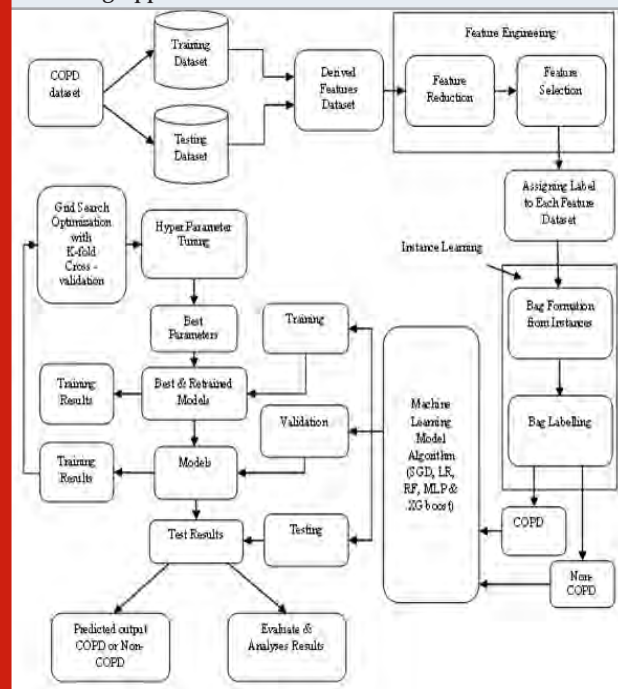
Authors applied classification techniques to improve classification performance and assessment time by reducing imbalance from used COPD dataset which has high dimension. Wang, Q. et al. (2020) proposed Gaussian process classification with gradient boosting decision tree feature transformation model to improve accuracy. Islam M. A. et al. (2018), Lung sound signals data are captured and classification performed using multiclass classification approach which based on multiclass classification. Ajina K.A. et al., (2017) Author designed model for detection of COPD at early stages new method implemented using Naïve Bayes classifier and Euclidean distance algorithm. Matheson M. et al. (2016) Data driven predictive algorithms for predicting the occurrence of an exacerbation of COPD of a patient in the near future were trained, validated and compared and best accuracy achieved using a PNN classifier was 85.5%. As per review most of COPD prediction model suffered from prediction accuracy and performance in terms of AUC. We are aiming to optimize prediction ability of the proposed COPD prediction model.

MATERIAL AND METHODS

Dataset Acquisition: (COPD Machine Learning Datasets, 2020) COPD dataset contains derived features from CT images of patients scanned at the National Jewish Center in Denver, Colorado. This COPD dataset include training Dataset (DLCST) and testing Dataset (Frederikshavn). In given dataset two features are derived (extracted) gss and kdei. GSS is Gaussian scale space features or histograms of intensity values after filtering the image using eight filters, four scales and histograms of 10 bins. Botev, Z., et al. (2010), KDEI is a histogram intensity values in the ROI, estimated with Kernel Density Estimation. The feature size 320 for GSS and 256 for KDEI. In model learning final feature length for GSS is 30000×320 and 30000×256 for KDEI. The feature length of combined feature vector is 30000×576 . The label of each ROI, determined by the subject's diagnosis: COPD (1) or healthy (Normal) (0). COPD diagnosis is determined according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) criteria ($FEV_1/FVC < 0.7$). COPD is a heterogeneous disease with various clinical presentations.

Feature Pre-processing and Feature Reduction: In feature pre-processing Calculate normalized value for all features set and scale all features data into specific range. Paoletti M. et al., (2009), Principle Component Analysis (PCA) allow us to reduce dataset into smaller number of dimensions with minimal loss of information. PCA used to make a classifier system more effective. PCA method is used before classifying used for dimensionality reduction of COPD disease dataset. In proposed prediction model performance of proposed Machine learning algorithms increased with feature reduction using PCA method.

Figure 1: Proposed COPD Prediction model using Machine Learning approach



Discrete Feature Selection and Hybrid Feature Selection

Strategy: In discrete feature selection method we selected GSS as separate feature and not selecting other feature. We analyse effect of GSS feature on proposed ML classifier. The GSS feature is histogram intensity values from ROI of CT images of dataset. In this feature selection process algorithm performance are measured. In phase of hybrid feature selection both features are selected and combined features GSS and KDIE to improve accuracy of classifier. The proposed strategy of mixed feature selection optimizes the performance of classifiers.

In this case of features selection ML classifier model trained with large set of features which effects on predicting capability of classifier as compared. In bag labelling this bag formation instance learning performed and the bags formed from instances of dataset. This process happened before bag labeling. As per given dataset labelling for given data is COPD or Non COPD(Healthy) which is used to labelling data. The proposed ML model filters out data based on these labels.

Machine Learning Approach: The proposed approach is supervised machine learning algorithm and these learning algorithms make use of labeled data. We applied five supervised methods of machine learning (ML). Stochastic Gradient Descent Algorithm (SGD) is famous for its performance, which is mostly linear with the learning rate and simple implementation. This algorithm process that concerns with Random probability for i in range (m) and it is a slope plunge technique improved by the pace of union. Second we investigated COPD prediction model using Logistic Regression(LR) classifier which is most utilized ML algorithm to calculations for twofold arrangement and make use of given set of independent variable, it predict dependent variable by giving values 0 and 1, it predict values which lies in range 0 to 1. Third machine learning method is multilayer perceptron algorithm(MLP) consist of input, output and hidden layer of activating nodes learned through back propagation, during learning happened by switching weight after that data element processed.

Proposed Ensemble Machine Learning Method

Random Forest (RF): RF are very promising algorithm for its performance and takes less training time as compared to other algorithms. It predicts output with high accuracy, even for the large dataset it runs efficiently. We optimize RF algorithm by optimal selection of hyperparameter which improves its testing accuracy. RF proceeds with selecting random data points (K) from the training data and Build Decision tree (DT) related with the particular sample data points. Then Choose numbers say N for decision trees that to build. Repeating these procedure and finally for new data points, find the predictions of each decision tree, and assign the new data points to the category that wins the majority votes. Considering B is bagging then Predications can be made by taking the majority vote in the case of classification trees using.

$$\hat{f} = \frac{1}{B} \sum_{b=1}^B f_b(x')$$

XG Boost-

The learning ensemble increases the score of our computer model relative to simple models. Ichikawa D. et al. (2016), XG boosts an algorithm which constructs an arbitrarily differentiable loss function of the model, in a way similar to other boosting methods but which is more popular than a lot of approaches. In XG boost Loss function gives $l(y_i, \hat{y}_i)$ our purpose to minimize following objectives

$$L(\theta) = \sum_{i=1}^I l(\hat{y}_i, y_i)$$

In case of the XG boost parameter prioritization, select a reasonably high rate of learning. A learning rate of 0.1 usually functions but varies from 0.5 to 0.3 for multiple issues. For this learning rate, decide the best number of trees in order to improve testing accuracy.

The proposed Novel Machine learning approach for Prediction of Chronic Obstructive Pulmonary Disease- Input: Training and Testing instance set S , a vector of feature values and the class i.e.

label value

Feature Set $F(i) = \{GSS(i), KDEI(i)\}$

Label Set $L(i) = \{COPD(1), NORMAL(0)\}$

Initialization

Step1: Collect and Prepare feature data and label data from raw dataset values from

COPD Machine Learning Dataset.

Preprocessing Phase

Step2: For each feature data

Calculate the normalized value of all features set.

Scale the all feature data into specific range.

Perform Feature reduction using PCA

Parameter Hyper tuning Phase

Step3: Define the model for SGD, LR, RF, MLP and XG Boost.

Step4: Define the range of possible value for all hyper parameters of ML algorithms.

SGD: { 'alpha', 'max_iter', 'loss', 'penalty', 'n_jobs' }

LR: { 'C', 'random_state', 'penalty', 'n_jobs' }

RF: { 'n_estimators', 'max_features', 'criterion', 'max_depth', 'min_samples_split',

max_leaf_node s', 'random_state', 'min_samples_leaf' }

MLP: { 'hidden_layer_sizes', 'max_iter', 'activation', 'solver', 'alpha', 'learning_rate' }

XGboost: { 'min_child_weight', 'objective', 'gamma', 'subsample', 'colsample_bytree',

'n_estimators','learning_rate','max_depth']

Step5: Sampling of hyper parameters values using Grid Search CV Function.

Step6: Evaluate and find the best score among all hyper parameters value.

Step7: Validate the model using K-Fold Validation Learning Method.

Training Phase

Step8: Initialize the parameter tuned for ML model of SGD, LR, RF, MLP and XG boost.

Step9: Initialize the feature data and label data for training dataset.

Step10: Train the model for respective ML algorithms.

Step11: Validate the model performance using K-fold cross validation method.

Step12: If validation successful then saves the trained model TMsgd, TMLr, TMrf, TMmlp and TMxgboost and if not the repeat from step 8.

Testing Phase

Step13: Initialize the feature data for testing dataset.

Step14: Load the trained model of ML algorithms.

Step15: Predict the results whether its COPD (1) or Normal (0).

Step16: Plot Confusion matrix between Actual Label Data and Predicted Label Data to Check system accuracy.

Evaluation Phase

Step 17: Evaluate performance of classification model based on ROC, Confusion Matrix

Parameters based TP, FP, TN and FN.

Hyper parameter Optimization and Grid Search optimization:

The choosing of acceptable hyperparameters for an algorithm is a problem for the priority tuning of hyperparameters. A hyperparameter is used to track the learning process. It strengthens model parameters to reliably train and analyze. Various thresholds, weights or speeds of learning may be used for generalizing different data patterns in the same form. Grid search lets you essentially pick the problem optimization parameter choices so that the test and error solution is automatic. We used Grid search method for optimization problems which supports to achieve the highest model accuracy. K-fold learning validate according to number of fold in order to optimize machine learning model.

RESULT AND DISCUSSION

We trained model using discrete features as GSS features and applied SGD, LR, MLP, RF and XG boost algorithm. The validate model using cross validation and finally performed testing to evaluate model. In second phase proposed classifier trained with KDEI features set and ML classifier tuned with optimal parameter. The confusion matrix contributes performance of algorithm and prediction ability of classifier. The confusion matrix for hybrid feature selection with Random Forest and XG boost method shown in Table-1.

Table 1. Confusion matrix using hybrid feature selection with RF and XG boost algorithm

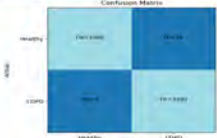
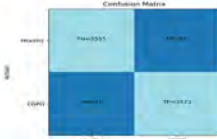
Machine Learning Algorithm	Confusion matrix	Discussion
Random Forest		In case of resultant confusion matrix, the correctly classified instances for Random Forest algorithm are 3582, which shows improved prediction ability for given sampling data. RF gives high prediction accuracy.
XG boost		The confusion matrix of XG boost is more precise in terms of prediction. XG boost True Positive 3572 and True Negative 3555 as shown in which correct classification of XG boost.

Table 2. Classification performance of RF Classifier with hybrid features set

RF	Precision	Recall	f1-score
Healthy	1.00	0.99	1.00
COPD	1.00	1.00	1.00

Table 3. Classification performance of XG boost Classifier with hybrid features set

XG boost	Precision	Recall	f1-score
Healthy	0.99	0.99	0.99
COPD	0.99	0.99	0.99

RF classifier with mixed (hybrid) feature selection method gives precision 1.00 for COPD and 1.00 for healthy and F1 score 1.00 for Healthy and 1.00 for COPD shown in Table-2. XG boost classifier with mixed (hybrid) feature selection method gives precision 0.99 for COPD and 0.99 for healthy and F1 score 0.99 for Healthy and 0.99 for COPD where recall is 0.99 as shown in Table- 3.

In case of GSS feature the performance of proposed model are improved and testing accuracy increased as we improved learning of algorithm. In case hybrid feature selection outstanding performance of both classifier as shown in Table-6.

Table 4. Performance of Proposed Machine learning algorithm using discrete feature selection

Feature Selection Strategy	Machine Learning Algorithm	Sensitivity	Specificity	AUC	Accuracy
Discrete features Selection GSS	Random Forest	0.9874	0.9975	0.9997	99.24%
	XG Boost	0.9874	0.9825	0.9987	98.49%

Table 5. Performance of Proposed Machine learning algorithm using discrete feature selection

Feature Selection Strategy	Machine Learning Algorithm	Sensitivity	Specificity	AUC	Accuracy
Discrete features Selection KDEI	Random Forest	0.9874	0.985	0.9996	98.62%
	XG Boost	0.9624	0.99	0.9949	97.62%

Table 6. Performance of Proposed Machine learning algorithm using hybrid feature selection

Feature Selection Strategy	Machine Learning Algorithm	Sensitivity	Specificity	AUC	Accuracy
Hybrid features Selection GSS and KDEI	Random Forest	0.9974	0.995	0.9999	99.62%
	XG Boost	0.9924	0.9875	0.9992	98.99%

Figure 2: ROC shows predction of COPD and Healthy using proposed Random forest classifier by using hybrid feature selection

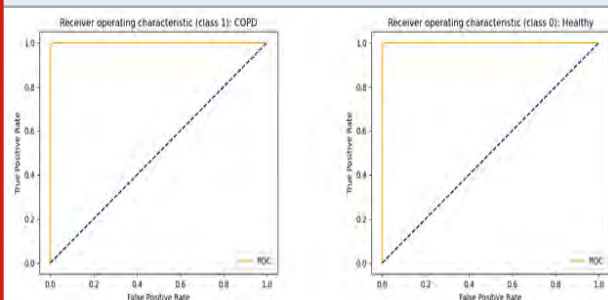


Figure 3: ROC shows prediction of COPD and Healthy using proposed XG boost classifier by Hybrid feature selection

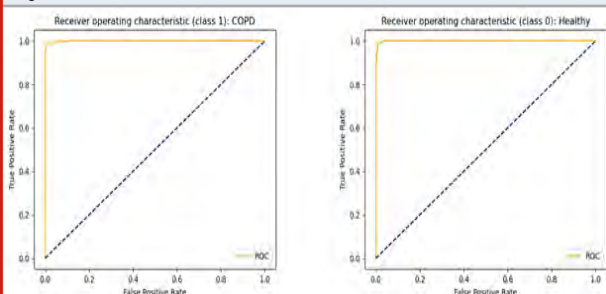


Figure 4: Accuracy comparison of proposed COPD prediction model using machine learning approach with previous model

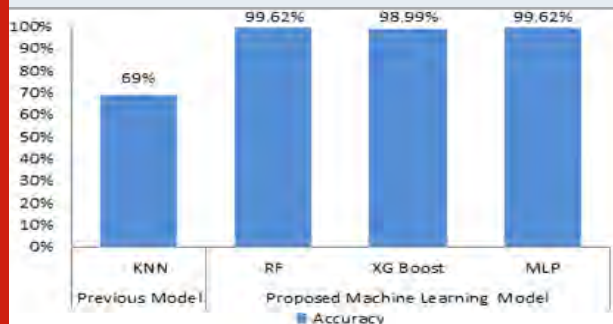


Figure 5: Comparative AUC of Proposed Model and Previous Model using Discrete feature selection GSS and KDEI

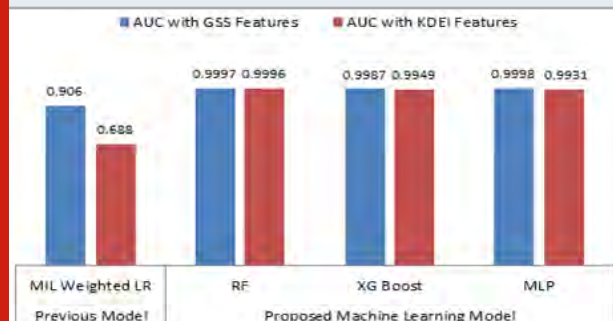
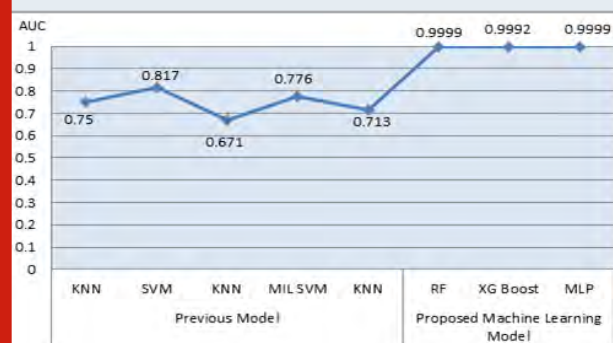


Figure 6: Comparative AUC of Proposed machine learning Model and Previous Model using hybrid features selection



ROC graph plotted TPR against FRP, if predicted and actual value is true then it is TP and if actual value is negative then is false positive. ROC of RF and XG boost model shows best performance at all threshold as shown in Figure-2 and Figure-3. We optimize proposed machine learning algorithm Random forest, XG boost and Chopde, N. R. and Miri, R., (2020) Multilayer perceptron which results in high accuracy as compared to previous model based on Sørensen, L. et al.(2009), KNN method, which shown in Figures-4.

The peak point of AUC 0.9999 for RF, 0.9992 for XG boost and Chopde, N. R. and Miri, R., (2020) 0.9999 for

MLP are our proposed model AUC which are outstanding as compared to AUC of previous prediction models based on Sørensen, L. et al. (2009), KNN method, Sørensen, L. et al. (2010), SVM Method and Cheplygina, V. et al. (2014) MIL SVM method, Sørensen, L. et al. (2012) KNN as shown in Figure-6. COPD prediction model performance shows that our proposed machine learning algorithms are best in terms in many measures like AUC and accuracy.

CONCLUSION

In the proposed COPD prediction model we analyses performance of proposed machine learning classifier using derived features set GSS, KDEI from COPD dataset. It is found that feature selection effects on machine learning classifier performance. Our proposed COPD prediction model trained with variety of features set of COPD dataset and our novel approach optimize the performance of proposed machine learning classifier and gives remarkable AUC in case of MLP, RF and XG boost. The proposed prediction model worthy to diagnosis of patient is COPD or healthy it gives promising results. The accuracy of proposed Multilayer perceptron classifier gives 99.62% with AUC of 0.9999.

The ensemble method Random Forest classifier gives 99.62% accuracy with AUC of 0.9999 and XG boost reported 98.99% accuracy and AUC of 0.9992 which gives outstanding performance as compared to other classifier when hybrid features set are used. The resultant measures are superior like prediction accuracy and AUC with approach of machine learning classifier than previously reported research on same dataset. The novel machine learning approach for proposed COPD prediction model is very helpful for predicting chronic obstructive pulmonary disease patients at early stages and to assist patients by the expert. Our implemented system is reducing burden of healthcare system by contributing efficient COPD prediction model.

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Empirical Analysis of Object-Oriented Metrics for Prediction of Software Faults

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ABSTRACT

Software fault prediction is the highly researched field due to its significance in the software industry. Object oriented metrics plays a significant role in software fault prediction. Various features of object orientation like inheritance, polymorphism, abstraction, data encapsulation is helpful in finding fault prone module that will significantly reduce the software maintenance cost. This paper presents an empirical analysis of the significance of object-oriented metrics for building an efficient fault prediction model. The experiment is performed on Camel 1.6 dataset collected from promise data repository. To exhibit the importance of object-oriented metrics for prediction of faults a correlation table is also prepared. The model was build using various machine learning techniques like SVC, Logistic regression, Adaboost, Bernoulli naïve bayes and the results proved that object-oriented metrics are good indicators of fault prone modules.

KEY WORDS: FAULTS, MACHINE LEARNING TECHNIQUES, OBJECT-ORIENTED METRICS, SOFTWARE FAULT PREDICTION.

INTRODUCTION

The last two decade was completely dedicated to the object-oriented approach for software development. It is the root of modern-day software development. It helps to develop stable and maintainable software product. Object oriented metrics are the measurements of the various aspects of object-oriented software. Generally, each software metric is related to some functional properties of the software project such as coupling, cohesion, inheritance, code change etc., and is used to indicate an external quality attribute such as reliability, testability, or fault-proneness. The performance of the model is highly influenced by the type of metrics used. The popularity of object-oriented metrics lies in the researches where

these were used twice as when compared with traditional metrics. This study investigates the significance object-oriented metrics with regard to defect prediction. A correlation analysis was also performed in order to investigate the relation between the software metrics and faulty modules. Figure 1 show various design measures related to fault proneness of a class.

II. Object Oriented Metrics Used For Software Fault Prediction

Object-oriented (OO) metrics are divided into two categories: structural metrics and dynamic metrics.

A. Static metrics: Static metrics measures different aspects of the source code by doing static analysis of the code. we have many structural OO metrics suites proposed by various researchers. Some of them are given below:

1. CK metrics suite proposed by chaidamber and kemere in 1994. It includes "Coupling between Object class CBO), Lack of Cohesion in Methods (LCOM), Depth of Inheritance Tree (DIT), Response for a Class (RFC), Weighted Method Count (WMC) and Number of Children (NOC)"
2. MOODS metrics suite is proposed by Harrison and

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Counsel in 1998. It includes “Method Hiding Factor (MHF), Attribute Hiding Factor (AHF), Method Inheritance Factor (MIF), Attribute Inheritance Factor (AIF), Polymorphism Factor (PF), Coupling Factor (CF)”

3. Wei Li and Henry metrics suite is proposed by Li and Henry in 1996. It includes “Coupling Through Inheritance, Coupling Through Message passing (CTM), Coupling Through ADT (Abstract Data Type), Number of local Methods (NOM), SIZE1 and SIZE2”
4. Lorenz and Kidd’s metrics suite are proposed by Lorenz and Kidd in 1994. It includes “PIM, NIM, NIV, NCM, NCV, NMO, NMI, NMA, SIX and APPM”
5. Bansiya metrics suite proposed by Bansiya and Davis in 2002. It includes “DAM, DCC, CIS, MOA, MFA, DSC, NOH, ANA, CAM, NOP and NOM”
6. Briand metrics suite is proposed by Briand et al. in 1997. It includes “IFCAIC, ACAIC, OCAIC, FCAEC, DCAEC, OCAEC, IFCMIC, ACMIC, OCMIC, FCMEC, DCMEC, OCMEC, IFMMIC, AMMIC, OMMIC, FMMEC, DMMEC, OMMEC”

Figure 1: Object oriented design measures related to fault proneness of a class

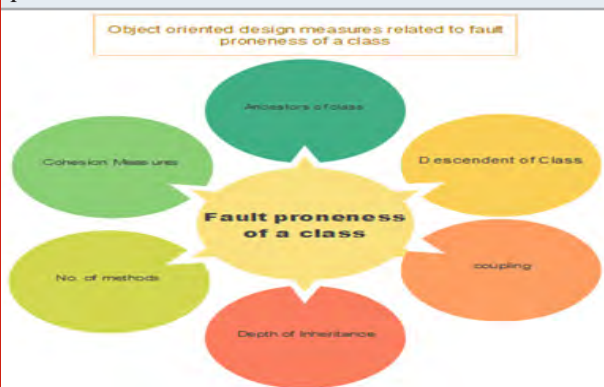
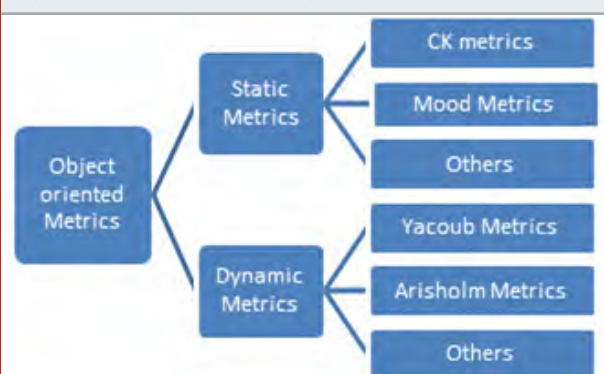


Figure 2: Classification of object-oriented metrics



B. Dynamic metrics: Dynamic metrics refer to the set of metrics which depends on the features gathered from a running program. These metrics reveal behaviour of the software components during execution, and are used to measure specific runtime properties of programs, components, and systems. There are many dynamic metrics suite that are given below:

1. Yacoub metrics suite proposed by Yacoub et al. in 1999. It includes “Export Object Coupling (EOC) and Import Object Coupling (IOC)”
2. Arisholm metrics suite proposed by Arisholm in 2004. It includes “IC_OD, IC_OM, IC_OC, IC_CD, IC_CM, IC_CC, EC_OD, EC_OM, EC_OC, EC_CD, EC_CM, EC_CC”
3. Mitchell metrics suite proposed by Mitchell and power in 2006. It includes “Dynamic CBO for a class, Degree of dynamic coupling between two classes at runtime, Degree of dynamic coupling within a given set of classes, RI, RE, RDI, RDE”.

III. Analysis Of Existing Literature: Many previous studies have examined the capabilities of object-oriented metrics for software fault prediction and found that object-oriented metrics performed better than static code metrics in predicting software faults because metrics represent various structural characteristics of object-oriented software systems like coupling, cohesion, inheritance, encapsulation, complexity, and size metrics. The research evidences pertaining to it are presented in following text. Syed rashid aziz [2020] performed a survey on inheritance metrics in object-oriented metrics for finding the faults in the software modules.

Md. Fahimuzzman et al. [2019] proposed a framework to handle the class imbalance issue. Author used object-oriented metrics to find the correspondence between object-oriented attributes and faults. Emam et al. proposed a model to predict vulnerability of a class on the essence of CK metrics. The probability that class has a fault was estimated with logistic regression model. Fioravanti and Nesi applied Principal Component Analysis and Multivariate Logistic Regression model to estimate the proneness of different software components. The work of Gyimothy, Ferenc, and Siket studied the effectiveness of individual CK metrics in OO software. The study collected the bugs data for Bugzilla, which is open-source software. The study found that CK metrics reveals low severity faults better.

Singh, Kaur, and Malhotra also carried out the similar investigations. Olague et al. evaluated three OO metrics suites: CK, MOOD and QMOOD to predict fault proneness of the classes. Their study used ‘Rhino’ software as subject software. They concluded that QMOOD and CK metrics encompass similar constituents. Study also confirms the capabilities of these two suites in fault prediction. As per their study the components of MOOD suite are not much effective predictors of fault proneness. Elish, Al-Yafei, and Al-Mulhem experimentally compared effectiveness of MOOD, CK and Martin’s suites for fault prediction in java packages. The eclipse IDE was used as subject program for the study. The study revealed that composite models based on MOODS and Martin’s suites performed better than composite models based on CK and MOOD.

Xu, Ho, and Capretz found that SLOC, RFC, CBO and WMC metrics of CK suite are reliable ones in predicting the fault. Authors incorporated Spearman’s rank correlation coefficient method and LR technique to

study the inter-dependence of metrics and software fault-proneness. Malhotra and Khanna further enacted machine learning and search based techniques (SBT) to determine the relationship of OO metrics and change prediction. In their work they investigated effectiveness of six SBT, four machine learning techniques and the

Logistic Regression (LR). This study advocates the use of methods based on SBT in classification of classes for their change proneness. In Malhotra and Bansal put thresholds on the object-oriented metrics. The metrics worked upon are CK metrics.

Table 1. Description of tool

Tool	Description	IDE
Anaconda Distribution	Anaconda is a birthplace of python data science. Anaconda is a package manager, an environment manager, and Python distribution that contains a collection of many open-source packages	Jupyter Notebook

Table 2. Description of Dataset

Dataset	No. of instances	No. of attributes	No. of buggy classes	No. of non-buggy classes
Camel 1.6	965	24	189	776

Figure 3: Detailed description of dataset

	wmc	dit	noc	cbo	rfc	lcom	ca	ce	npm	lcom3	...	dam	moa	mfa	cam	lc	cbm	amc	max_cc	avg_cc	bug
0	5	3	0	7	10	0	1	7	4	0.250	...	1.000	1	0.921	0.360	1	2	7.400	1	0.600	0
1	4	1	0	3	5	4	1	2	3	0.667	...	1.000	1	0.000	0.500	0	0	3.000	1	0.500	0
2	20	4	0	26	95	144	2	26	13	0.842	...	1.000	0	0.727	0.197	4	5	20.300	3	1.000	0
3	3	2	0	8	22	3	2	6	2	2.000	...	0.000	0	0.750	0.667	1	3	54.000	15	5.333	1
4	0	1	0	25	20	22	22	3	6	0.571	...	1.000	0	0.000	0.250	0	0	20.875	1	0.750	1
5	3	1	0	6	3	3	5	2	3	2.000	...	0.000	0	0.000	1.000	0	0	0.000	1	1.000	0
6	1	1	0	0	2	0	0	0	0	2.000	...	0.000	0	0.000	1.000	0	0	3.000	0	0.000	0
7	6	1	0	9	17	15	2	7	6	2.000	...	0.000	0	0.000	0.333	0	0	6.667	4	1.333	0
8	0	1	0	0	0	0	0	0	0	2.000	...	0.000	0	0.000	0.000	0	0	0.000	0	0.000	0
9	4	1	0	7	8	6	0	7	3	2.000	...	0.000	0	0.000	0.375	0	0	4.500	1	0.750	0

Rosli et al proposed a fault prediction model by using the values of object-oriented metrics from the web application as input values to the GA to predict the faulty systems. The main goal of the proposed model is to find the most likely software modules that might be the most problematic module in the future. The authors selected eight internal metrics to clarify the main design attributes of object-oriented applications, and these metrics are lines of code (LOC), coupling between object classes (CBO), response for a class (RFC), depth inheritance tree (DIT), number of children (NOC), weighted methods per class (WMC), lack of cohesion (LCOM), and number of public methods (NPM) and they used a single constrained fitness function to specify the optimal metrics conjunction in order to maximize the percentage of faults, which means fewer faults. It is evident from the literature reviews that object-oriented metrics are extensively being exploited to examine fault proneness of a software component. And it's still an area of investigation.

Dataset and Tool Used in the Study: To perform the experiment, we have used the dataset camel-1.6 class

level dataset available in promise data repository. The tool we used is anaconda python distribution. The description of dataset and tool is mentioned in the following table 1 and Table 2. The detailed description of dataset is shown in Fig. 3:

Figure 4: Data balancing ratio of dataset

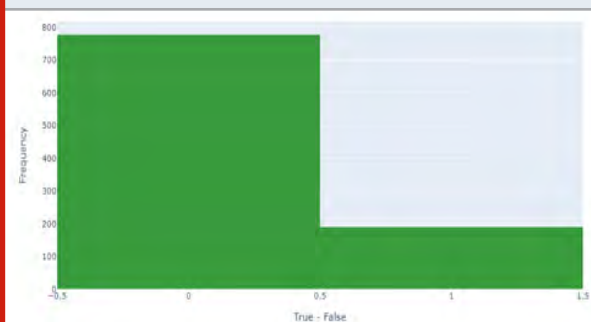


Figure 5: Identification of outliers using boxplot

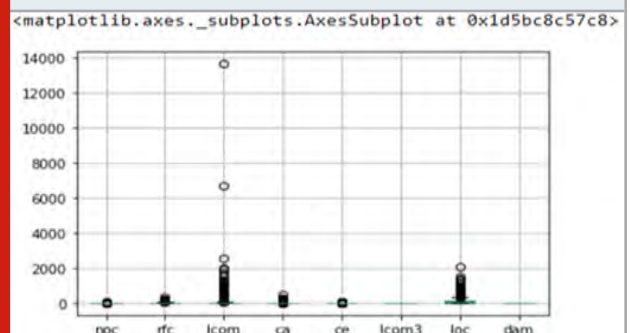


Figure 7: Performance score of SVM

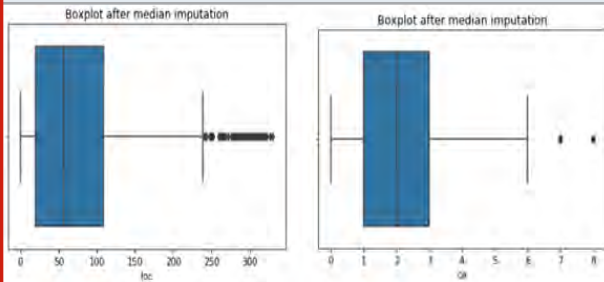


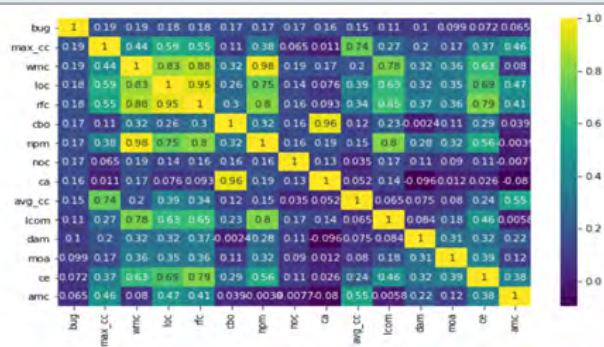
Figure 7: Performance score of SVM

[[222 0]				
[68 0]]				
	precision	recall	f1-score	support
0	0.77	1.00	0.87	222
1	0.00	0.00	0.00	68
accuracy			0.77	290
macro avg	0.38	0.50	0.43	290
weighted avg	0.59	0.77	0.66	290

Table 3. Results of Classifiers

Name of Classifier	Accuracy score
Logistic Regression	0.75
AdaBoost	0.86
Bernoulli Naïve Bayes	0.76

Figure 8: Correlation of object-oriented metrics with faults



Dataset and Tool Used in the Study: To perform the experiment, we have used the dataset camel-1.6 class level dataset available in promise data repository. The tool we used is anaconda python distribution. The description of dataset and tool is mentioned in the following table 1 and Table 2. The detailed description of dataset is shown in Fig. 3:

CONCLUSION AND FUTURE SCOPE

In this paper we have empirically analysed the importance

of object-oriented metrics in finding the fault prone modules. The results proved that object-oriented metrics are good indicator of faulty modules. Also, we find the correlation of various software metrics with the faults. The value close to 1 is highly correlated with the bug. So, on that basis we also recommend the set of metrics that are good indicators of fault prone modules. This study greatly helps the practitioners in finding the right set of object-oriented metrics for prediction of faults in their future projects. In the future scope they can implement the same model with different dataset or with different classifiers.

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IVF Efficiency After Metroplasty in Patients with Uterine SCAR

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ABSTRACT

Infertile marriage, the frequency of which does not tend to decrease, is an urgent issue of modern healthcare. According to world statistics, the frequency of infertility is 10-15% and its causes are numerous. The prevalence of this problem is increasing every year. Today, assisted reproductive technologies can help overcome all known causes of infertility. Pregnancy achieved with the use of assisted reproductive technologies ended in live births based on embryo transfer in IVF cycles 28.0% and with ICSI 25.7%. increasing the efficiency of assisted reproductive technologies in the treatment of uterine scar. In our study, the age of the patients, gynecological status, duration of infertility, clinical manifestations, IVF performance, results of ultrasound diagnostics for the viability of the uterine scar, as well as signs of inconsistency of the uterine scar were noted. In our study, after confirming the inconsistency of the uterine scar, 30 patients underwent metroplasty. According to the protocol, after the surgery, the patients were prescribed contraception in order to avoid unwanted pregnancy until the full recovery of the uterine scar within 6 months. Conducting pregravid metroplasty in patients with inconsistent uterine scar will significantly increase the rate of IVF success. The results obtained contributed to the introduction of metroplasty surgery to correct the inconsistency of the uterine scar in patients when planning ART.

KEY WORDS: INFERTILE MARRIAGE, IVF, METROPLASTY, SCAR.

INTRODUCTION

Infertile marriage, the frequency of which does not tend to decrease, is an urgent issue of modern healthcare. According to world statistics, the frequency of infertility is 10-15%. The prevalence of this problem is increasing every year. Today, assisted reproductive technologies can help to overcome all known causes of infertility. These

methods include the transfer of gametes into the lumen of fallopian tubes, in vitro fertilization and transfer of embryos into the uterine cavity, transfer of zygotes into the lumen of fallopian tubes, transfer of embryos into fallopian tubes, freezing of gametes, and embryos, ovarian and testicular tissue, oocyte and embryo donation, surrogacy. However, the methods of assisted reproductive technologies, despite the development of technologies, demonstrate insufficient efficiency. According to ESHRE, the Russian School of Reproductology, modern ART methods can achieve the effectiveness of infertility treatment up to 30-40% per attempt. Pregnancy achieved with the use of assisted reproductive technologies ended in live births based on embryo transfer in IVF cycles 28.0% and with ICSI 25.7%.

In recent years, there has been a significant increase in cesarean section operations, the frequency of which

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exceeds the WHO recommended limit, 15% of the volume of all delivery operations. According to the statistical collections "Health of the population of the Republic of Kazakhstan in 2018", in the Republic of Kazakhstan in 2017 the frequency of cesarean section of the total number of women in labor was 18.6%, in 2018 - 19.3%. Moreover, among re-pregnant women who had a pregnancy through assisted reproductive technologies (IVF), the proportion of patients with a scar on the uterus can be up to 70-80%.

Despite the fact that there is no generally accepted opinion about the possibility of the influence of the presence of a scar on the uterus on the effectiveness of IVF and on fertility in general, based on the results of a retrospective analysis, Wang Y-q. with co-authors noted a decrease in the frequency of pregnancy with the use of assisted reproductive technologies in women with a history of operative delivery. Moreover, it was found that in the presence of a scar defect on the uterus, the incidence of clinical pregnancy decreased to 12.5%. In addition, the fact that a scar on the uterus poses a high risk of pregnancy complications is beyond doubt. Therefore, a thorough assessment of predictors of the effectiveness and safety of IVF procedure in patients with uterine scar requires study.

Aim of the study: increasing the efficiency of assisted reproductive technologies in the treatment of uterine scar.

MATERIAL AND METHODS

This research work was carried out from 2017 to 2020 on the basis of the Department of Obstetrics and Gynecology of the NJSC "Astana Medical University", the "Ecomed" medical center and the Akmola Regional Hospital №2 in Nur-Sultan. The first stage included an analysis of the records of patients who underwent ART from 2017-2020

in order to determine predictors of IVF performance, which included:

- age - 25 - 40 years;
- patients with secondary infertility who have undergone IVF treatment and transfer of one embryo (blastocyst) into the uterine cavity;
- normal menstrual function;
- satisfactory ovarian reserve (AMH more than 1 ng / ml, the total number of antral follicles in the ovaries on days 2-5 of the menstrual cycle is 6 or more)
- sex life in marriage;
- lack of bad habits.

Ultrasound examination of the small pelvis was carried out to assess the viability of the uterine scar in all patients with uterine scars on a Voluson S8 apparatus (General Electric, USA), with a contact scanning system using a transabdominal convex probe with a frequency of 2-5 MHz and a transvaginal probe with a frequency of 2.9 -9.7 MHz, in 2D, 3D, 4D mode, allowing using longitudinal and transverse sections to assess the structure of the myometrium, the presence, and features of signs characteristic of the inferiority of the scar on the uterus. In this case, ultrasound examination was carried out in phase 1 at 5-6, 8-9, 12-13, and in the second phase at 16-18 days of the menstrual cycle. A total of 804 ultrasound examinations were carried out. The main diagnostic criteria were the following:

- typical location of the scar;
- absence of deformations;
- "niches", areas of retraction;
- thickness of the myometrium in the lower uterine segment over 4 mm;
- absence of heterogeneous inclusions in the area of the scar;
- adequate blood flow with an even distribution of color signals.

Table 1. Distribution of patients in the studied groups by age

		All patients (n=1858)	Patients withoutscar on uterus (1657)	Patients with scar on uterus (n=201)
		abs±CI /%	abs±CI /%	abs±CI /%
Age	25-30	520±0,35	472±0,47	48±1,48
		(28,0%)	(28,5%)	(23,9%)
	31-35	475±0,42	404±0,51	71±1,32
		(25,6%)	(24,4%)	(35,3%)
	36-40	863±0,97	781±0,42	82±1,14
		(46,4%)	(47,1%)	(40,8%)
*p>0,05				

If signs of a defective scar on the uterus were detected, the patients underwent hysteroscopy on the 6-7th day of menstrual cycle with direct visualization of the uterine cavity using a KARLSTORZ office hysteroscope with a

diameter of 5 mm, which allows it to be inserted into the cervical canal atraumatically. At the same time, important diagnostic signs of the inferiority of the scar on the uterus include retraction in the area of the scar, whitish color

of the scar tissue, absence of endometrium in the defect zone, depletion of the vascular pattern. A total of 38 hysteroscopic examinations were performed.

RESULTS

In accordance with the study design, the questionnaires of 1858 patients who underwent ART from 2017 to 2020 were analyzed. The age of women varied from 25 to 40 years, the average age was 36 ± 3.1 years. Based on the questionnaire survey and analysis of accounting and reporting documentation, all patients were divided into the following age groups and study groups (Table 1).

As can be seen from the presented table 1, the largest number of patients were in the age group from 36 to 40 years old - 46.4%, in contrast to the groups 25-30 years old and 31-35 years old, where 28% and 25.6% of patients corresponded. Analysis of gynecological diseases showed the presence of background cervical pathology,

minor forms of genital endometriosis, uterine fibroids in every 6 patients [18]. At the same time, the frequency of gynecological pathology in patients with a scar on the uterus was 33.3% (67 patients), and without a scar was 33.4% (553) patients.

Thus, 201 (86.6%) patients underwent surgery on the uterus. At the same time, in 94% (189) cases, surgical interventions were due to cesarean section, and in 6% of cases (12) due to myomectomies. In this regard, in 94% (189) cases, the surgical approach was laparotomic, and in 6% (12) cases, laparoscopic. During the questioning process, secondary infertility of varying duration was noted. In most patients, the duration of infertility was 4 years - 1040 patients (56%), on average 4 ± 1.1 years. When analyzing the duration of infertility in patients without a scar on the uterus was 4 years - 56.1%, as well as in patients with a scar on the uterus 55.2%. At the same time, patients with a scar on the uterus did not have a single case with a duration of infertility for 1 year.

Table 2. Distribution of patients depending on the duration of infertility (abs / (%))

Duration of infertility	All patients (n=1858)		Patients without the scar on uterus (1657)		Patients with the scar on uterus (n=201)	
	abs/%	±CI	abs/%	±CI	abs/%	±CI
1 year	20 (1,1%)	±3,8	20 (1,2%)	±3,8	0 (0%)	0
2 years	91 (4,9%)	±3,1	86 (5,2%)	±3,1	5 (2,5%)	±4,2
3 years	465 (25%)	±2,4	398 (24,0%)	±2,6	67 (33,3%)	±3,4
4 years	1040 (56%)	±0,84	929 (56,1%)	±1,6	111 (55,2%)	±2,6
5 years and more	242 (13%)	±2,7	224 (13,5%)	±2,4	18 (9%)	±4,4

*p>0,05

Table 3. The effectiveness of IVF in the studied patients.

Year	All patients (n=1858)			Patients without the scar on uterus (1657)			Patients with the scar on uterus (n=201)		
	1	2	3	1	2	3	1	2	3
2017	483	223	46	444	211	47	39	12	31*
2018	639	250	39	587	232	40	52	18	35*
2019	736	356	48	626	321	51	110	35	32*

*p < 0,05

1 - the number of embryo transfers into the uterine cavity

2 - the number of clinical pregnancies

3 - % of clinical pregnancies

In a comparative analysis of the frequency of gynecological pathology in patients with and without a scar on the uterus, no statistically significant differences were found ($\chi^2 = 3.905$; $p > 0.05$). In addition, 12.5% (232) of patients underwent surgery on the pelvic organs. Moreover, 85.8% (199) patients had laparotomic access and 14.2% (33) laparoscopic access. The studied patients underwent the following surgical interventions: 189 (81.5%) - cesarean section, 17 (7.3%) - cystectomy, 12 (5.2%) - myomectomy, 14 (6.0%) - tubectomy.

The main complaint of the treatment of the studied patients was infertility. However, a thorough analysis of the questionnaires made it possible to identify other clinical symptoms that occurred in 375 (20.2%) patients. All identified patient complaints can be grouped into the following groups of symptoms: pain syndrome and menstrual irregularities. In conclusion, we analyzed the effectiveness of IVF in the studied patients (table 3). So, for 2017, 2018, 2019, into the uterine cavity 483, 639, 736 embryo transfers were carried out, of which 223,

250, 829 clinical pregnancies were obtained, which amounted to 46%, 39%, 48% of pregnancies, respectively. Thus, over 3 years, 1858 transfers were carried out, 829 pregnancies were obtained, which amounted to 44.6% of the IVF efficiency.

The results of ultrasound examination showed that 163 patients had signs of a scar consistency on the uterus. In

38 (19%) patients, there was at least one sign of uterine scar failure. The most common sign of uterine scar inconsistency is the “niche” symptom in 16 cases ($42 \pm 2.67\%$), every fourth one had thinning of the myometrium in the area of the scar - in 8 cases ($21 \pm 2.16\%$), in every sixth, the indistinctness of the endometrial contour, endometrial hypoplasia - in 5 cases (13 ± 2.2), and the rarest was the presence of cavities in the area of the scar on the uterus - in 2 cases (5 ± 1.85).

Table 4. McNemar Test

Criteria	Criterion value	Significance level, p
χ^2 McNemar	36.481	<0,001
χ^2 McNemar with Yates' correction	35.795	<0,001
χ^2 McNemar with Edwards' correction	35.117	<0,001
The increase in the frequency of the sign is statistically significant, <0.001		

CONCLUSION

In our study, after confirming the inconsistency of the uterine scar, 30 patients underwent metroplasty. According to the protocol, after the surgery, the patients were prescribed contraception in order to avoid unwanted pregnancy until the full recovery of the uterine scar within 6 months. In these patients with secondary infertility, after confirmation of full recovery of the scar on the uterus, in cases of the likelihood of pregnancy, spontaneous pregnancy was expected within 6 months. In the absence of spontaneous pregnancy, they switched to the treatment of infertility using ART methods.

So, in this study, after metroplasty in one patient, pregnancy occurred spontaneously. In this patient, the duration of infertility was more than 5 years and in the anamnesis, there were more than 5 unsuccessful IVF attempts with embryo transfer into the uterine cavity. The remaining 29 patients underwent 40 transfers, of which 18 cases achieved clinical pregnancy, which amounted to an IVF efficiency of 45%, compared to an IVF efficiency before metroplasty of 32%. This indicator of IVF efficiency is close to the IVF efficiency in patients without a uterine scar. To assess the impact of pregravid metroplasty on the effectiveness of IVF, we performed the McNemar test (Table 4).

Table 4 shows the effect of the use of metroplasty at the pregravid stage on the effective IVF indicators with a 95% confidence interval. That is, performing pregravid metroplasty in patients with inconsistent uterine scar will significantly increase the rate of IVF success. The results obtained contribute to the introduction of metroplasty surgery to correct the inconsistency of the uterine scar in patients when planning ART.

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Water Pollution in India: Causes, Effects and Remedies – A Case Study

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ABSTRACT

Water contamination is the defilement of water bodies all the time by human activities. It occurs when pollutants are discharged directly into water bodies without enough treatment to get rid of harmful compounds. Pollutants get into water mainly by human causes or factors. Water pollution is one of the biggest issues facing India right now. As may be evident, untreated sewage is the biggest source of such form of pollution in India. There are other sources of pollution such as runoff from the agricultural sector as well as unregulated units that belong to the small-scale industry. The situation is so serious that perhaps there is no water body in India that is not polluted to some extent or the other. In fact, it is said that almost 80% of the waterbodies in India are highly polluted. Ganga and Yamuna are the most polluted rivers in India.

KEY WORDS: CONTAMINATION, HUMAN HABITATION, WATER POLLUTION.

INTRODUCTION

Water contamination is debased water, harmful to people or the climate. It happens when unsafe synthetic substances or microorganisms or now and again essentially trash or a lot of residue sullies a stream, waterway, lake, wetland, groundwater spring, sea, so, any waterway. Anthropogenic warm contrasts brought about by the release of high temp water from power plants and industrial facilities straightforwardly into an untamed water source is additionally viewed as water contamination as it diminishes oxygen levels and adjusts the species that can make due there, frequently welcoming non-local species attack, modifying the natural pecking order and regularly lessening species biodiversity. The

sacred Ganges River takes the prize for the world's most polluted river, carrying sewage, trash, animal carcasses and wasted food. The single biggest reason for water pollution in India is urbanization at an uncontrolled rate. The treatment and disposal of wastewater has also been a major issue in this regard. The areas near rivers have seen plenty of towns and cities come up and this has also contributed to the growing intensity of problems.

Uncontrolled urbanization in these areas has also led to generation of sewage water. In the urban areas water is used for both industrial and domestic purposes from waterbodies such as rivers, lakes, streams, wells, and ponds. Worst still, 80% of the water that we use for our domestic purposes is passed out in the form of wastewater. In most of the cases, this water is not treated properly and as such it leads to tremendous pollution of surface-level freshwater.

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2. Sources of Water Pollution: The two chief sources of water pollution can be seen as:

2.1 Point Source: Point source refers to the pollutants that belong to a single source. An example of this would be emissions from factories into the water. Point source

pollution refers to a contaminants that enter a waterway through a discrete conveyance, such as pipe or ditch. The Example for point source is the discharges from a sewage treatment plant, a factory and a city storm drain.

2.2 Non-Point Source: Non point refers to the pollutants emitted from multiple sources. Contaminated water after rains that has travelled through several regions may also be considered as a non-point source of water pollution. Non-point source pollution refers to diffuse contaminants that does not originate from a single discrete source. NPS pollution is often accumulative effect of small amounts of contaminants gathered from a large area. The leaching out of nitrogen compounds from agricultural land which has been fertilized is a typical example.

3. Causes of Water Pollution:

3.1 Agriculture and Nutrient Pollution: Around the world, agriculture is the leading cause of water degradation. Every time it rains, fertilizers, pesticides, and animal waste from farms and livestock operations wash nutrients and pathogens such bacteria and viruses into our waterways. Nutrient pollution, caused by excess nitrogen and phosphorus in water or air, is the number-one threat to water quality worldwide and can cause algal blooms, a toxic soup of blue-green algae that can be harmful to people and wildlife. Some waste water, fertilizers and sewage contain high levels of nutrients. If they end up in water bodies they encourage algae and weed growth in the water bodies, this will make the water undrinkable, and even clog filters. Too much algae will also use all the oxygen starvation

3.2 Sewage and Wastewater: Used water is wastewater. It comes from our sinks, showers, and toilets (think sewage) and from commercial, industrial, and agricultural activities (think metals, solvents, and toxic sludge). The term also includes storm water runoff, which occurs when rainfall carries road salts, oil, grease, chemicals, and debris from impermeable surfaces into our waterways.

3.3 Surface Water Pollution: Surface water includes natural water found on the earth's surface like rivers, lakes, lagoons and oceans. Hazardous substances coming into contact with this surface water, dissolving or mixing physically with the water can be called surface water pollution. For example, industries emptying oil spills and chemical waste into water bodies are also key contributors.

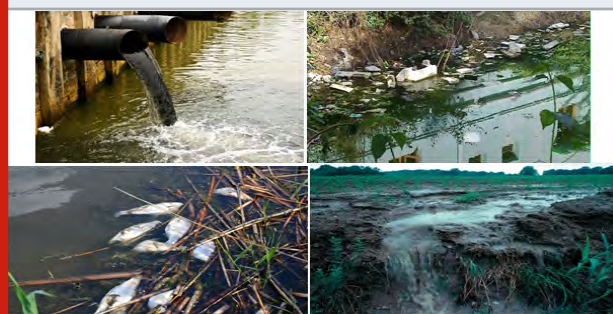
3.4 Oxygen Depletion: Water bodies have microorganism. These include aerobic and anaerobic organisms, when too much biodegradable matter (things that easily decay) end up in water, it encourages more microorganisms growth, and they use up more oxygen in the water. If oxygen is depleted, aerobic organisms die, and anaerobic organisms grow more to produce harmful toxins such as ammonia, sulfides.

3.5 Ground Water Pollution: When humans apply pesticides and chemicals to soils, they are washed deep into the ground by rain water. This get to underground

water, causing pollution underground. This means when we dig wells and bore holes to get water from underground, it needs to be treated before.

3.6 Oil Pollution by Oil Industries: Routine shipping, runoff and dumping of oils on the ocean surfaces happens every day. Oil spills cause major problems, and can be extremely harmful to local marine wildlife such as fish, birds and sea otters and other aquatic life. Because oil does not dissolve it stays on the water surface and suffocates fish. Oil also gets caught in the feathers of sea birds, making it difficult for them to fly. Some animals die as a result.

Figure 3.1: Causes of Water Pollution



4. Effects of Water Pollution: In fact as far as India is concerned polluted water is one of the major factors behind the general low levels of health in India, especially in the rural areas. Polluted water can lead to diseases such as cholera, tuberculosis, dysentery, jaundice, diarrhea, etc. In fact, around 80% stomach ailments in India happen because of consuming polluted water. Many water bodies near urban areas are highly polluted. This is the result of both the garbage dumped by individuals and dangerous chemicals legally and health centers, schools, market places. The Death of aquatic animals, Disruption of food chains, Diseases, Destruction of ecosystems and so on are some of the common effects of water pollution.

4.1 Human Health: We all drink water that comes from a source: this may be a lake or local river. In practice of poor screening and purification practices, people often get water-borne disease outbreaks such as cholera and tuberculosis. Every year, there are an estimated 3–5 million cholera cases and 100,000–120,000 deaths due to cholera. Take toxins emitted by algae growth for instance: this can cause stomach aches and rashes. Excess nitrogen in drinking water also poses serious risks to infants. EPA's 2010 National Lakes Assessment found that almost 20 per cent of the nation's lakes have high levels of nitrogen and phosphorus pollution. The report also showed that poor lake conditions related to nitrogen or phosphorus pollution doubled the likelihood of poor ecosystem health.

4.2 Ecosystems: Nutrient pollution from upstream often flow downhill and even travel miles into other larger water bodies. The effect is that it breeds algae growth and causes the growth of much more water organism.

This algae attack affects fish and other aquatic animals by absorbing and reducing their oxygen supply.

4.3 Death of Animals: Animals, including water animals, die when water is poisoned for various reasons. Other animals are stressed and their populations are endangered. In a classic case of marine pollution in recent time, 16000 miles of a coastline was affected by an oil spill. That water pollution caused a lot of damage and deaths of many animals. Over 8,000 animals (birds, turtles, mammals) were reported dead just 6 months after the spill, including many that are already on the endangered species list. The immediate impact on the wildlife includes oil-coated birds and sea turtles, mammal ingestion of oil, and dead or dying deep-sea coral

4.4 Economic Cost: From the above, it is evident that there are some real financial implications that will result from water pollution. It can cost a lot more to purify drinking water that takes its source from nutrient-polluted water bodies. Fishing stock is affected negatively when there is a depletion of oxygen. Consumers are also worry of fish from these sources and tend to stay away from them, costing fisheries to lose revenue. In places where there are water activities or sports, lots of money is spent to clean up the water from algae blooms and the like.

5. Treatments Involved To Control Water Pollution

5.1 Primary Treatment: Primary treatment of wastewater involves sedimentation of solid waste within the water. This is done after filtering out larger contaminants within the water. Wastewater is passed through several tanks and filters that separate water from contaminants. The resulting “sludge” is then fed into a digester, in which further processing takes place. This primary batch of sludge contains nearly 50% of suspended solids within wastewater. It includes:

Screening and Pumping: The incoming wastewater passes through screening equipment where objects such as rags, wood fragments, plastics, and grease are removed. The material removed is washed and pressed and disposed of in a landfill. The screened wastewater is then pumped to the next step: grit removal.

Grit Removal: In this step, heavy but fine material such as sand and gravel is removed from the wastewater. This material is also disposed of in a landfill.

Primary Settling: The material, which will settle, but at a slower rate than step two, is taken out using large circular tanks called clarifiers. The settled material, called primary sludge, is pumped off the bottom and the wastewater exits the tank from the top. Floating debris such as grease is skimmed off the top and sent with the settled material to digesters.

5.2 Secondary Treatment: Secondary treatment of wastewater makes use of oxidation to further purify wastewater. It includes

Aeration / Activated Sludge: In this step, the wastewater receives most of its treatment through biological degradation, the pollutants are consumed by microorganisms and transformed into cell tissue, water, and nitrogen. The biological activity occurring in this step is very similar to what occurs at the bottom of lakes and rivers, but in these areas the degradation takes years to accomplish.

Secondary Settling: Large circular tanks called secondary clarifiers allow the treated wastewater to separate from the biology from the aeration tanks at this step, yielding an effluent, which is now over 90% treated. The biology (activated sludge) is continuously pumped from the bottom of the clarifiers and returned to the aeration tanks in step four.

Filtration: The clarified effluent is polished in this step by filtering through 10 micron polyester media. The material captured on the surface of the disc filters is periodically backwashed and returned to the head of the plant for treatment.

5.3 Tertiary Treatment: Tertiary treatment is the final cleaning process that improves wastewater quality before it is reused, recycled or discharged to the environment. It includes:

Disinfection: To assure the treated wastewater is virtually free of bacteria, ultraviolet disinfection is used after the filtration step. The ultraviolet treatment process kills remaining bacteria to levels within our discharge permit.

Oxygen Uptake: The treated water, now in a much stabilized high quality state, is aerated if necessary to bring the dissolved oxygen up to permit level. After this step, the treated water passes through the effluent outfall where it joins the River. Pollutant removal is maintained at 98% or greater.

6. Prevention of Water Pollution

- Never throw rubbish away anyhow. Always look for the correct waste bin. If there is none around, please take it home and put it in your trash can. This includes places like the beach, river.
- Use water wisely, do not keep the tap running when not in use. Also, you can reduce the amount of water use in bathing and washing. If we all do this, we can significantly prevent water shortages and reduce the amount of dirty water that needs treatment.
- Don't throw chemicals, oils and medicines down the sink drain or the toilet, in any cities your local environment office can help with the disposal of medicines and chemicals.
- Buy more environmentally safe cleaning liquids for use at home and other public places they are less dangerous to the environment
- If you use chemicals and pesticides for our gardens and farms, be mindful not to overuse pesticides and fertilizers. This will reduce runoff of the chemical into nearby water sources. Start looking at options

- of composting and using organic manure instead
- If you live close to a water body, try to plant lots of trees and flowers around your home, so that when it rains, chemicals from your home does not easily drain into the water.

6.1 Things You Can Do To Reduce Water Pollution

- Do not pour fat from cooking or any other type of fat, oil, grease down the sink. Keep a fat jar under the sink to collect the fat and discard in the solid waste when full
- Do not dispose of house hold chemicals or cleaning agents down the sink or toilet
- Do not flush pills, liquids or powder medications or drugs down the toilet. For recommendations on paper disposal for all types of medical wastes
- Avoid using the toilet as waste basket. Most tissues, wrappers, dust clothes and other paper goods should be properly discarded in a waste basket
- Use the minimum amount of detergents and or bleach when you are washing clothes or disposals. Use phosphate free soaps and detergents
- If your home has a sump pump or cellar drain, make certain it does not drain into the sanitary sewer system.
- Minimize the use of pesticides, herbicides, fertilizers. Do not dispose of these chemicals, motor oil, or other automotive fluids into the sanitary sewer systems. Both of them end at the river
- Avoid using a garbage disposal. Keep solid wastes solid. Make a compost pile from vegetable scraps

CONCLUSION

The first major solution in this context is conservation of soil. Soil erosion can contribute to water pollution. So, if soil can be conserved we can prevent water pollution too. We can follow measures such as planting more trees, managing erosion in a better way, and use farming methods that are better for the soil. In the same vein it is also important to follow the right methods in disposing

toxic waste. For starters, we can use products that have lesser amounts of volatile organic compounds in them. Even in cases where toxic material like paints, cleaning supplies, and stain removers are used, they need to be disposed of in the right way. It is also important to look into oil leaks in one's cars and machines. Cleaning up waterways and beaches, avoiding the usage of non-biodegradable material like plastic, and being more involved in various measures pertaining to preventing water pollution.

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To Assess the Effect of Breast Feeding Self Efficacy Intervention on Primiparous Mothers

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ABSTRACT

Breastfeeding is long recognized as a popular form of feeding during the first year of life (American Academy of Pediatrics, 1997). Despite the obvious benefits of breastfeeding to mother and child, breastfeeding rates in many parts of the world and in India tend to stay below the recommended levels. There have been many research studies in which trust in breast feeding has been shown to be an important factor in early initiation, productive establishment and continued breastfeeding. A longitudinal retrospective analysis of 64 low-income mothers in the United States reveals that trust in breastfeeding is correlated with early termination of breastfeeding rather than perceived problems. Methods and Material: This study was based on the application of Pre experimental-One Group Pre post test design. This study includes 60 samples. Used for purpose sampling technique. A tool is a data collection tool or equipment used by Breast Feeding Self – Efficacy Scale. There have been two sections that are primigravida woman's demographic information and breast feeding self – Efficacy Scale. Results There is a significant difference between pretest scores and posttest knowledge scores that interpret effective breast feeding self-efficacy breastfeeding intervention. The mean pretest value is 95.83 and the posttest value is 129.80, and the standard pretest deviation value is 30.032 and the posttest value is 20.419. Conclusion: T-value is calculated at 8.502 and p-value is 0.000. Therefore it is interpreted statistically that breast feeding self-efficacy intervention on breastfeeding has been successful.

KEY WORDS: IMPACT, BREASTFEEDING SELF-EFFICACY BREASTFEEDING INTERVENTION, MOTHERS PRIMIPAROUS.

INTRODUCTION

Lactation facilitated human survival. Breastfeeding infants obtain nutritional, immunological, cognitive and psychosocial advantages. Human milk contains both

biochemistry as well as biology. It has effective features that have provided evidence of the nutritional benefits of breastfeeding. Although, the contents of breast milk is varied from mother's milk to other mammals. Proteins, fat, carbohydrates, vitamins, and minerals in mother's milk also differ from the milk of other mammals. The composition of substitute milk is identical, but the composition of mother's milk will be altered.

If there were evidence means associated with the further benefits of breast feeding help to minimize child morbidity, cost of health care and initiation. But breastfeeding in primipara mothers is difficult to sustain, and it is more common among low-income women. It is

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not easy to learn the art of breastfeeding. The climate of society in past century for breastfeeding has been irregular that results introduction of breastfeeding may experience without any social support. That will cause premature termination of breastfeeding. Although health care professionals may positively encourage women for breastfeeding.

They have been reported as lack of knowledge, not helpful, sending inaccurate information and being inconsistent in their treatment and counselling about breastfeeding to the women. (Anderson & Geden, 1991; Hayes, 1981; Humenick et al. 1998). Teaching and support about breastfeeding by nursing personnel have been reported to enhance breastfeeding success² India is home to maximum number of under five deaths (21% of the global burden) and 1/3 of the world's underweight children under the age of five years. Early breast feeding within one hour of life and exclusive breast feeding during the first six months are key interventions to reduce child malnutrition and mortality³ In India, women who initiate breast feeding within one hour of delivery are only 24.5%, whereas the exclusive breast feeding rates for children under six months are only 46.4%. Given the policies and services that India has implemented it has seen that initiation of breast feeding has increased just about 1% each year and exclusive breast feeding has in fact declined³.

A pilot randomized controlled trial of a breast feeding self effectiveness intervention with 150 primiparous mothers conducted in Ontario, Canada in 2008. The intervention group received three individualized sessions which strengthened self-efficacy. At 4 weeks Postpartum the intervention group mothers had a higher mean of BFSE-SF ($M=58.4$, $SD=11$ vs. $M=54.0$, $SD=14$). Only 14 percent of mothers discontinued breastfeeding in the intervention group at 4 weeks postpartum compared to 26 percent in the control group and the intervention group was more exclusive (61 percent) than those in the control group⁴ A 2007 study at NEW SOUTH WALES, Australia, pointed to a increase among 90 percent females in breast-feeding self-efficacy and real breast-feeding through and practice.

Women who have been educated in breast-feeding self-efficacy showed significantly greater increases in breast-feeding self-efficacy, a trend towards breast-feeding of their infants longer and more exclusively than those in charge in the control group⁵ A descriptive research is seen in 2007 to investigate the influences of efficacy-enhancing experiences among 63 mothers on breast-feeding self-efficacy. The impacts of vicarious verbal reference and physiological forms of experience on breast feeding self-efficacy are analyzed at 48 hours and 4 weeks postpartum using the Scale-Short Form breastfeeding auto-efficacy. The data suggest that the mothers who received intervention had significantly greater percentages of self-efficacy in breastfeeding than those who did not receive⁶

A 2006 research conducted among 110 primiparous mothers in the US to assess the effects of prenatal breast feeding workshop on self-efficacy of maternal breast feeding and breastfeeding duration. Results in the control group scores at the fourth postpartum weeks were slightly lower than in the intervention group. There was a higher rate of exclusive breast feeding in the intervention group at the eighth week postpartum mothers (70%) than the control group (57%)⁷.

A survey was followed to determine the effect on breastfeeding results of mothers receiving health promotion material and education from among 587 mothers in Western Australia. Study revealed that moms with hospital staff receiving antenatal breastfeeding education were less willing to stop full breastfeeding before six months (55 per cent). For mothers seeking medical treatment (30%) For (30%) mothers seeking medical care during the postnatal period, breastfeeding was less likely to stop before six months⁸.

All of these reasons specifically state the need for a breastfeeding program to strengthen self-efficacy. Midwives may alter the morale of a mother in breastfeeding as the belief focuses exclusively on the skills and ability they achieve and the encouragement. Breast feeding self – Effectiveness Enhancing program composing information on the importance of breast feeding for mothers and babies, exclusive breast feeding, breast feeding techniques such as proper latching, baby positioning and handling, how to overcome physiological problems and stress, psychological support, affirmation and motivation will help primary mothers develop initial affirmation and motivation will help the primary mother develop initial confidence and achieve good breast feeding. Even though the confidence formation is a long term process, the investigator aims to give an initial boost through this intervention which enhances her confidence and thus helps her to sustain in exclusive breast feeding.

Objectives

1. To assess the self-efficacy of breastfeeding in primiparous mother by using a self-efficacy scale for breast feeding.
2. To evaluate the self-efficacy of breastfeeding in primiparous mother by using a self-efficacy scale of breast feeding.

Assumptions

1. To determine the self-efficacy of breastfeeding in primiparous mother by using a self-efficacy scale for breast feeding.
2. Development of initial confidence will help mothers to establish successful breast feeding.

Hypotheses

H1. The mean post-test score on Breast Feeding Self-Efficacy will be significantly higher than the mean pre-test score

MATERIAL AND METHODS

This study was based on Pre experimental - One Group Pre test post test design is used. Population refers to primiparous antenatal women who are admitted for parturition and the same primiparous mothers at immediate postnatal period who gave birth to a single, during their hospitalization In this study, 60 sample are included.

Inclusion Criteria

1. Primiparous antenatal women who are admitted for delivery
2. Primiparous mothers who delivered a single healthy baby and are within first 12 hours of post partum period and who were assessed prior to the delivery for self efficacy.
3. Primiparous mothers who are able to breast feed their baby.

Exclusion Criteria

1. Moms that have some disorder that can greatly interfere with breast feeding, such as serious disease, and a congenital defect or child admitted to NICU.
2. Multiparous mothers.
3. Mothers with Caesarean Section

Development of tools: A tool is an instrument or equipment use for collection of data which is Breast Feeding Self -Efficacy Scale

Section I- Demographic information of primigravida woman.

Section II- Breast Feeding Self -Efficacy Scale

Data Collection Method: 1. Moms that have some disorder that can greatly interfere with breast feeding, such as serious disease, and a congenital defect or child admitted to NICU. An interview schedule will be used to elicit the Demographic Profile. After delivery those who are fulfilling the eligibility criteria will again assessed with the same BFSES. Those who are found with low breast feeding self – efficacy, will receive individualized Breast Feeding Self- Efficacy Intervention on the first day of post partum. Breast feeding by the mother from the initial stage of placement of baby on breast till the feeding is over, will be observed from a far .This observation will be made three times a day (9am-5pm) for three consecutive days and followed by it, mother will be interviewed to assess breast feeding self-efficacy. Post test will be conducted on fourth day, using the same Breast Feeding Self -Efficacy Scale. Participants will be thanked for their co-operation.

RESULTS

Section I- Percentage wise distribution of primiparous mother with regards to selected demographic variables

SECTION-II: Assessment the breast feeding self-efficacy in primiparous mothers by using a breast feeding self –efficacy scale

Table 1. Percentage wise distribution of Women with regards to selected demographic variables. n =60

Demographic variable	Frequency	Percentage (%)
Age(years)		
18-21	15	25
22-25	29	48.33
26-29	11	18.33
30-33	4	6.6
Above 34	1	1.6
Weeks of pregnancy		
< 30 weeks	1	1.6
31-33 weeks	12	20
34- 36 weeks	45	75
>37 weeks	2	3.3
Religion		
Hindu	36	60
Muslim	6	10
Christian	5	8.3
Others	13	21.66
Education of women		
Primary	5	8.3
Secondary	40	66.66
College degree	15	25
Post graduation and above	00	00
Occupation of women		
Private	7	11.66
Government	5	8.33
Farmer	5	8.33
Housewife	43	71.66
Duration of marriage life		
1-2 years	43	71.66
3-4years	8	13.33
5-6 years	2	3.33
7-8 years	7	11.66
Family income		
Less than Rs. 3000/-	6	10
Rs. 3001-5000/-	15	25
Rs. 5001-7000/-	19	31.66
More than Rs.7000/-	20	33.33
Type of family		
Nuclear family	37	61.66
Joint family	23	38.33
Residence		
Urban	44	73.33
Rural	16	26.66

- Table no.4 shows that primiparous mother 3(5%) had not confident at all, 42(70%) of them had half the time confident, 6(10%) of them had usually confident, and 9(15%) had always confident. The

minimum score was 2 and the maximum score was 152, the mean score was 95.83 ± 30.032 with a mean percentage score of 58.07.

PART B

Assessment of post test score of the breast feeding self-efficacy in primiparous mothers by using a breast feeding self-efficacy scale.

Table no. shows that 4(6.6%) had half the time confident, 31(51.66%) had usually confident and 25(41.66%) had always confident. The minimum score was 92 and the

maximum score was 156, the mean score was 129.80 ± 20.419 with a mean percentage score of 78.66.

SECTION-III: Effectiveness of breast feeding self-efficacy intervention on breastfeeding among primiparous mothers by comparing pre-test and post-test scores

Table no.6 confirms that there is a huge disparity between pretest scores and posttest learning scores that define positive breast feeding self-efficacy in breastfeeding intervention. The breast feeding self-efficacy intervention on breastfeeding was effective. Thus the H1 is accepted.

Table 2. Assessment the breast feeding self-efficacy in primiparous mothers by using a breastfeeding self-efficacy scale.

Breastfeeding self-efficacy score	Score range	Percentage score	Pre Test	
			Frequency	Percentage
Not confident at all	0-33	0-20%	3	5%
Not very confident	34-66	21-40%	0	0%
Half the time confident	67-99	41-60%	42	70%
Usually confident	100-132	61-80%	6	10%
Always confident	133-165	81-100%	9	15%
Minimum score	2			
Maximum score	152			
Mean score	95.83 ± 30.032			
Mean %	58.07%			

Table 3. Assessment of post test score of the breast feeding self-efficacy in primiparous mothers. n = 60

Breastfeeding self-efficacy score	Score range	Percentage score	Post Test	
			Frequency	Percentage
Not confident at all	0-33	0-20%	0	0%
Not very confident	34-66	21-40%	0	0%
Half the time confident	67-99	41-60%	4	6.66%
Usually confident	100-132	61-80%	31	51.66%
Always confident	133-165	81-100%	25	41.66%
Minimum score	92			
Maximum score	156			
Mean score	129.80 ± 20.419			
Mean %	78.66%			

Table 4. Percentage wise distribution of Effectiveness of breast feeding self-efficacy intervention on breastfeeding among primiparous mothers by comparing pre-test and post-test scores n=60

Tests	Mean	SD	't'-value	Degree of Freedom	p-value	Significant
Pre Test	95.83	30.032	8.502	59	0.000	S, $p < 0.05$
Post Test	129.80	20.419				

DISCUSSION

A cross-sectional survey in Guangzhou, China shows that a total 640 qualified women have been come up to and 571 moms have finalized the education with an 86 percent reaction rate. In the immediate postpartum period, mums showed moderate degree of self-efficacy in breast feeding. The best-fit regression study identified six variables that clarified 43.9 per cent of the variance in self-efficacy of breast feeding in the immediate postpartum period. The aim was to feed the breast, support the mother, support the nurses / midwives, attend prenatal breast feeding courses, period from birth to breast feeding and previous breastfeeding experience⁹.

A longitudinal study was designed to examine the effectiveness of a self-efficacy-centered breast feeding education program (SEBEP) in boosting breast feeding self-efficacy, breast feeding time and exclusive breast feeding outcomes among mothers in Hong Kong. Analytical tests based on an intention-to-treat (ITT) assumption showed a substantial difference ($p < 0.01$) in the shift in mean BSES-SF scores between the mothers who received SEBEP and those who did not receive SEBEP at two weeks post partum.

The exclusive breast feeding rate in the intervention group was 11.4 percent and the control group at six months post partum was 5.6 percent. The findings of this study highlight the feasibility of a major breastfeeding trial in Hong Kong with the goal of the self-efficacy and exclusive breast feeding rates¹⁰ A total of 85 low birth weight babies and their mothers who had received care in the two hospitals' neonatal clinics. In the first 5 days of their hospitalization the mothers included in the study group were given breast-feeding supervision in half an hour a day. Home visits were decided to carry out in the study and control classes at the participants' homes before the children reached the age of 6 months.

The following methods were used for collecting data: Personal Data Form, Breast-feeding Self-Efficacy Form, LATCH Breast-feeding Evaluation Method, and Form for anthropometric data. Researchers used t-tests to evaluate the data obtained, rate, arithmetic mean, standard deviation, and chi-square in separate classes. Findings: Natural-food education provided to the mothers has been determined to improve their breast-feeding self-efficacy and breast-feeding success ($P < 0.05$). This was found that in the study group, in contrast with the control group ($P < 0.001$) The rate of feeding the children exclusively with breast milk is greater ¹¹ The results to present the analysis are described above. The research in this area has been examined which has a direct or indirect impact on the efficacy of breast feeding¹²⁻¹³.

Nursing Implication

Nursing services:- Nurses employed in the existing obstetrics will benefit from these studies, as this form of breast feeding self-efficacy interventions would provide in the setup of obstetrics.

Nursing administration:- Administrative personnel, hospital workers should provide a clear contact network to receive information on breastfeeding self-efficacy intervention.

Nursing education: Nursing education is developing in India and nurses from our country can be found throughout the world providing education. Nursing education should help that include value and sense of responsibility in students to educate breastfeeding self-efficacy

Recommendations

- A similar study may be conducted or a larger population for generalization of findings
- A comparative study on Breastfeeding Self-Efficacy Intervention on breastfeeding between working and non-working primiparous women.

CONCLUSION

The finding indicates that breastfeeding self-efficacy intervention on breastfeeding is very effective in increasing the efficacy of breast feeding which is an important primiparous female factor. It also increases breast feeding time.

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Treatment of Pregnancy Induced Hypertension and its Effect on Oxidative Stress

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ABSTRACT

Hypertension is the most common medical problem encountered during pregnancy, complicating 5-10% of Pregnancies. It is associated with oxidative stress, confirmed by measurement of biomarkers and relevant antioxidant enzymes in the placenta and maternal circulation. In a healthy body, Reactive Oxygen Species and antioxidants remain in balance. When the balance is disrupted toward an overabundance of Reactive Oxygen Species, oxidative stress occurs. Reactive Oxygen Species affect multiple physiological processes from oocyte maturation to fertilization, embryo development and pregnancy. Pre- eclampsia is a leading cause of maternal and paternal morbidity. It is pregnancy specific disease characterized by denovo development of concurrent hypertension and proteinuria. Objectives: 1. To assess the level of physiological parameters in blood of antenatal mothers with Pregnancy induced hypertension. 2. To monitor the treatment of antenatal mothers of Pregnancy induced hypertension. 3. To correlate the treatment of Pregnancy induced hypertension and its effects on oxidative stress with MDA and SOD estimation in antenatal mothers. Methodology: Pregnant women from AVBRH hospital, Wardha were selected for the study. The study was carried out in the department of OBGY which included total 50 patients of Pregnancy Induced Hypertension (PIH) age group of 20-40 years. Selection cases of PIH were done after assessing for BP > 140/90 mm Hg, proteinurea, edema and within 28-42 weeks of gestation. Result: MDA in pregnancy induced hypertension was 109.09±24, in preeclampsia was 130.65±43.02 and eclampsia was 141.04±50.95. SOD in pregnancy induced hypertension was 3.24±1, in preeclampsia was 2.69±1.34 and eclampsia was 2.59±1.33. Discussion: The present study was planned to detect lipid peroxidation products i.e. MDA and SOD in PIH, pre eclampsia and eclampsia. The lipid peroxidation product like malondialdehyde (MDA) levels has been measured in plasma of hypertensive pregnant women. It was found that higher O₂ free radical production, evidenced by increase levels of MDA in hypertensive pregnant women. The present study shows that, there is significant difference between PIH, pre eclampsia and eclampsia regarding serum MDA. Rise in MDA could be due to increased generation of ROS due to the excessive oxidative damage generated in the hypertensive patients. These O₂ species in turn can oxidize many other important biomolecules including membrane lipids. The lipid peroxides & free radicals may be important in pathogenesis of PIH. In similar previous study was done on pregnant women with pregnancy induced hypertension, it was found that there was a significant increase in erythrocytes MDA levels, activities of SOD, & GP level. Conclusion: The present study has shown a significant increase in serum MDA levels, the indicator of lipid peroxidation, in the 3 groups suggest that lipid peroxidation plays a role in the pathogenesis of hypertensive disorders of pregnancy. Increased lipid peroxidation causes increased consumption of antioxidant free radical scavenging system. In PIH, preeclampsia and eclampsia there is an imbalance between lipid peroxides and the antioxidant system.

KEY WORDS: PREGNANCY INDUCED HYPERTENSION, SOD, MDA

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INTRODUCTION

Pregnancy is a stressful condition in which many physiological and metabolic functions are altered to a considerable extent. Hypertension is the most common medical problem encountered during pregnancy, complicating 5-10% of pregnancies. It is associated with oxidative stress, confirmed by measurement of biomarkers and relevant antioxidant enzymes in the

placenta and maternal circulation. In a healthy body, ROS (Reactive Oxygen Species) and antioxidants remain in balance. When the balance is disrupted toward an overabundance of ROS, oxidative stress occurs. ROS affect multiple physiological processes from oocyte maturation to fertilization, embryo development and pregnancy. It also modulates age-related decline in fertility, normal parturition and initiation of preterm labor. Pre-eclampsia is a leading cause of maternal and paternal morbidity. It is pregnancy specific disorder characterised by *denovo* development of concurrent hypertension and proteinuria.

Need of the Study: Pregnancy is one of the wonderful and noble services imposed by nature. Most of the women may not have many problems during pregnancy, but some are not so lucky, face various problems related to pregnancy and child birth. Every minute, each day somewhere in the world, a woman dies as result of complications related to pregnancy and childbirth. Gestational hypertension and preeclampsia are common disorders during pregnancy with the majority of cases developing at or near term.

Sharma JB et al, 2013A comparative studies was carried out to compare the levels of 3 oxidative stress markers (glutathione peroxidase [GPX], superoxide dismutase [SOD], and malondialdehyde [MDA]) and 2 antioxidants (vitamin C and lycopene) in healthy and pre-eclamptic pregnant women. Circulating levels of GPX, SOD, MDA, vitamin C and lycopene were measured in 50 healthy pregnant women and 50 women with pre-eclampsia (PE) (41 with mild PE and 9 with severe PE) attending the antenatal clinic or admitted to the maternity ward of the All-India Institute of Medical Sciences, New Delhi, India.

They were found that the levels of GPX, SOD and MDA were significantly higher in women with PE than in controls, and the increase was higher in women with severe PE ($P < 0.001$ using analysis of variance and the Kruskal Wallis test). The levels of vitamin C and lycopene were significantly lower in women with PE than in controls, with a greater decrease in women with severe PE. Then concluded that Increased levels of oxidative stress markers and decreased levels of antioxidants in pre-eclamptic women suggest that oxidative stress markers play a significant role in the pathophysiology of pre-eclampsia, and that supplemental dietary antioxidants may have a beneficial role in the prevention of pre-eclampsia in women at high-risk for this condition.

In this study 154 prescriptions were, a higher number, 55.84 % belonged to stage II hypertension (B.P. $\geq 160/\geq 100$) before administration of drugs. Out of 154 patients, 123 (i.e, 79.87%) received a single antihypertensive drug while 27 (i.e, 17.53 %) received two antihypertensive drugs and 4 patients (2.59%) received three drugs. Methyl dopa was the most common antihypertensive drug used as monotherapy in 54 (i.e, 35.06% cases), followed by Labetalol in 32 (i.e, 20.77%) cases. Combination

of Methyl dopa and Labetalol was the most common multidrug antihypertensive regimen used in 7.79% cases. Average number of antihypertensives per prescription was found to be 1.22. A total of 83.76% prescriptions were found in generic name.

A study conducted on 60 pregnant women with blood pressure of 140/90 mm Hg or more with $\geq 1+$ proteinuria between 20 and 38 weeks of gestation were randomly allocated to receive nifedipine ($n=20$), methyl dopa ($n=20$) or labetalol ($n=20$). Blood pressure was measured at 0, 6, 24, 48 and 72 h of initiation of antihypertensive drugs. Patients were also followed up for development of adverse drug effects during this period. Antihypertensive treatment with methyl dopa was associated with reduction in systolic blood pressure (SBP) by 50 mmHg and diastolic blood pressure (DBP) by 30 mmHg at 72 h. For the same period treatment with nifedipine was associated with reduction in SBP by 54 mmHg and DBP by 30 mmHg. Treatment with labetalol was associated with reduction in SBP by 70 mmHg and DBP by 36 mmHg at 72 h. Labetalol was more effective than methyl dopa and nifedipine in controlling blood pressure in patients with pregnancy-induced hypertension while methyl dopa and nifedipine are equally effective in controlling blood pressure.

A number of drugs in various combinations are generally used for effective long-term management of hypertension in pregnancy. There is need to survey the pattern of usage of anti hypertensives drugs, to see if the current usage is rational, effective and tolerated and in concordance with current guidelines for treatment of hypertension. The greatest challenge in treating hypertension in pregnancy is to reduce the blood pressure to assure the safety of mother and at same time not to compromise utero placental perfusion or cause harmful effects on the foetus. The ideal therapy of hypertension in pregnancy should be potent, rapidly acting and without any adverse maternal or foetal effect. The present study aims to investigate the drug utilization pattern of antihypertensive drugs in pregnancy induced hypertension.

Statement of the Problem: "Treatment of Pregnancy Induced Hypertension and Its Effect on Oxidative Stress"

Objectives of the Study

1. To assess the level of physiological parameters in blood of antenatal mothers with Pregnancy induced hypertension.
2. To monitor the treatment of antenatal mothers of Pregnancy induced hypertension.
3. To correlate the treatment of Pregnancy induced hypertension and its effects on oxidative stress with MDA and SOD estimation in antenatal mothers.

Operational Definitions

Oxidative Stress: - is essentially an imbalance between the production of free radicals and the ability of the body to counteract or detoxify their harmful effects through

neutralization by antioxidants.

4. **Pregnancy induced hypertension:**—in this study, the antenatal mothers, whose blood pressure is increased above 140/90, mmHg due to pregnancy.
5. **Treatment of pregnancy induced hypertension:**— in this study, the drugs given to antenatal mothers to reduce pregnancy induced hypertension.

Hypothesis: The study is based on the hypothesis:

H1:—There is strong correlation between the treatments of pregnancy induced hypertension and oxidative stress.

Variables

Dependent— Oxidative stress in pregnancy induced hypertension.

Independent--- Treatment of pregnancy induced hypertension.

MATERIAL AND METHODS

In this study Evaluative research approach was used. The research design was true experimental. The study will be conducted in AVBR hospital Sawangi (M), Wardha. Non probability convenient sampling technique will be used for this study. 50 antenatal mothers upto 8 month, pregnant mothers in AVBR hospital, Sawangi (M), Wardha were the sample.

Inclusion Criteria For Sampling

1. Antenatal mothers with pregnancy induced hypertension.
2. Antenatal mothers admitted first time for pregnancy induced hypertension.
3. Antenatal mother's upto 8 months with pregnancy induced hypertension.
4. Willing to participate in the study.
5. Available at the time of study

Exclusion Criteria

1. Illness like anemia, diabetes mellitus, essential hypertension, renal insufficiency, cardiovascular disease which by themselves are known to alter free radical status.

Delimitation: The study is limited to the antenatal mothers after upto 8 months gestation with hypertension admitted in hospital.

Discription of Tools

Section A: Physiological Parameters in Blood of Antenatal Mothers.

Section B: Investigation Data (MDA and SOD estimation in antenatal mothers

Procedure

1 At the time of admission—

- Information about antenatal mother's name, age, obstetric history will be noted.
- Blood pressure and blood sample will be taken for MAD, and SOD estimation.

- Treatment for pregnancy induced hypertension will be recorded.
- Recording of data will be done.

2. At the time of discharge again the above procedure will be repeated.

- Blood Sample Collection
- 2ml blood will be collected in plain tubes for MDA estimation.
- 2ml blood will be collected in EDTA tubes for SOD estimation.
- Immediately the blood sample will be sent to the central research lab.

Instrument

1. Spectrophotometer
2. Weighing Balance
3. Centrifuge
4. Vortexer
5. Micropipette

Procedure for Mda Estimation:

1. Serum should be fresh and analyzed within 6 hours of separation.
2. Take three clean test tubes namely blank, standard and test.
3. To each test tube add 2 ul of Trichloroacetic Acid (TCA) solution.
4. To them add 800 ul of Thiobarbituric Acid (TBA) solution.
5. To the test tube blank add 200 ul distilled water.
6. To the test tube standard add 200 ul working MDA standard.
7. To the test tube add 200ul serum.
8. Final volume of solution will be 3ml in all the test tubes.
9. Then keep all the tubes in a boiling water bath for 20 minutes.
10. Then switch off the water bath and keep the tubes in water bath for further 10 min.
11. After that cooling the tubes under tap water and centrifuge them at 300 RPM for 1 min.
12. After that immediately take reading on uv- vis spectrophotometry at 531 nm and note the readings.

Procedure for Sod Estimation:

1. Take two clean tubes namely blank and test.
2. Take 2.7 ml of tris buffer in a tube blank.
3. Take 2.699ml of tris buffer in a tube namely test and to it add 1ul of hemolysate.
4. At the time of reading add 300ul pyrogallol to the test tube blank and start the stop watch simultaneously.
5. Final volume of solution will be 3ml in all the test tubes.
6. We have to take reading within 1 min. vortex the mixture for 20 sec.
7. Put the solution in cuvette. Keep the cuvette in a spectrophotometer in a manner such that opaque side facing yourself. Do not touch the transparent side.

8. After 60 sec. press enter, and again on 90 sec. press enter.
9. 10 readings come one by one which are shown on display screen. Note down the readings.
10. Take the readings for test in a same manner at 420nm.

RESULTS

Table 1. Physiological parameters of Pregnancy Induced Hypertension, Preeclampsia and Eclampsia

Parameters	Pregnancy Induced Hypertension	Preeclampsia	Eclampsia
Age	24.55	25.98	28.58
Mean gestational age in weeks	36.8	32.65	30.16
Mean systolic blood pressure in mm Hg	119.4	146.31	168.33
Mean diastolic blood pressure in mm Hg	79.5	97.63	113.0
Proteinurea (mean) in gm/ day	Nil	0.95	3.6
Oedema	Nil	Nil to + in all cases	++ in all cases

Table 2. Comparison of MDA and SOD in pregnancy Induced Hypertension, Preeclampsia and Eclampsia

	Pregnancy Induced Hypertension	Preeclampsia	Eclampsia
MDA (nmol/dl)	109.09 ± 24	130.65±43.02	141.04±50.95
P-Value	<0.001	<0.001	<0.001

Table 3

	Pregnancy Induced Hypertension	Preeclampsia	Eclampsia
SOD	3.24 ± 1.	2.69 ± 1.34	2.59 ± 1.33
P-Value	<0.001	<0.001	<0.001

MDA in pregnancy induced hypertension, preeclampsia and eclampsia was 109.09±24, 130.65±43.02 and 141.04±50.95 respectively. . SOD in pregnancy induced hypertension, preeclampsia and eclampsia was 3.24±1, 2.69±1.34 and 2.59±1.33 respectively.

DISCUSSION

The present study was planned to detect lipid peroxidation products i.e. MDA and SOD in PIH, pre eclampsia and eclampsia. The lipid peroxidation product like malondialdehyde (MDA) levels has been measured in plasma of hypertensive pregnant women. It was found that higher O₂ free radical production, evidenced by increase levels of MDA in hypertensive pregnant women. The present study shows that, there is significant difference between PIH, pre eclampsia and

eclampsia regarding serum MDA. Rise in MDA could be due to increased generation of ROS due to the excessive oxidative damage generated in the hypertensive patients. These O₂ species in turn can oxidize many other important biomolecules including membrane lipids. The lipid peroxides & free radicals may be important in pathogenesis of PIH. In similar previous study was done on pregnant women with pregnancy induced hypertension, it was found that there was a significant increase in erythrocytes MDA levels, activities of SOD, & GP level.

A study conducted in Kerala, India evaluates the role of oxidative stress in PIH preeclampsia and eclampsia. This is done by measuring the levels of Malondialdehyde and superoxide dismutase in serum and catalase activity in erythrocytes. Age, gestational age, systolic and diastolic blood pressures and protein creatinine ratio in urine has also been included as baseline parameters. The results are tabulated in Tables 1-6. The mean value of MDA was found to be significantly increased ($P<0.001$) in PIH group. Mean SOD and Catalase in PIH group was found to be significantly less ($P<0.01$) than that of the normal group. The mean values of MDA and Catalase in preeclampsia was found to be significantly increased ($P<0.001$) as compared to normal pregnant.

Whereas, the activity of SOD was decreased significantly ($P<0.001$) in patients suffering from preeclampsia. The result of MDA, SOD and Catalase was similar to preeclampsia in Eclampsia. When the serum MDA and catalase activity in erythrocytes in PIH, Preeclampsia and Eclampsia were compared with normal group has shown a significant increase ($P<0.001$) respectively in all the groups. Whereas, the activity of SOD in PIH, Preeclampsia and Eclampsia when compared with normal group has shown a significant decline ($P<0.001$) respectively in all the groups.

CONCLUSION

The present study has shown a significant increase in serum MDA levels, the indicator of lipid peroxidation, in the 3 groups suggest that lipid peroxidation plays a role in the pathogenesis of hypertensive disorders of pregnancy. Increased lipid peroxidation causes increased consumption of antioxidant free radical scavenging system. In PIH, preeclampsia and eclampsia there is an imbalance between lipid peroxides and the antioxidant system.

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Observation and Documentation of Medicinal Plant Diversity of Seoni District, Madhya Pradesh Used in Traditional Medicine for Skin Diseases

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ABSTRACT

The paper reports ethnobotanical study based on the traditional medicinal plants used by the local population for the treatment of skin diseases. The main aim of the study was to observe and document medicinal plants of Seoni district, Madhya Pradesh. In the present study exhaustive field exploration and study was conducted to survey medicinal plants originating in eight tehsils of Seoni District from November 2019 to November 2020. The ethnobotanical data was collected using field work and survey method by performing semi-structured interviews and group discussions with the traditional healers and the local population. The ethnomedicinal survey yielded documentation of 97 plant species belonging to 43 families and 90 genera. The most dominant families observed in the study were Fabaceae, Cucurbitaceae, Poaceae, Moraceae, Caesalpinaceae, Rutaceae, Apiaceae, Anacardiaceae, Zingiberaceae, Chenopodiaceae, Rosaceae, Liliaceae, Arecaceae and Malvaceae. The tribals possess tremendous traditional knowledge of medicinal plants that can be used to cure different ailments. However, urbanization and expansion on agricultural practices have become a major threat to the medicinal plants. Hence, it is of utmost importance to preserve the indigenous knowledge of herbal medicines through identification and systematic documentation. The present study also aims to document the use of traditional herbal medicines of Seoni district that are used for curing skin problems. Conservation of the traditionally important plant species with the help of local population will enhance the ethnomedicinal diversity of the place.

KEY WORDS: SEONI, MADHYA PRADESH, MEDICINAL PLANTS, DOCUMENTATION, HERBAL MEDICINES, CONSERVATION.

INTRODUCTION

Plants form an integral part of our lives as they provide bioactive compounds and secondary metabolites that can fight several infections (Singh et al., 2020). Medicinal plants are traditionally used in herbal and Ayurvedic

medicines for curing different ailments (Lal and Sahu, 2019). The practice and use of traditional medicine has been conducted throughout the world for healing various human diseases (Hussain et al., 2018; Singh et al., 2020). Tribal population across the globe still depends on the medicinal plants for first aid treatment of cough, cold, fever and other related diseases (Ayyan and Ignacimuthu, 2011). Thus, traditional medicinal practices are a piece of knowledge that is transferred through generations for diagnosis, management and treatment of body ailments (Jima and Megersa, 2018; Vendrapati et al., 2020).

Madhya Pradesh comes in the central part of India and has a rich and diverse bio-geographical area (Lal and Sahu, 2019). Seoni district is located near the Satpura plateau and has a vast store of herbal plants

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and traditional medicinal knowledge. The area is rich in diverse flora across the district and its medicinal knowledge is still preserved by the herbal healers, vaidya and the tribal population. The Seoni district is divided into eight tehsil places that are Lakhnadaun, Ghansaur, Dhanora, Chhapara, Keolari, Seoni, Barghat and Kurai. The tribal population and the forest dwellers have access to the remote areas of the forests and are mostly dependent on the medicinal plant knowledge for curing several ailments.

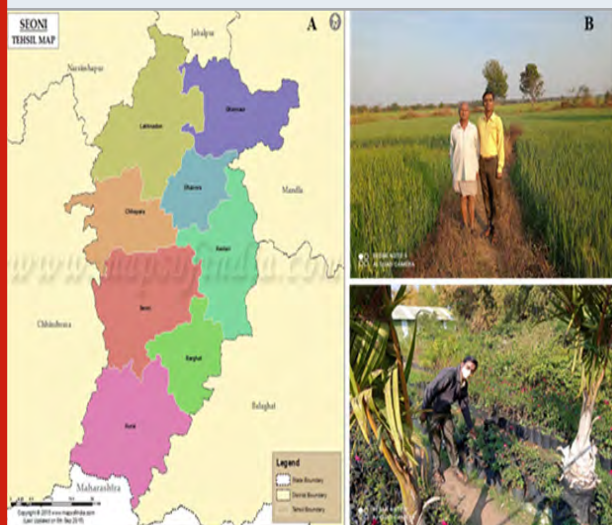
Ethnomedicinal work in India and across the globe has also been studied and outlined by a number of research scholars such as Mohan et al., (2008); Alyemeni et al., (2010); Ayyanar and Ignacimuthu (2011); Karunamoorthi et al., (2012); De Wet et al., (2013); Rahman (2013); Sharma et al., (2013); Pius et al., (2015); Bandyopadhyay (2017); Hussain et al., (2018); Jima and Megersa (2018); Satpute (2020); Singh et al., (2020); Vendrapati et al., (2020). Similary, Several ethnomedicinal work related to the medicinal flora of Madhya Pradesh has been done by many researchers as Dwivedi et al. (2008); Nath and Khatri (2010); Jatav and Mehta (2013); Ahirwar (2014); Wagh and Jain (2014); Rai (2016); Ahirwar (2017); Ahirwar et al. (2017); Iqbal (2017); Rai (2017); Gwalvanshi and Bishwas (2017); Pal and Patel (2017); Jain et al. (2018); Lal and Sahu (2019). However, in Central India, Seoni district was unexposed to ethnomedicinal survey and documentation of the traditional medicinal flora. Hence, the present study was performed to identify and document the medicinal plant diversity of the eight tehsils of Seoni district and also analyze the use of the medicinal plants in healing skin diseases.

MATERIAL AND METHODS

Seoni district is situated on North-South area of Satpura Plateau and lies between latitude 21° 36' & 22° 57' North and longitude 79° 19' and 80° 17' East. The total geographical area of Seoni district is 8,758 km². For the ethnomedicinal study eight tehsils of Seoni District, Madhya Pradesh namely Lakhnadaun (LD), Ghansaur (GS), Dhanora (DN), Chhapara (CP), Keolari (KL), Seoni (SN), Barghat (BG) and Kurai (KR) were selected (Figure 1 A). The study was performed to identify and document the traditional medicinal flora of the Seoni district. The survey was conducted from November 2019 to November 2020 and plant samples were collected through medicinal information gathered from traditional healers, vaidya and the local tribal population (Figure 1 B and C).

The medicinal information was obtained using interview method and preparation of question design technique and group discussions. Method of cross checking the information through different sources and sampling technique was also followed. The identification of the plant samples was conducted with the help of local tribals of the place and the traditional healers of the locality. Identification of the plant specimens was performed using the Book, Flora of Madhya Pradesh Vol. 1 and Ayurved Jadi Booti Rahasya Vol. 1, literature available through other sources was also referred for the study.

Figure 1: A- Map of Seoni district showing Eight Tehsils (Sampling sites) for collection of Medicinal plants. B and C- Fieldwork and collection of medicinal plants with help of tribals.



RESULTS AND DISCUSSION

In the present study, 97 plant species belonging to 43 families and 90 genera have been identified and documented (Table 1). Plants of ethnomedicinal importance were collected from eight tehsils (Lakhnadaun, Dhanora, Ghansaur, Chhapara, Keolari, Seoni, Barghat and Kurai) of Seoni district. From the study it was observed that the highest number of medicinal plants was observed in Seoni and Barghat Tehsils (Graph 1). The traditional healers and the tribals use these plants for their medicinal importance. Out of the total number of reported plant species, plant families Fabaceae, Cucurbitaceae and Poaceae were found to be the most dominant which depicted nine and six plant species followed by Moraceae, Caesalpiniaceae, Apiaceae, Malvaceae, Myrtaceae, Anacardiaceae, Solanaceae, Zingiberaceae, Oleaceae, Chenopodiaceae, Lamiaceae, Combretaceae, Apocynaceae, Arecaceae, Liliaceae, Brassicaceae and Rutaceae which showed five and less than five plant species while, plant families Asteraceae, Linaceae, Punicaceae, Cuscutaceae, Araceae, Myristicaceae, Pedaliaceae, Lythraceae, Bixaceae, Rubiaceae, Nymphaeaceae, Musaceae, Magnoliaceae, Cactaceae, Meliaceae, Caricaceae, Mimosaceae, Tilaceae, Rhamnaceae, Annonaceae, Verbenaceae and Ongraceae reported single plant species (Graph 2.1- 2.4).

The reported plant species are used by the traditional healers and forest dwellers for the treatment for various skin ailments. The use of medicinal plants for curing different ailments is prevalent in this region and a large number of local populations rely on this indigenous knowledge and abundantly available herbal flora. As the modern medicinal facilities and allopathic medicines are out of the reach of tribals due to their high cost and lack of availability the medicinal plants knowledge is

transferred through generations through the traditional healers.

Ethnomedicinal documentation of medicinal plants was also carried out by Nath and Khatri (2010), the authors reported documentation of ethnomedicinal data of Chhindwara and Betul districts and uses of medicinal plants for the treatment of various diseases. Seventy seven species of medicinal plants was reported from Chhindwara district and 50 species of plants were reported from Betul district in the study. De Wet et al. (2013) studied the ethnomedicinal uses of plants found

in the rural community of Northern Maputaland, South Africa for various skin disorders. The authors concluded use of nine different medicinal plant species for curing skin infections like rashes, ringworm, sores, wounds, acne, burns and boils. Gwalvanshi and Bishwas (2017) also documented ethnomedicinal plants of Balaghat district and their ethnoveterinary uses. For the study two divisions of Balaghat district were selected and field work and survey for documentation of medicinal plants was performed. The medicinal plants identified in the survey were used by the tribal people for curing different ailments of animals.

Table 1. Tabular representation of list of Medicinal plants observed in 8 Tehsils of Seoni District, Madhya Pradesh, India.

SN.	BOTANICAL NAME	COMMON NAME	FAMILY	DISTRIBUTION
1.	<i>Helianthus annuus</i> Linn	Suryamukhi	Asteraceae	LD
2.	<i>Trachyspermum ammi</i>	Ajwain	Apiaceae	GS,DN,CP
3.	<i>Daucus carota</i> Linn var sativa	Gajar	Apiaceae	KL,SN,BG,KR
4.	<i>Coriandrum sativum</i> Linn	Dhaniya	Apiaceae	BG,KR,SN
5.	<i>Foeniculum vulgare</i> Mill	Sauf	Apiaceae	BG
6.	<i>Linum usitatissimum</i>	Alsi	Linaceae	BG,KR
7.	<i>Punica granatum</i> Linn	Anar	Punicaceae	BG,SN,KL
8.	<i>Clitoria ternatea</i> Linn	Aparajita	Fabaceae	CP
9.	<i>Cajanus cajan</i> (L) Millsp	Arhar	Fabaceae	DN,GS,LD
10.	<i>Derris indica</i> (Lam.) Bennet	Karanj	Fabaceae	BG
11.	<i>Butea monosperma</i> Linn	Palash	Fabaceae	BG,KR
12.	<i>Lens culinaris</i> Medik	Masur	Fabaceae	CP
13.	<i>Vigna radiata</i> (Linn) wilczek var.radiata verdcourt	Mung	Fabaceae	KL,SN,BG,KR
14.	<i>Arachis hypogea</i> Linn	Mungfali	Fabaceae	BG
15.	<i>Vigna aconitifolia</i> Marechal	Moth	Fabaceae	KL,SN,BG,KR
16.	<i>Dalbergia sissoo</i> Roxb ex dc	Sheesham	Fabaceae	KR,BG,SN
17.	<i>Cuscuta reflexa</i> Roxb	Amar bel	Cuscutaceae	KR,BG
18.	<i>Syzygium cumini</i> (Linn) Skeels	Jamun	Myrtaceae	LD,GS,DN
19.	<i>Syzygium aromaticum</i> (Linn) merr&t l.m.perry	Laung	Myrtaceae	CP,KL,SN,BG
20.	<i>Cassia fistula</i> Linn	Amaltas	Caesalpiniaceae	KR,BG
21.	<i>Bauhinia variegata</i> Linn	Kachnar	Caesalpiniaceae	BG
22.	<i>Delonix regia</i> (Boj ex hook) raf	Gulmohar	Caesalpiniaceae	BG,KR
23.	<i>Senna tora</i> (Linn) roxb	Panwar	Caesalpiniaceae	BG
24.	<i>Amorphophallus paeoniifolius</i>	Suran	Araceae	LD,GS,DN,CP
25.	<i>Mangifera indica</i> Linn	Aam	Anacardiaceae	KL,SN,BG,KR
26.	<i>Anacardium occidentale</i> Linn	Kaju	Anacardiaceae	GS,DN,CP
27.	<i>Solanum tuberosum</i> Linn	Aaloo	Solanaceae	KL
28.	<i>Lycopersicon esculentum</i> Mill	Tamatar	Solanaceae	SN,BG,KR
29.	<i>Datura metel</i> Linn	Dhatura	Solanaceae	CP,KL,SN
30.	<i>Solanum melongena</i> Linn	Baigan	Solanaceae	BG
31.	<i>Amomum subulatum</i> Roxb	Badi Elaichi	Zingiberaceae	SN,BG,KR
32.	<i>Zingiber officinale</i> rocs.	Adrak	Zingiberaceae	BG
33.	<i>Curcuma longa</i> Linn	Haldi	Zingiberaceae	LD,GS,DN,CP
34.	<i>Ficus carica</i> Linn	Anjir	Moraceae	KL,SN
35.	<i>Artocarpus hetrophyllum</i> Lam	Kathal	Moraceae	SN
36.	<i>Morus alba</i> Linn	Shehtut	Moraceae	BG,KR,SN
37.	<i>Ficus religiosa</i> Linn	Peepal	Moraceae	SN,BG,KR

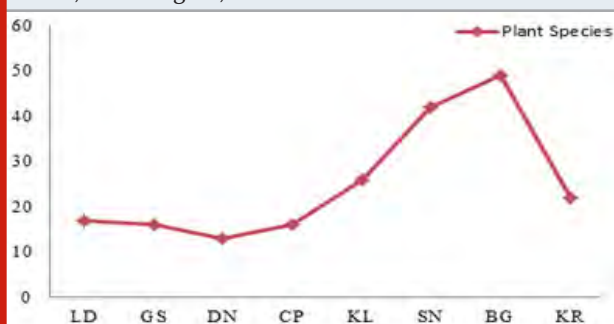
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38	<i>Ficus benghalensis</i> L.	Bargad	Moraceae	LD,GS,DN
39	<i>Anthocephalus cadamba</i> Roxb. mig	Kadamba	Rubiaceae	BG,SN
40	<i>Tabernaemontana divaricata</i> Chandni (Linn) R. Br. Ex Roem & Schult	Apocynaceae	BG,SN	
41	<i>Catharanthus roseus</i> (Linn) g. don	Sadapuspa	Apocynaceae	SN
42	<i>Gossypium herbaceum</i> Linn	Kapas	Malvaceae	CP,KL,SN
43	<i>Hibiscus rosasinensis</i> Linn	Gudhal	Malvaceae	BG,SN
44	<i>Abelmoschus esculentus</i>	Bhindi	Malvaceae	KR,SN,LD
45	<i>Nelumbo nucifera</i>	Kamal	Nymphaeaceae	KR,LD
46	<i>Momordica dioica</i> Roxb Ex . willd	Karkoti	Cucurbitaceae	SN
47	<i>Momordica dioica</i> charantia	Karela	Cucurbitaceae	SN,KL,CP
48	<i>Cirtullus vulgaris</i> var. fistulosus (Stocks) Duthie & Fuller	Tarbuj	Cucurbitaceae	SN
49	<i>Trichosanthes dioica</i> Roxb	Parval	Cucurbitaceae	BG,GS,LD
50	<i>Lagenaria siceraria</i> (Molina) standl	Lauki	Cucurbitaceae	BG,SN
51	<i>Cayaponio laciniola</i> (Linn) C. Jeffery	Shivalingi	Cucurbitaceae	CP,LD,SN,BG
52	<i>Anacardium occidentale</i> Linn	Kaju	Anacardiaceae	SN
53	<i>Saccharum spontaneum</i> Linn	Kaans	Poaceae	SN,BG
54	<i>Desmostachya bipinnata</i> (Linn) stapf.	Kush	Poaceae	SN,BG,KR
55	<i>Rosa centifolia</i> Linn	Gulab	Poaceae	LD,GS,DN
56	<i>Oryza sativa</i> Linn	Chawal	Poaceae	CP,KL,SN
57	<i>Cynodon dactylon</i> (Linn) pers	Dub	Poaceae	BG,SN,LD,KL
58	<i>Bambusa arundinaceae</i> Willd	Bans	Poaceae	SN,BG
59	<i>Musa paradisiaca</i> Linn	Kela	Musaceae	SN
60	<i>Phoenix sylvestris</i> (Linn) Roxb	Khajur	Arecaceae	BG
61	<i>Cocos nucifera</i> Linn	Nariyal	Arecaceae	DN,CP,KL
62	<i>Areca catechu</i> Linn	Supari	Arecaceae	BG,SN
63	<i>Aloe vera</i> (Linn) burm. . F .	Gwarpatha	Liliaceae	LD,GS,DN
64	<i>Allium cepa</i> Linn	Pyaz	Liliaceae	CP,KL,SN
65	<i>Allium sativum</i> Linn	Lasun	Liliaceae	BG
66	<i>Pyrus communis</i> Linn	Nashpati	Rosaceae	KL,LD
67	<i>Prunus amygdalus</i> Batsch	Badam	Rosaceae	DN,CP
68	<i>Brassica rapa</i> Linn	Shalgam	Brassicaceae	SN
69	<i>Brassica campestris</i> Linn	Sarso	Brassicaceae	BG
70	<i>Michelia champaca</i> Linn	Champa	Magnoliaceae	SN,BG
71	<i>Jasminum officinale</i> Linn	Chameli	Oleaceae	KR
72	<i>Jasminum sambac</i> (Linn)	Bela	Oleaceae	BG,SN,KL,CP, DN
73	<i>Manilkara zapota</i> (Linn) p. van royen	Chikoo	Oleaceae	GS,DN,CP
74	<i>Beta vulgaris</i> Linn	Chukandar	Chenopodiaceae	BG,SN
75	<i>Spinacia oleracea</i> Linn	Paalak	Chenopodiaceae	SN,BG
76	<i>Chenopodium album</i> Linn	Bathua	Chenopodiaceae	SN,KL,CP
77	<i>Myristica fragrans</i> houtt	Jaiphal	Myristicaceae	LD,GS,DN
78	<i>Sesamum indicum</i> Linn	Til	Pedaliaceae	SN
79	<i>Ocimum sanctum</i> Linn	Tulsi	Lamiaceae	BG,SN
80	<i>Mentha spicata</i> Linn	Pudina	Lamiaceae	KL,SN,BG,KR
81	<i>Opuntia dillenii</i>	Nagfani	Cactaceae	LD,BG,GS
82	<i>Azadirachta indica</i> Linn	Neem	Meliaceae	SN,BG,KL
83	<i>Murraya koenigii</i> Linn	Meethi Neem	Rutaceae	LD,GS
84	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Nimbu	Rutaceae	BS,GS
85	<i>Aegle marmelos</i> Linn correa	Bel	Rutaceae	GS,LD,KL
86	<i>Citrus sinensis</i> (Linn) Osbeck	Mosumbi	Rutaceae	SN,KL,LD
87	<i>Carica papaya</i> Linn	Papita	Caricaceae	KR,SN,KL

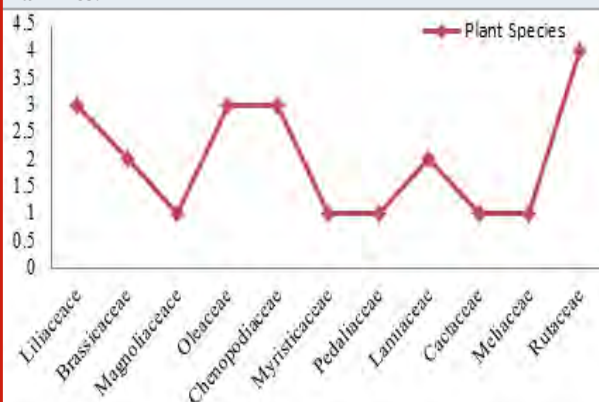
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88	<i>Acacia senegal</i> Linn	Babul	Mimosaceae	GS,SN,BG
89	<i>Sida acuta</i> Burm f.	Baraira	Tilaceae	KL,SN
90	<i>Terminalia bellirica</i> (Gaertn) Roxb	Baheda	Combretaceae	KR,KL,LD
91	<i>Terminalia catappa</i> Linn	Jungli Badam	Combretaceae	GN,SN
92	<i>Ziziphus mauritiana</i> Lam	Ber	Rhamnaceae	BG,KL
93	<i>Lawsonia inermis</i> Linn	Mehendi	Lythraceae	BG
94	<i>Annona squamosa</i> Linn	Sitafal	Annonaceae	BG,SN
95	<i>Tectona grandis</i> Linn	Sagvan (sagon)	Verbenaceae	BG,KL
96	<i>Bixa orellana</i> Linn	Sinduria	Bixaceae	KL,KR,LD
97	<i>Trapa natans</i> Linn var. <i>bispinosa</i> (Roxb) makino	Singhada	Onagraceae	KL,SN,BG

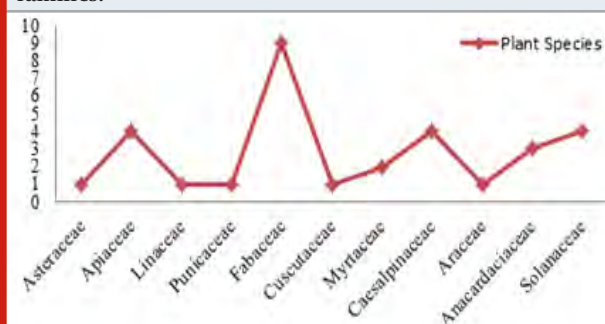
Graph 1: Block wise distribution of Plant species from Seoni District, Madhya Pradesh. LD- Lakhnadaun; GS- Ghansaur, DN-Dhanora, CP- Chapara, KL- Kevlari, SN- Seoni, BG- Barghat, KR-Kurai.



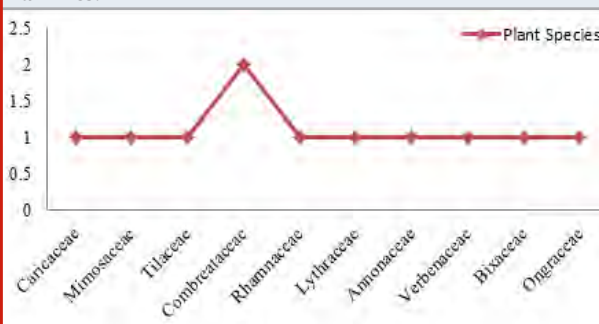
Graph 2.3: Comparative account of dominant plant families.



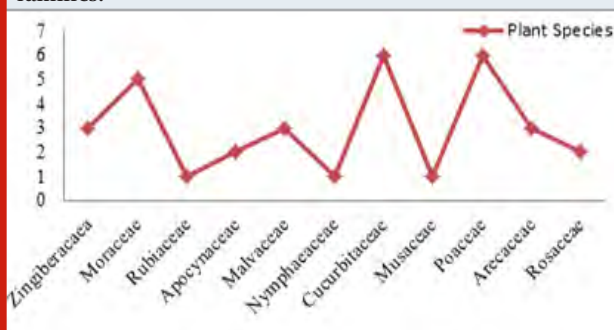
Graph 2.1: Comparative account of dominant plant families.



Graph 2.4: Comparative account of dominant plant families.



Graph 2.2: Comparative account of dominant plant families.



The authors highlighted 41 plant species that the tribals used for curing fever, jaundice, diarrhea, dysentery, cough and asthma. Jima and Megersa (2018) performed ethnobotanical survey for documentation of medicinal plants used by local communities of Berbere district, South East Ethiopia for the treatment of various human diseases. The authors identified 70 medicinal plants belonging to 56 genera and 46 families in the survey. Singh et al. (2020) explored the ethnobotanical diversity of Jasrota Hill in Western Himalaya region. The study was conducted to check local healing practices followed by the local dwellers of the region for the treatment of various diseases. The authors determined ethnomedicinal uses of 121 plant species belonging to 105 genera and 53 families.

Ahirwar et al. (2017) reported survey of medicinal plants of Tikamgarh, Madhya Pradesh for the detection of plants species used by the tribal people for curing fever.

The present study overviews documentation of maximum number of medicinal plant species used for preparation

of herbal medicines by the traditional healers and tribals. Seoni district has rich herbal biodiversity which was observed in the study, the tribals and rural inhabitants of the place largely depend on this medicinal treasure to treat various ailments. Concrete measures should be taken to conserve this rich natural flora of Seoni district along with the traditional herbal medicine knowledge.

CONCLUSION

The observations and data acquired from the traditional healers in the above study indicate that the tribal people possess prominent knowledge of the medicinal plants found in the region. The fieldwork and survey of all the eight tehsils of Seoni district showed presence of prosperous biodiversity of the region with the Seoni and Barghat tehsil treasuring highest number of medicinal plant species. In the overall study, 97 plant species were documented belonging to 43 plant families with the help of the tribals and the locals of the area. Further studies related to the medicinal preparations using the herbal plants will be investigated. The study strongly supports conservation and documentation of the vast flora of the Seoni district.

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Improved Process for Anti-Coagulant Drug Substance Rivaroxaban

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ABSTRACT

An anti-coagulant drug substance rivaroxaban is developed with improved process by introducing a new oxazolidine ring formation with commercially available carbamide in presence of strong base like potassium hydroxide in toluene as solvent and the developed process is scalable, economic than innovator process, which is mentioned in scheme 1.

KEY WORDS: IMPROVED SYNTHESIS, ALTERNATIVE REAGENTS, RIVAROXABAN.

INTRODUCTION

Rivaroxaban is an orally bioavailable member of a new class of potent and novel factor Xa inhibitors (oxazolidinone derivatives) is used for the treatment and prevention of various thromboembolic ailments, especially deep venous thrombosis, pulmonary embolism, angina pectoris, myocardial infarction, cerebral stroke, restenosis after angioplasty or aortocoronary bypass, transitory ischemic attacks and the peripheral arterial occlusive diseases. It has also been used in the treatment of stroke and systemic embolism in adult patients with non-valvular atrial fibrillation and for the prevention of deep vein thrombosis. It has also been approved for the treatment of atherothrombotic events in patients who have high cardiac biomarkers.

In this accord great attention has been focused on the synthesis of rivaroxaban and as such many reviews have been published on the rivaroxaban. Whereas, the

Author in his improved route of synthesis he developed with commercially viable and available reagents used for cyclization and as well as peptide bond formation This current paper describes an insight into the improved route synthesis of rivaroxaban that is commercially viable.

Experimental: Chemical & Solvents: All the chemicals for the synthesis of rivaroxaban were supplied from Merck and Aldrich Chemicals & Co. And used as received. All reactions were carried out with dry, freshly distilled solvents under anhydrous conditions.

The UV-Visible absorption spectra were recorded in DMSO with a SHIMADZU UV-1800 spectrometer at concentration range of 10–4 M. IR spectra were recorded in the region of 4000 cm⁻¹ to 400 cm⁻¹ on an FT-IR-Alpha Bruker IR spectrometer in KBr pellets. The ¹H- and ¹³C-NMR spectra were recorded in DMSO-d₆ at 500MHz using AV500-High Resolution Multinuclear FT-NMR Spectrometer with tetramethylsilane as internal standard.

RESULTS AND DISCUSSION

Improved process of synthesis of rivaroxaban was made by introducing a new oxazolidine ring formation with commercially available carbamide in presence of strong base like potassium hydroxide in toluene as solvent. The synthesized compound was analyzed and characterized by melting point, UV-Vis, IR, ¹H-NMR, ¹³C NMR, and elemental analysis.

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Process for the preparation of 2-(2-Hydroxy-3-((4-(3-Oxomorpholino) Phenyl) Amino) Propyl) Isoindoline-1, 3-Dione (3): In a 500 ML round bottom flask 50gm of 4-(4-aminophenyl) morpholin-3-one(1) and 45 gm of 2-(oxiran-2-ylmethyl) isoindoline-1, 3-dione(2) was taken in a 300ml of Toluene at room temperature. Slowly rose the temperature up to 80-85°C and maintained the reaction mass for 4-5 hours. After completion of the reaction, cooled the reaction mass temperature to room temperature and filtered through Buckner funnel. The obtained off-white solid was again purified in water and dried.

Process for the preparation of 2-((2-Oxo-3-(4-(3-Oxomorpholino) Phenyl) Oxazolidin-5-Yl) Methyl) Isoindoline-1, 3-Dione (4): 34.5 gm of 2-(2-hydroxy-3-((4-(3-oxomorpholino) phenyl) amino) propyl) isoindoline-1, 3-dione (3) in 250 mL of Toluene was taken in a 500 ML round bottom flask and added 50gm of carbamide, 22 gm of potassium hydroxide. The reaction mass was refluxed for 10-11 hours. After completion of the reaction in thin layer chromatography monitoring cooled the reaction mass to room temperature and filtered the precipitated reaction mass to obtain a half white solid, which was further purified in water to get pure ring closed materials(4).

Process for the preparation of 4-(4-(5-(Aminomethyl)-2-Oxooxazolidin-3-Yl) Phenyl) Morpholin-3-One (5): 15gm of 2-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) isoindoline-1, 3-dione (4) was subjected to de-phthalation in 100mL of 10% Ammonia in Isopropyl alcohol under reflux condition for 5-6 hours. Once reaction completed reaction mass was cooled to room temperature and filtered the light brown colored targeted product 5 good quality and yield.

round bottom flask 75 gm of 4-(4-(5-(aminomethyl)-2-oxooxazolidin-3-yl)phenyl)morpholin-3-one (5), 82gm of 5-chlorothiophene-2-carbonyl chloride (6) taken in 200 mL of N,N-Dimethyl amine (DMF) and 45gm of Potassium tertiary butoxide at room temperature and maintained it for 2-3 hours for completion of the reaction. After completion of the reaction 350 mL of Water was added to quench the reaction and the obtained white colored material was purified in ethyl acetate to get high pure material with any other impurity NMT 0.10%.

Scheme 1: Route of Synthesis of rivaroxaban (Improved process route of synthesis)

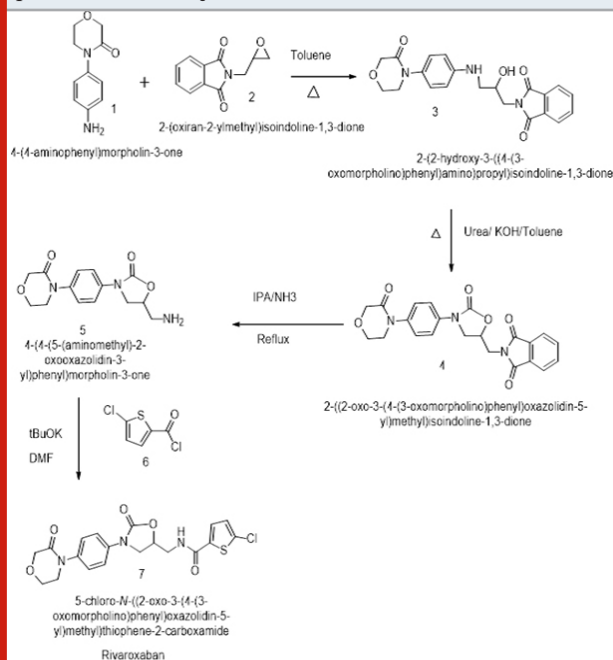
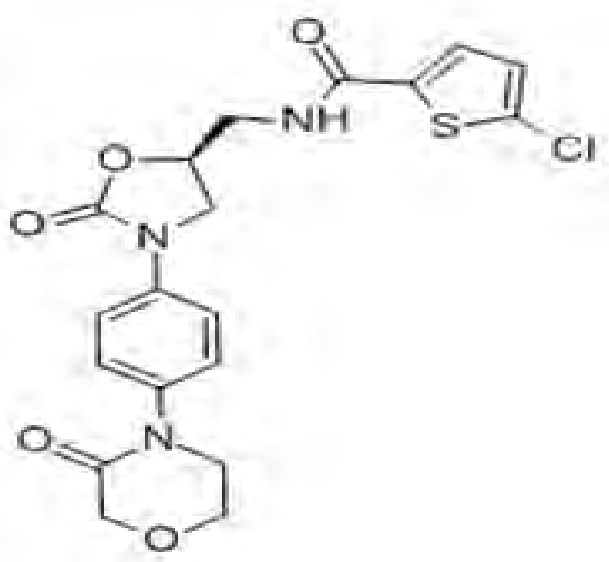


Figure 1: Structure of rivaroxaban



Process for the preparation of 5-Chloro-N-((2-Oxo-3-(4-(3-Oxomorpholino) Phenyl) Oxazolidin-5-Yl) Methyl) Thiophene-2-Carboxamide (7): In a 1000mL

Figure 2: 1H NMR 2-(2-hydroxy-3-((4-(3-oxomorpholino) phenyl) amino) propyl) isoindoline-1, 3-dione

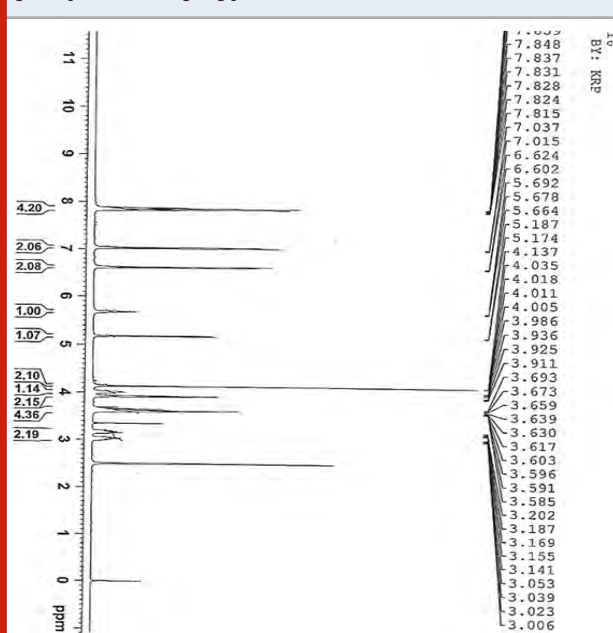


Figure 3: ^{13}C NMR 2-((2-hydroxy-3-((4-(3-oxomorpholino phenyl) amino) propyl) isoindoline-1, 3-dione

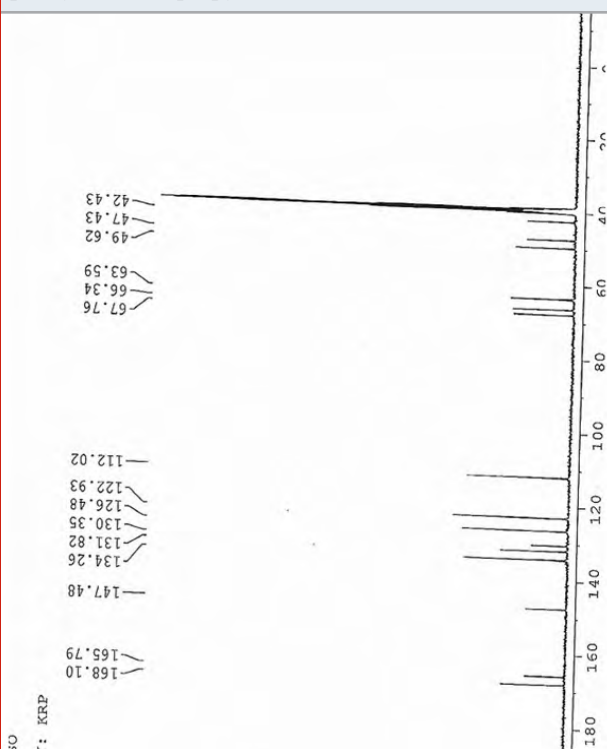


Figure 4: Mass 2-((2-hydroxy-3-((4-(3-oxomorpholino phenyl) amino) propyl) isoindoline-3-dione

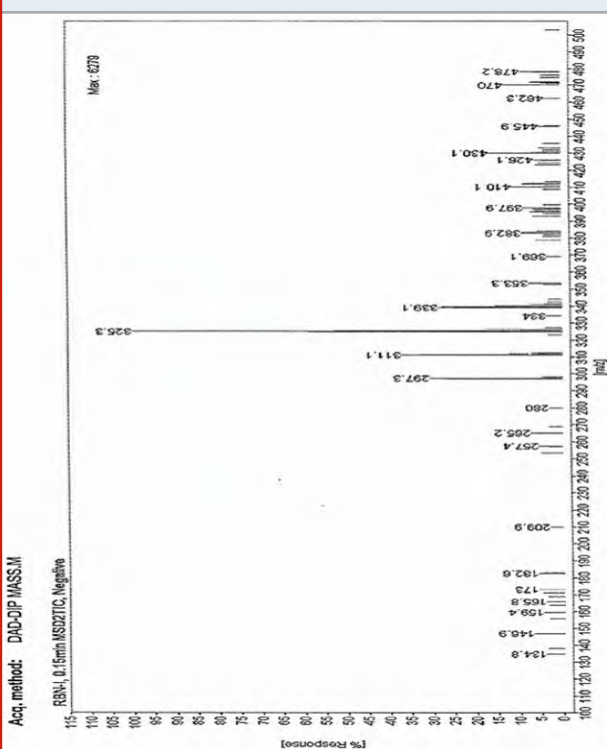


Figure 5: FT-IR 2-((2-hydroxy-3-((4-(3-oxomorpholino phenyl) amino) propyl) isoindoline-1, 3-dione

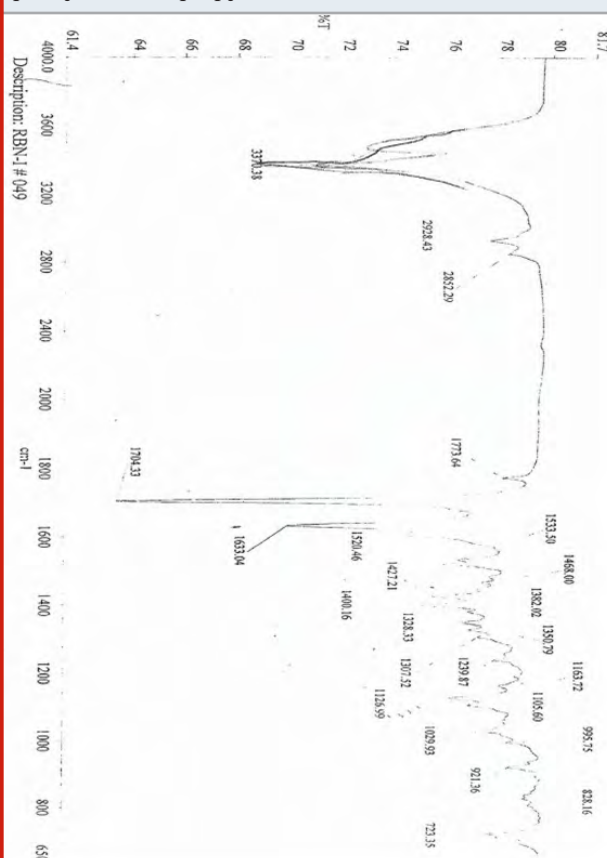


Figure 6: ^1H NMR 2-((2-oxo-3-(4-(3-oxomorpholino phenyl) oxazolidin-5-yl) methyl) isoindoline-1, 3-dione

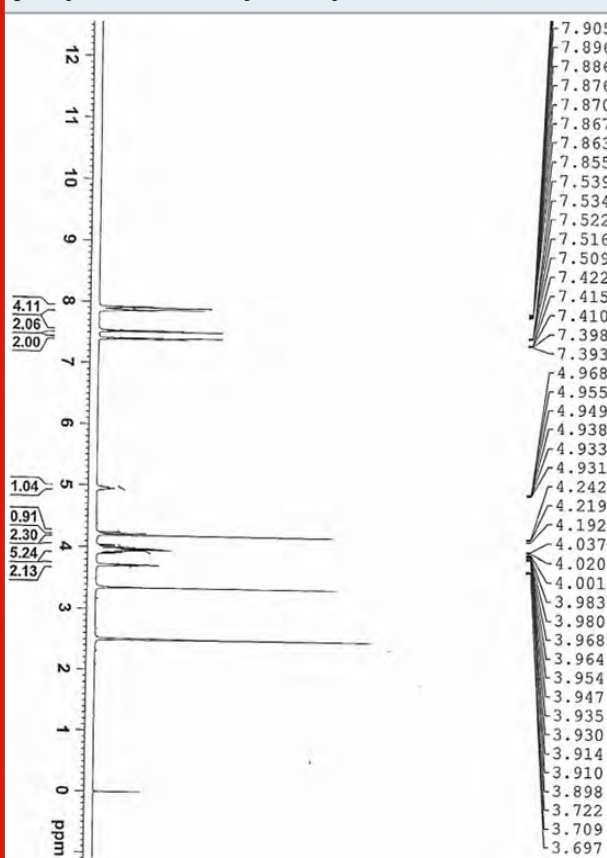


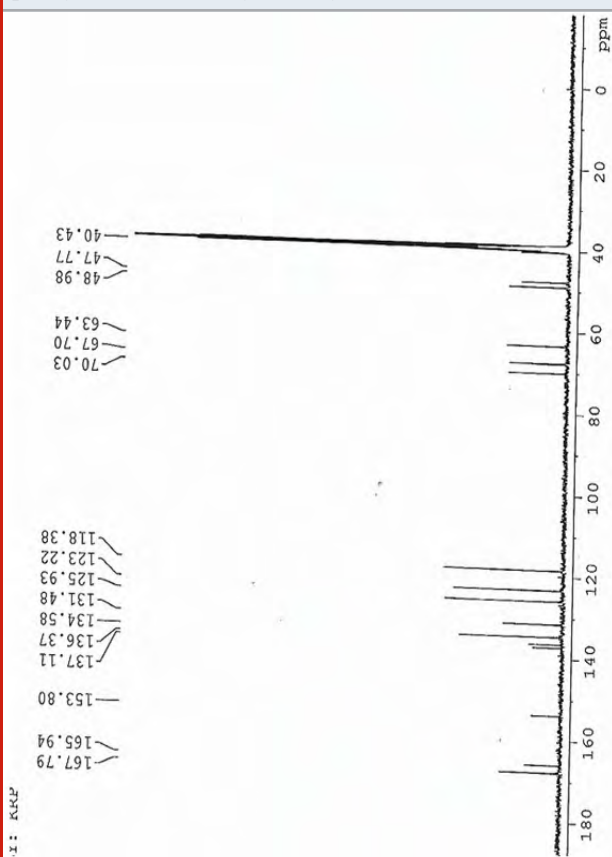
Figure 7: ^{13}C NMR 2-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) isoindoline-1, 3-dione

Figure 8: Mass 2-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) isoindoline-1, 3-dione

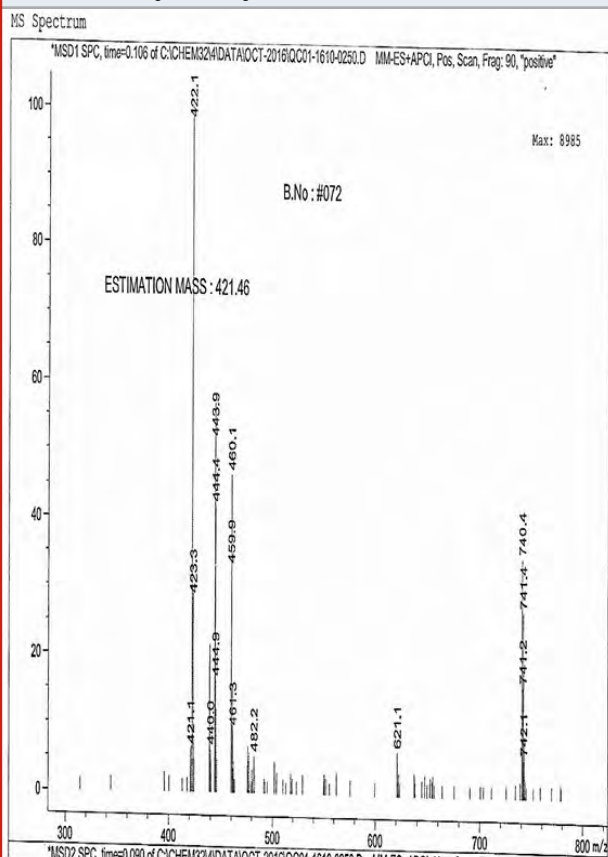


Figure 9: FT-IR 2-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) isoindoline-1, 3-dione

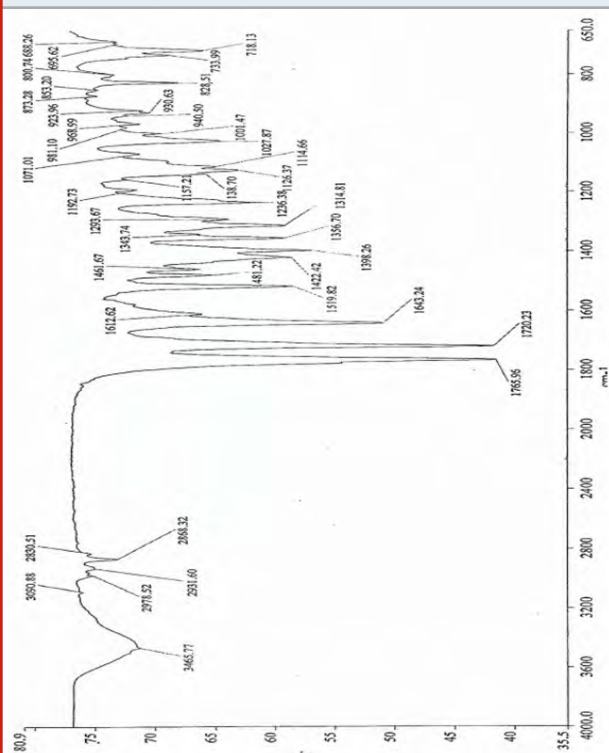
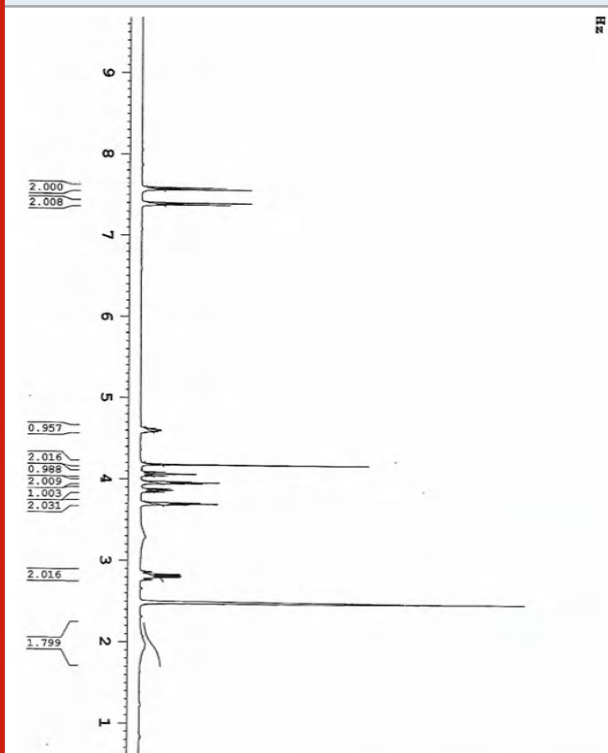
Figure 10: ^1H NMR 4-(4-(5-(amino methyl)-2-oxooxazolidin-3-yl) phenyl) morpholin-3-one

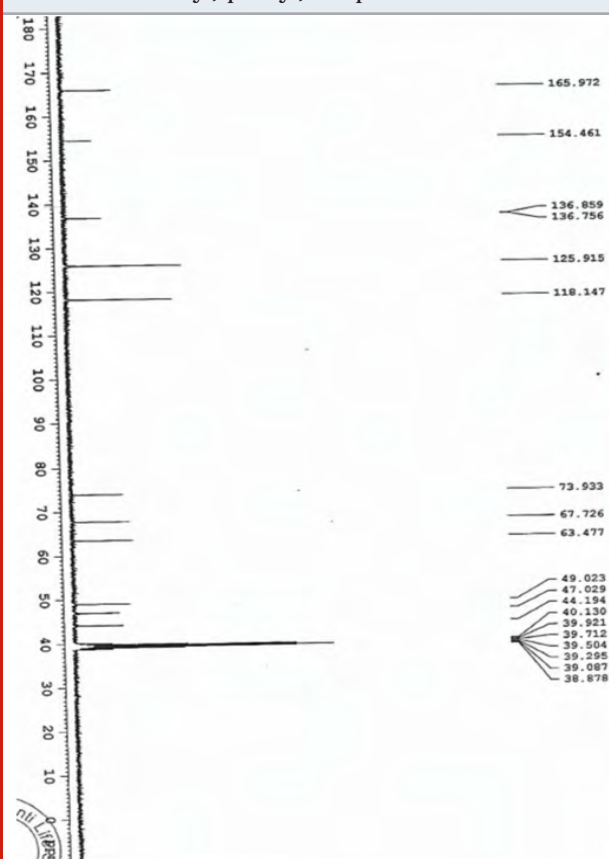
Figure 11: ^{13}C NMR 4-(4-(5-(amino methyl)-2-oxooxazolidin-3-yl) phenyl) morpholin-3-one

Figure 12: Mass 4-(4-(5-(amino methyl)-2-oxooxazolidin-3-yl) phenyl) morpholin-3-one

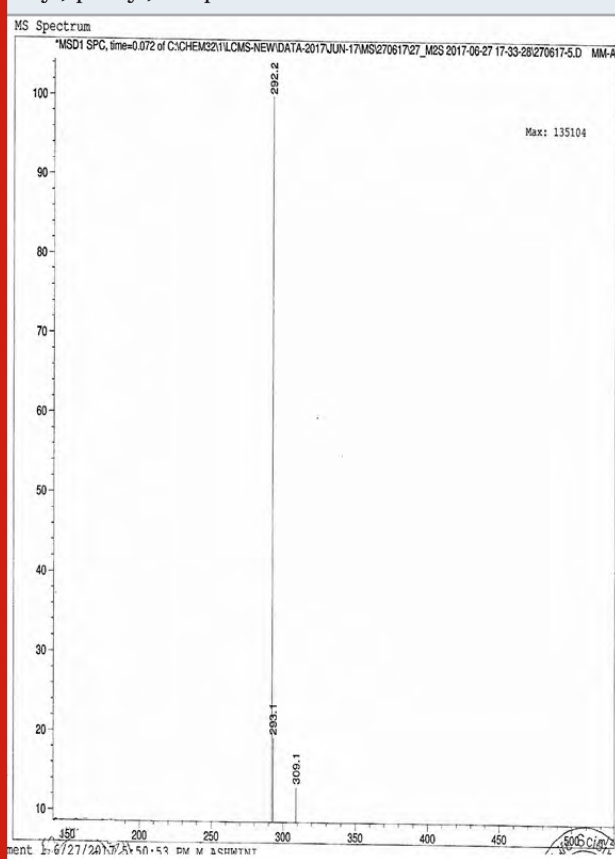
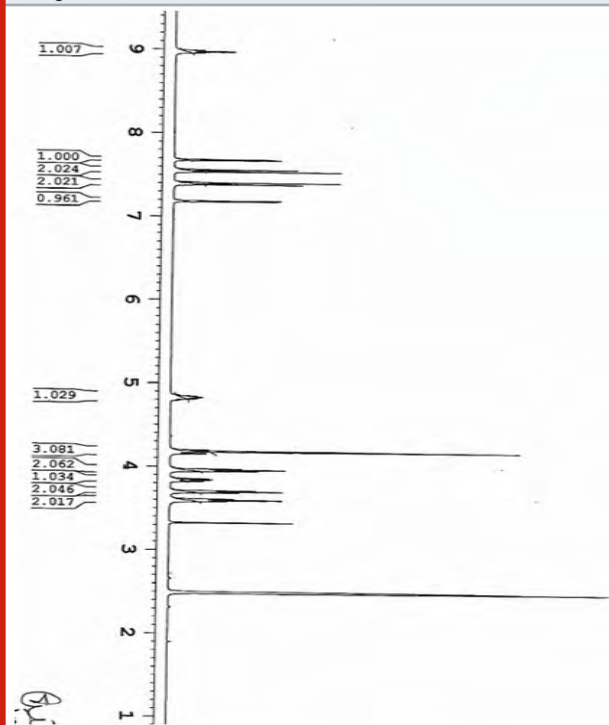
Figure 13: ^1H NMR 5-chloro-n-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) thiophene-2-carboxamide

Figure 14: 5-chloro-n-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) thiophene-2-carboxamide

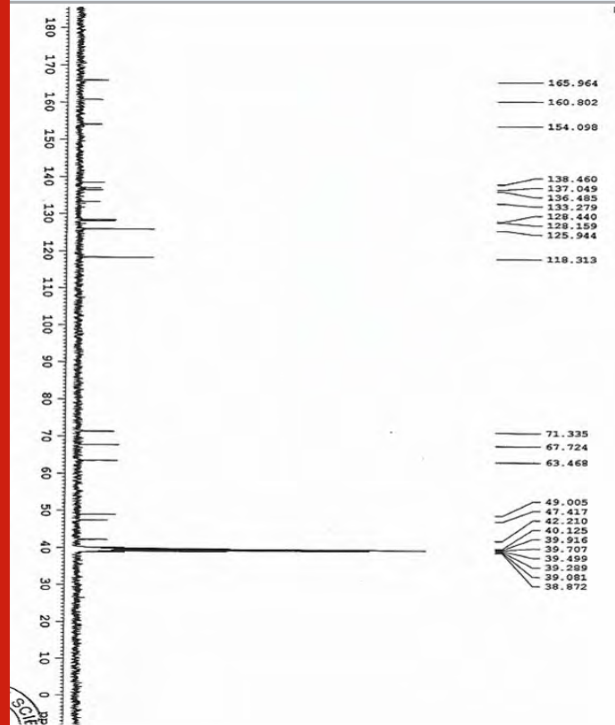


Figure 15: Mass 5-chloro-n-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) thiophene-2-carboxamide

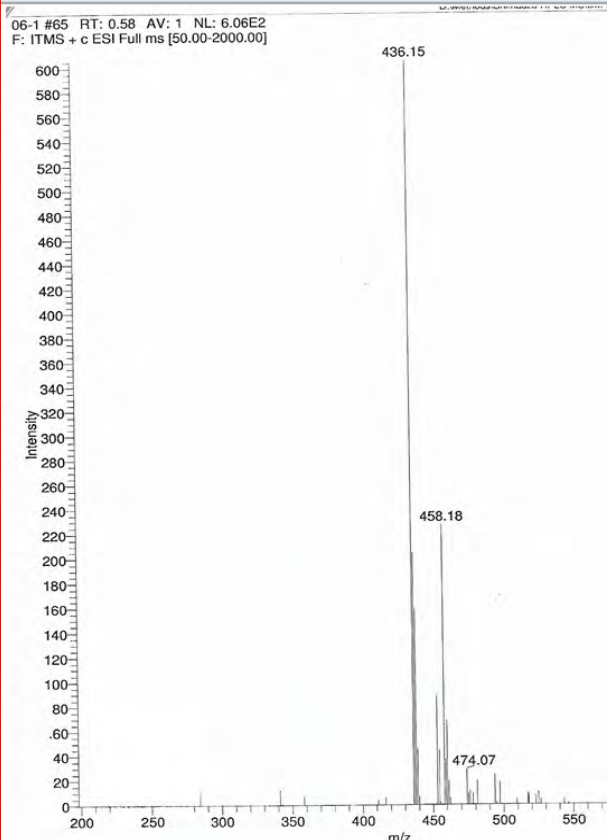
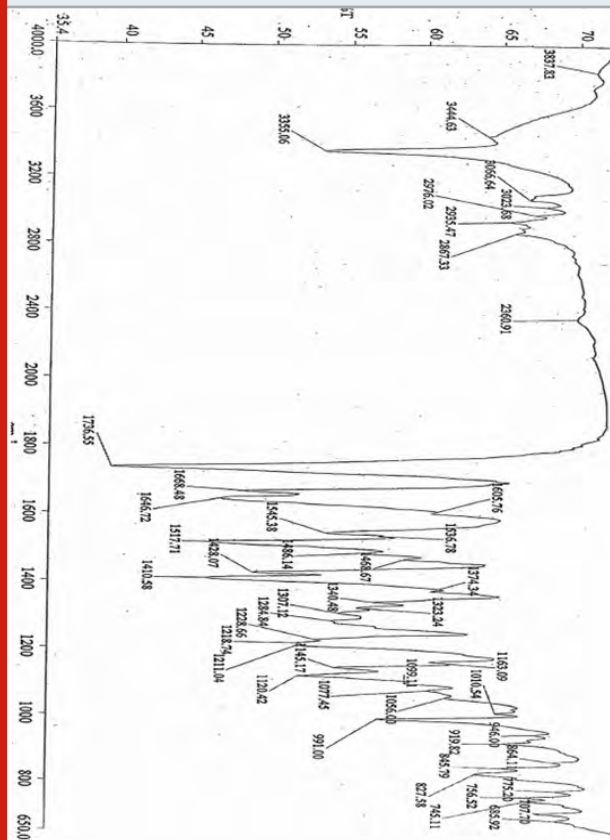


Figure 16: FT-IR 5-chloro-n-((2-oxo-3-(4-(3-oxomorpholino) phenyl) oxazolidin-5-yl) methyl) thiophene-2-carboxamide



CONCLUSION

In conclusion, the present paper summarizes the improved synthetic approach utilized for the synthesis of the anticoagulant drug rivaroxaban. The synthetic approach of rivaroxaban was made by introducing a new oxazolidine ring formation with commercially available carbamide in presence of strong base like potassium hydroxide in toluene as solvent that could be used for the industrial production of rivaroxaban in high yield and enantiopurity.

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Root Cube Mean Cordial Labeling of Some Standard Graphs

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ABSTRACT

Let $G=(V,E)$ be a graph and f be a mapping from $V(G) \rightarrow \{0,1,2\}$. For each edge uv of G assign the label $\left\lfloor \sqrt{\frac{f(u)^3 + f(v)^3}{2}} \right\rfloor$. f is called a root cube mean cordial labeling if $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$, where $v_f(x)$ and $e_f(x)$ denote the number of vertices and edges labeled with x , $x \in \{0,1,2\}$ respectively. A graph with a root cube mean cordial labeling is called root cube mean cordial graph. In this paper, root cube mean cordiality of some standard graphs such as cycle, path, star are discussed.

KEY WORDS: CYCLE, PATH, ROOT CUBE MEAN CORDIAL LABELING, ROOT CUBE MEAN CORDIAL GRAPHS.

INTRODUCTION

The graphs considered here are finite, undirected and simple. The vertex set and edge set of a graph G are denoted by $V(G)$ and $E(G)$ respectively. Labeled graphs are useful models for a broad range of applications such as coding theory, X-ray crystallography, astronomy, circuit design etc. The concept of cordial labeling was introduced by Cahit in the year 1987. Let $f: V(G) \rightarrow \{0,1\}$ be a function. For each edge uv assign the label $|f(u) - f(v)|$. f is called a cordial labeling if $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$, $i, j \in \{0,1\}$ where $v_f(x)$ and $e_f(x)$ denote the number of vertices and edges respectively labeled with x ($x = 0,1$). A graph which admits a cordial labeling is called cordial graph.

2. Root Cube Mean Cordial Labeling

Definition 2.1

Let $G = (V,E)$ be a graph and f be a mapping from $V(G) \rightarrow \{0,1,2\}$. For each edge uv of G assign the label

$$\left\lfloor \sqrt{\frac{f(u)^3 + f(v)^3}{2}} \right\rfloor$$

f is called a root cube mean cordial labeling if $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$, where $v_f(x)$ and $e_f(x)$ denote the number of vertices and edges labeled with x , $x \in \{0,1,2\}$ respectively. A graph with a root cube mean cordial labeling is called root cube mean cordial graph. We illustrate the definition using the following example.

Example 2.2 A graph that admits a root cube mean cordial labeling is given below.

Here $v_f(0) = 2$, $v_f(1) = 3$, $v_f(2) = 3$ and $e_f(0) = 3$, $e_f(1) = 2$, $e_f(2) = 3$ and $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$ for all $i, j \in \{0,1,2\}$.

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Theorem 2.3. The graph P_n is a root cube mean cordial graph.

Proofs

Let P_n be the path $u_1 u_2 \dots u_n$ where $|V(P_n)| = n$

and $|E(P_n)| = n - 1$.

Define $f: V(P_n) \rightarrow \{0, 1, 2\}$ as follows.

Case (i) $n \equiv 0 \pmod{3}$

Let $n = 3t$, Define $f(u_i) = 0, 1 \leq i \leq t$

$$f(u_{t+i}) = 1, 1 \leq i \leq t$$

$$f(u_{2t+i}) = 2, 1 \leq i \leq t$$

Then $v_f(0) = t, v_f(1) = t, v_f(2) = t$

$$e_f(0) = t, e_f(1) = t - 1, e_f(2) = t.$$

Therefore, $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)|$

for all $i, j \in \{0, 1, 2\}$.

Hence P_n is a root cube mean cordial graph.

Case (ii) $n \equiv 1 \pmod{3}$

Let $n = 3t + 1$. Define $f(u_i) = 0, 1 \leq i \leq t$

$$f(u_{t+i}) = 1, 1 \leq i \leq t + 1$$

$$f(u_{2t+i}) = 2, 1 \leq i \leq t$$

Then $v_f(0) = t, v_f(1) = t + 1, v_f(2) = t$

$$e_f(0) = t, e_f(1) = t, e_f(2) = t.$$

Therefore, $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)|$

for all $i, j \in \{0, 1, 2\}$.

Hence P_n is a root cube mean Cordial graph.

Case (iii) $n \equiv 2 \pmod{3}$

Let $n = 3t + 2$. Define $f(u_i) = 0, 1 \leq i \leq t + 1$

$$f(u_{t+1+i}) = 1, 1 \leq i \leq t + 1$$

$$f(u_{2t+2+i}) = 2, 1 \leq i \leq t$$

Then $v_f(0) = t + 1, v_f(1) = t + 1, v_f(2) = t$

$$e_f(0) = t + 1, e_f(1) = t, e_f(2) = t.$$

Therefore, $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$

for all $i, j \in \{0, 1, 2\}$.

Hence P_n is a root cube mean Cordial graph.

Example 2.4: Root cube mean cordial labeling of the path P_9, P_{10}, P_{11} is given below.

Theorem: 2.5

The cycle C_n is a root cube mean cordial graph if $n \equiv 1 \pmod{3}$ and $n \equiv 2 \pmod{3}$

Proof:

Let C_n be the cycle $u_1 u_2 \dots u_n u_1$ where $|V(C_n)| = n$ and $|E(C_n)| = n$.

Define $f: V(C_n) \rightarrow \{0, 1, 2\}$ as follows.

Case (i) $n \equiv 1 \pmod{3}$

Let $n = 3t + 1$. Define $f(u_i) = 0, 1 \leq i \leq t$

$$f(u_{t+i}) = 1, 1 \leq i \leq t + 1$$

$$f(u_{2t+i}) = 2, 1 \leq i \leq t$$

Then $v_f(0) = t, v_f(1) = t + 1, v_f(2) = t$

$$e_f(0) = t + 1, e_f(1) = t, e_f(2) = t.$$

Therefore, $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$

for all $i, j \in \{0, 1, 2\}$.

Hence C_n is a root cube mean cordial graph.

Case (ii) $n \equiv 2 \pmod{3}$

Let $n = 3t + 2$. Define $f(u_i) = 0, 1 \leq i \leq t$

$$f(u_{t+i}) = 1, 1 \leq i \leq t + 1$$

$$f(u_{2t+1+i}) = 2, 1 \leq i \leq t$$

$$f(u_n) = 0.$$

$$\text{Then } v_f(0) = t, v_f(1) = t+1, v_f(2) = t+1$$

$$e_f(0) = t+1, e_f(1) = t, e_f(2) = t+1.$$

$$\text{Therefore, } |v_f(i) - v_f(j)| \leq 1$$

$$\text{for all } i, j \in \{0, 1, 2\} \text{ and } |e_f(i) - e_f(j)| \leq 1$$

$$\text{for all } i, j \in \{0, 1, 2\}.$$

Hence C_n is a root cube mean cordial graph.

Remarks: 2.6

The cycle C_n is not a root cube mean graph if

$$n \equiv 0 \pmod{3}$$

Proof:

Let C_n be the cycle $u_1 u_2 \dots u_n u_1$ where $|V(C_n)| = n$ and $|E(C_n)| = n$.

$$\text{Define } f: V(C_n) \rightarrow \{0, 1, 2\}$$

$$\text{Consider } n \equiv 0 \pmod{3}.$$

Suppose the cycle C_n admits a root cube mean cordial graph if $n \equiv 0 \pmod{3}$.

$$\text{Let } n = 3t.$$

Then $v_f(0) = t, v_f(1) = t, v_f(2) = t$ and $e_f(0) = t, e_f(1) = t-1, e_f(2) = t+1$. Therefore, $|v_f(i) - v_f(j)| \leq 1$ for all $i, j \in \{0, 1, 2\}$ but $|e_f(i) - e_f(j)| \leq 1$ for all $i, j \in \{0, 1, 2\}$ not satisfied. Since $|e_f(0) - e_f(1)| > 1$, which is a contradiction.

∴ Our assumption is wrong. Hence C_n is not root cube mean cordial graph.

Example 2.7: Root cube mean cordial labeling of the cycle C_4 and C_5 is given below:

Theorem 2.8 The star $K_{1,n}$ is a root cube mean cordial graph.

Proof:

Let $K_{1,n}$ be the star with $n+1$ vertices and n edges. Let $V(K_{1,n}) = \{u, u_i: 1 \leq i \leq n\}$ and $E(K_{1,n}) = \{uu_i: 1 \leq i \leq n\}$. Let u be the centre of $K_{1,n}$. Define $f: V(K_{1,n}) \rightarrow \{0, 1, 2\}$ as follows.

$$\text{Let } f(u) = 1.$$

Case (i) $n \equiv 0 \pmod{3}$

$$\text{let } n = 3t. \text{ Define } f(u_i) = 0, 1 \leq i \leq t$$

$$f(u_{t+i}) = 1, 1 \leq i \leq t$$

$$f(u_{2t+i}) = 2, 1 \leq i \leq t$$

$$\text{Then } v_f(0) = t, v_f(1) = t+1, v_f(2) = t \text{ and}$$

$$e_f(0) = t, e_f(1) = t, e_f(2) = t.$$

$$\text{Therefore, } |v_f(i) - v_f(j)| \leq 1 \text{ and}$$

$$|e_f(i) - e_f(j)| \leq 1 \text{ for all } i, j \in \{0, 1, 2\}.$$

Hence $K_{1,n}$ is a root cube mean cordial graph

Case (ii) $n \equiv 1 \pmod{3}$

$$\text{Let } n = 3t+1. \text{ Define } f(u_i) = 0, 1 \leq i \leq t+1$$

$$f(u_{t+1+i}) = 1, 1 \leq i \leq t$$

$$f(u_{2t+1+i}) = 2, 1 \leq i \leq t$$

$$\text{Then } v_f(0) = t+1, v_f(1) = t+1, v_f(2) = t \text{ and}$$

$$e_f(0) = t+1, e_f(1) = t, e_f(2) = t.$$

$$\text{Therefore, } |v_f(i) - v_f(j)| \leq 1 \text{ and } |e_f(i) - e_f(j)| \leq 1 \text{ for all } i, j \in \{0, 1, 2\}.$$

Hence $K_{1,n}$ is a root cube mean cordial graph

Case (iii) $n \equiv 2 \pmod{3}$

$$\text{Let } n = 3t+2. \text{ Define } f(u_i) = 0, 1 \leq i \leq t+1$$

$$f(u_{t+1+i}) = 1, 1 \leq i \leq t$$

$$f(u_{2t+1+i}) = 2, 1 \leq i \leq t+1$$

$$\text{Then } v_f(0) = t+1, v_f(1) = t+1, v_f(2) = t+1$$

$$e_f(0) = t+1, e_f(1) = t, e_f(2) = t+1.$$

$$\text{Therefore, } |v_f(i) - v_f(j)| \leq 1 \text{ and } |e_f(i) - e_f(j)| \leq 1 \text{ for all } i, j \in \{0, 1, 2\}.$$

Hence $K_{1,n}$ is a root cube mean cordial graph

Example 2.9. Root cube mean cordial labeling of the star $K_{1,t}$ is given below

Theorem 2. 10

Bistar graph $B_{n,n}$ is a root cube mean cordial graph

Proof :

Let $B_{n,n}$ be the Bistar graph with vertex s .
 $V(B_{n,n}) = \{u, v, u_i, v_i; 1 \leq i \leq n\}$ and edges $E(B_{n,n})$
 $\{uv, uu_i, vv_i; 1 \leq i \leq n\}$.

Define $f: V(B_{n,n}) \rightarrow \{0, 1, 2\}$ as follows.

Let $f(u) = 1, f(v) = 1$.

Case (i)

$n \equiv 2 \pmod{3}$. Let $n = 3t - 1$

Define $f(u_i) = 0, 1 \leq i \leq 2t$

$f(u_i) = 1, 2t + 1 \leq i \leq n$

$f(v_i) = 2, 1 \leq i \leq 2t$

$f(v_i) = 1, 2t + 1 \leq i \leq n$

Then $v_f(0) = v_f(1) = v_f(2) = 2t$

$e_f(0) = 2t, e_f(1) = 2t - 1, e_f(2) = 2t$.

Therefore, $|v_f(i) - v_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$ and

$|e_f(i) - e_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$

Case (ii) $n \equiv 0 \pmod{3}$, let $n = 3t$

Define $f(u_i) = 0, 1 \leq i \leq t + 1$

$f(u_i) = 1, t + 2 \leq i \leq n$

$f(v_i) = 2, 1 \leq i \leq 2t$

$f(v_i) = 0, 2t + 1 \leq i \leq n$

Then $v_f(0) = v_f(1) = 2t + 1, v_f(2) = 2t$

$e_f(0) = 2t + 1, e_f(1) = 2t, e_f(2) = 2t$

Therefore $|v_f(i) - v_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$

$|e_f(i) - e_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$

Case (iii)

$n \equiv 1 \pmod{3}$, let $n = 3t + 1$

Define $f(u_i) = 0, 1 \leq i \leq 2t + 1$

$f(u_i) = 1, 2t + 2 \leq i \leq n$

$f(v_i) = 2, 1 \leq i \leq 2t + 1$

$f(v_i) = 1, 2t + 2 \leq i \leq n$

Then $v_f(0) = 2t + 1, v_f(1) = 2t + 2, v_f(2) = 2t + 1$

$e_f(0) = e_f(1) = e_f(2) = 2t + 1$

Therefore $|v_f(i) - v_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$

$|e_f(i) - e_f(j)| \leq 1 \forall i, j \in \{0, 1, 2\}$

From all the above cases, we have $B_{n,n}$ is a root cube mean cordial graph.

Theorem 2. 11.

The complete graph K_n is not a root cube mean cordial graph for any $n > 3$.

Proof:

Let G be the complete graph K_n with n vertices and $n(n-1)/2$ edges. Clearly K_1, K_2, K_3 are root cube mean cordial graphs. Let us check for the complete graphs $K_n, n > 3$

Define $f: V(K_n) \rightarrow \{0, 1, 2\}$ as follows :

Case (i) $n \equiv 0 \pmod{3}$

Let $n = 3t$

Then $v_f(0) = v_f(1) = v_f(2) = t$

$e_f(0) = \binom{t}{2} + t^2$

$e_f(1) = \binom{t}{2},$

$e_f(2) = \binom{t}{2} t^2 + t^2$, a contradiction,

since $|e_i(i) - e_i(j)| > 1$

Case (ii) $n \equiv 1 \pmod{3}$

Let $n = 3t + 1$

Subcase (i) If $v_K(0) = t + 1, v_K(1) = v_K(2) = t$

$$\text{then } e_K(0) = \binom{t+1}{2} + t(t+1)$$

$$e_K(1) = \binom{t+1}{2} - t$$

$$e_K(2) = \binom{t}{2} + t(t+1) + t^2, \text{ a contradiction,}$$

since $|e_i(i) - e_i(j)| > 1$

Subcase (ii) If $v_K(0) = v_K(2) = t, v_K(1) = t + 1$

$$\text{then } e_K(0) = \binom{t+1}{2} + t^2$$

$$e_K(1) = \binom{t+1}{2}$$

$$e_K(2) = \binom{t}{2} + t(t+1) + t^2, \text{ a contradiction,}$$

since $|e_i(i) - e_i(j)| > 1$

Subcase (iii) If $v_K(0) = v_K(1) = t, v_K(2) = t + 1$

$$\text{then } e_K(0) = \binom{t}{2} + t^2$$

$$e_K(1) = \binom{t+1}{2} \square t$$

$$e_K(2) = \binom{t+1}{2} + t(t+1) + t(t+1),$$

a contradiction

Case (iii) $n \equiv 2 \pmod{3}$

Let $n = 3t + 2$

Subcase (i) If $v_K(0) = t, v_K(1) = v_K(2) = t + 1$

$$\text{then } e_K(0) = \binom{t+1}{2} + t^2$$

$$e_K(1) = \binom{t+1}{2}$$

$$e_K(2) = \binom{t+2}{2} + t(t+1) + t(t+1),$$

a contradiction, since $|e_i(i) - e_i(j)| > 1$

Subcase (ii) If $v_K(1) = t, v_K(0) = v_K(2) = t + 1$

$$\text{then } e_K(0) = \binom{t+1}{2} + t(t+1)$$

$$e_K(1) = \binom{t+1}{2} - t$$

$$e_K(2) = \binom{t+2}{2} + t(t+1) + t(t+1),$$

a contradiction, since $|e_i(i) - e_i(j)| > 1$

Subcase (iii) If $v_K(2) = t, v_K(0) = v_K(1) = t + 1$

$$\text{then } e_K(0) = \binom{t+1}{2} + (t+1)^2$$

$$e_K(1) = \binom{t+1}{2}$$

$$e_K(2) = \binom{t+1}{2} + t(t+1) + t^2, \text{ a contradiction,}$$

since $|e_i(i) - e_i(j)| > 1$

From all the above cases, K_n is not a root cube mean cordial graph.

Theorem 2. 12

The complete bipartite graph $K_{2,n}$ is not root cube mean cordial for any $n > 2$.

Proof:

Let $V(K_{2,n}) = A \cup B$, where $A = \{u, v\}$

and $B = \{u_1, u_2, \dots, u_n\}$. Then $E(K_{2,n}) = \{uu_i, vu_i : 1 \leq i \leq n\}$. Clearly $K_{2,1}$ and $K_{2,2}$ are root cube mean cordial graph. Assume that $n > 2$. Here $K_{2,n}$ has $2 + n = m$ (say) vertices and $2n = 2(m-2)$ edges.

Case (i) $m \equiv 0 \pmod{3}$. Let $m = 3t$

Without violating the vertex label differences assign labels to the vertices $v_f(0) = v_f(1) = v_f(2) = t$, we have the following possibilities.

Subcase (a)

Let $f(u)=0, f(v)=0$. Then $e_f(0) = 4t-4, e_f(1) = 0, e_f(2) = 2t$.

Subcase (b)

Let $f(u) = 0, f(v) = 1$. Then $e_f(0) = 3(t-1), e_f(1) = t-1, e_f(2) = 2t$

Subcase (c)

Let $f(u) = 1, f(v) = 0$. Then $e_f(0) = 3(t-1), e_f(1) = t-1, e_f(2) = 2t$

Subcase (d)

Let $f(u) = 0, f(v) = 2$. Then $e_f(0) = 2t-1, e_f(1) = 0, e_f(2) = 4t-3$

Subcase (e)

Let $f(u) = 2, f(v) = 0$. Then $e_f(0) = 2t-1, e_f(1) = 0, e_f(2) = 4t-3$

Subcase (f)

Let $f(u) = 1, f(v) = 1$. Then $e_f(0) = 2t, e_f(1) = 2t-4, e_f(2) = 2t$

Subcase (g)

Let $f(u) = 1, f(v) = 2$. Then $e_f(0) = t,$

$e_f(1) = t-1, e_f(2) = 4t-3$

Subcase (h)

Let $f(u) = 2, f(v) = 1$. Then $e_f(0) = t,$

$e_f(1) = t-1, e_f(2) = 4t-3$

Subcase (i)

Let $f(u) = 2, f(v) = 2$.

Then $e_f(0) = 0, e_f(1) = 0, e_f(2) = 6t-4$

All the above subcases, the condition that $|e_f(i) - e_f(j)| \leq 1 \forall i, j$ is not satisfied. Hence we can see that $K_{2,n}$ is not root cube mean cordial.

Thus in the following cases, we consider only the subcases in which the vertices u and v are having labels 1 and 2 respectively.

Case (ii)

$m \equiv 1 \pmod{3}$. Let $m = 3t + 1$. Suppose $f(u) = 1$ and $f(v) = 2$

Subcase (a)

If $v_f(0) = t+1, v_f(1) = v_f(2) = t$. Then $e_f(0) = t+1, e_f(1) = t-1, e_f(2) = 4t-2$

Subcase (b)

If $v_f(1) = t+1, v_f(0) = v_f(2) = t$. Then $e_f(0) = t, e_f(1) = t, e_f(2) = 4t-2$

Subcase (c)

If $v_f(2) = t+1, v_f(0) = v_f(1) = t$. Then $e_f(0) = t, e_f(1) = t-1, e_f(2) = 4t-1$

Case (iii)

$m \equiv 2 \pmod{3}$, Let $m = 3t + 2$. Suppose $f(u) = 1$ and $f(v) = 2$

Subcase (a)

If $v_f(0) = v_f(1) = t+1$, $v_f(2) = t$. Then $e_f(0) = t+1$, $e_f(1) = t$, $e_f(2) = 4t-1$

Subcase (b)

If $v_f(0) = v_f(2) = t+1$, $v_f(1) = t$. Then $e_f(0) = t+1$, $e_f(1) = t-1$, $e_f(2) = 4t$.

Subcase (c)

If $v_f(0) = t$, $v_f(1) = v_f(2) = t+1$. Then $e_f(0) = t$, $e_f(1) = t$, $e_f(2) = 4t$. f does not satisfies the conditions $|v_f(i) - v_f(j)| \leq 1$ and $|e_f(i) - e_f(j)| \leq 1$, for $ij \in \{0,1,2\}$. Hence $K_{2,m}$ is not root cube mean cordial graph.

Figure 1: A root cube mean cordial graph

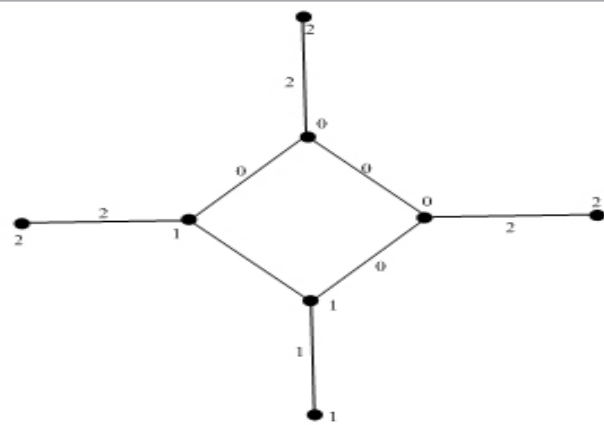


Figure 1.1



Figure 1.2

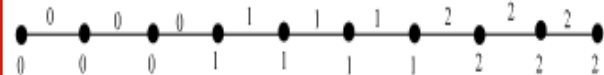


Figure 1.3



Figure: 4

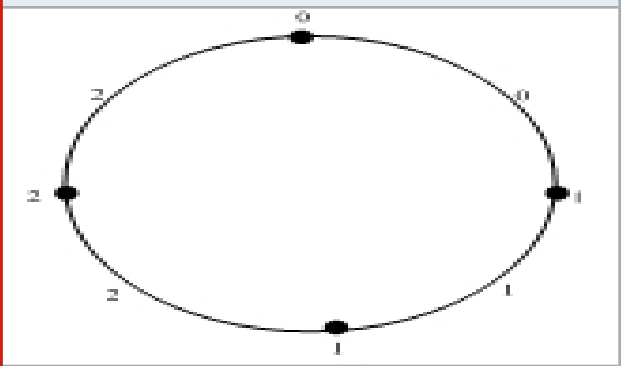


Figure: 5

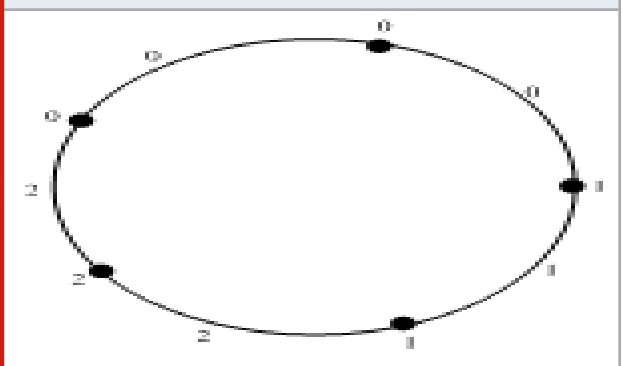
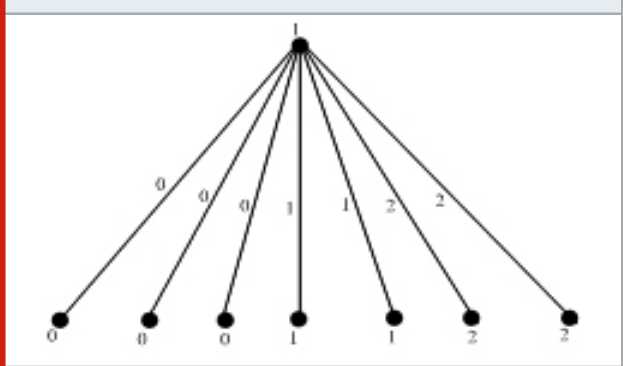


Figure: 6



CONCLUSION

In this paper root cube mean cordiality of some standard graphs such as cycle, path, star, complete graph, complete bipartite graph and bistar are studied.

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An In-silico Investigation of Natural Compounds Derived from *Mimosa pudica* as Potential Therapeutic Candidate Against Mumps Virus

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ABSTRACT

Mumps is a viral disease, which causes respiratory illness in humans. The symptoms involve swelling of one or both the parotid salivary glands. Among all the viral surface proteins in Mumps, the hemagglutinin-neuraminidase, MuV-HN, has a vital role in the entry of virus into the host cells and causing infection. Therefore, MuV-HN can be used as an ideal target in designing of novel inhibitors against the virus. In a drug designing approach, the protein-ligand interaction is one of the major aspect which gives potential candidates serving as an inhibitor against the mumps virus Hemagglutinin- neuraminidase protein. By performing docking studies, a detailed analysis of the protein-ligand interaction of the active compounds of plant *Mimosa pudica* against the MuV-HN protein was reported. The results confirmed that for each ligand there is a consistent binding affinity with specific energy. Among all the active compounds of *Mimosa pudica*, riboflavin and sitosterol showed efficient docking score which are -9 kcal/mol and -10.7 kcal/mol respectively against the MuV-HN. These results depict that out of the different phytochemicals of *Mimosa pudica*, riboflavin and sitosterol can be used as efficient candidates in pharmacokinetic and pharmacodynamic studies in developing a novel inhibitor against Mumps virus.

KEY WORDS: MUMPS, INHIBITORS, MUV-HN, DOCKING, MIMOSA PUDICA.

INTRODUCTION

Mumps is a viral disease which involves the painful swelling of one or both the parotid salivary glands (Hviid et al., 2008). It has been known to mankind since antiquity and has been mentioned by Hippocrates as early as 400 BC. It was first described scientifically by a

British physicist Robert Hamilton in 1790. However, its highly contagious nature was not proved until 1934 by C.D. Johnson and E.W. Good pasture. Prior to its vaccine development, it had significantly affected a sizeable portion of the human population, which also involved the armies of both the world wars (Sama et al., 2011).

It is a highly contagious disease spread by respiratory droplets from an infected person or by direct contact. Before the development of a vaccine, it was a common childhood disease worldwide with a large scale outbreak occurring every 2-5 years (Hviid et al., 2008). Early symptoms include fever, migraine, poor craving and feeling commonly unwell. These symptoms, however appear after 16-18 days of incubation period after contact with the virus. This is then followed by the swelling of parotid glands, which is the most obvious indicator of

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mumps disease. The afflicted person becomes contagious about 7 days before onset of parotid gland swelling to about 8 days after this onset. About 20-40% of the infected individuals do not show the early symptoms, and hence spread the infection without knowing. Once the disease has run its course, the person becomes typically immunized for life, i.e. does not have the disease again (Atkinson et al., 2006) (Kutty et al., 2010).

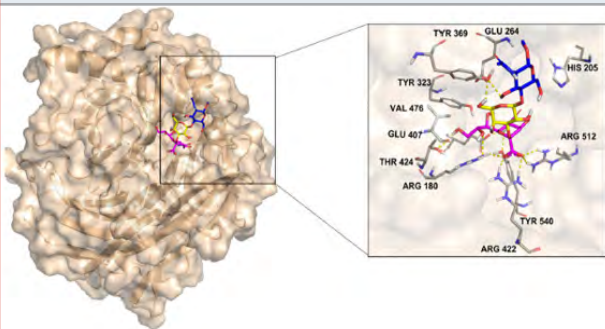
Prior to development of a vaccine, typically 0.1-1% of the world population was affected annually with mumps. Vaccine development has resulted in a decline of more than 90% of this disease (Hviid et al., 2008). However, it remains a problem in the developing nations where vaccination is less common (Farrar et al., 2013). Instances of co-infection with other disease have also occurred. For example, in about 25% of the mumps cases, occurrence of mumps-induced viral encephalitis has been reported. Prior to vaccine development mumps was the fundamental driver of viral encephalitis in numerous nations. Contracting the disease during the initial 12 weeks of pregnancy is related with a 25% frequency of unconstrained premature birth. Also, in children, acquired sensoryneural deafness is mainly caused by mumps (Pietrantonj et al., 2020).

There is no particular treatment for the mumps. Drugs such as paracetamol are administered for controlling the pain due to side effects. In specific cases, intravenous immunoglobulin administration is carried out. In case of co-infection with meningitis or pancreatitis, hospitalization may be required (Hviid et al., 2008). Recently there has been renewed focus to study the antigenic diversity of mumps virus due to occasional resurgence of mumps epidemics. The mumps virus is an enveloped, single-stranded, linear negative-sense RNA virus whose genome consists of 15,384 bases encoding nine proteins (Hviid et al., 2008). Various bioniformal approaches have been applied to study the mumps virus; docking being the most popular one.

Docking Studies Previously Carried Out With Mumps

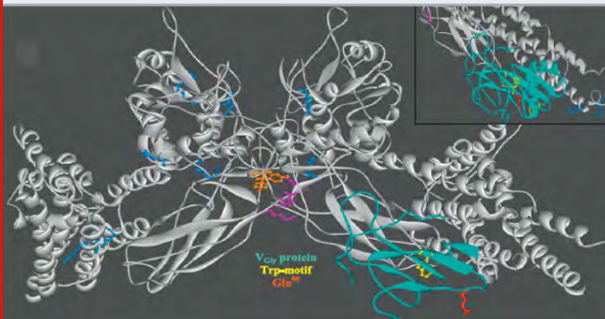
Virus: Very few docking studies have been performed on mumps virus. In these studies, it has been mentioned that Mumps Virus (MuV) Hemagglutinin-Neuraminidase (HN), which is one the viral surface glycoproteins, has a vital role in entry of virus into host cells. This causes infection and hence this viral glycoprotein represents an ideal target for design of novel inhibitor. Hence the structural basis of docking studies involves glycan-receptor binding by HN glycoprotein of mumps virus. Analysis of the molecular recognition of the silylatedglycans of the host cell surface by MuV-HN protein been reported in these docking studies. The structural features of sialoglycans and MuV-HN have been revealed by using NMR, docking, molecular modelling and CORCEMA-ST (Complete Relaxation and Conformational Exchange Matrix Analysis of Saturation Transfer) software. These reports provided the roots for design of structure based drugs against mumps-induced diseases (Forgione et al., 2020).

Figure 1: Close up view of ligand 1 binding mode at the MuV-HN active site, drawn by using Pymol 2.3 Software (<https://pymol.org/2/>). The main amino acid residues involved in the binding are represented in stick. Galactose and N-acetyl Glucosamine residues are depicted in yellow and blue, respectively (Forgione et al., 2020).



Forgione et al. performed a detailed study on the structural basis of glycan-receptor binding of MuV-HN. They retrieved the monomeric structure of MuV-HN receptor binding head space (PDB ID, 5b2c) and utilized it for docking computations (Fig 1). The docking of MuV-HN structure was done with 3' sialyllactose ligand (PDB-ID: 5b2d). The 3D structure of 3' sialyllactose was separated from the PDB document. Ligands were readied for docking estimations utilizing AutoDockTools, liberating all rotatable bonds to move, aside from the glycosidic linkages, during the docking computations. Missing hydrogen atoms were included, and protonation condition of ionizable bunches was registered by utilizing Maestro Protein Preparation Wizard. The structure was submitted to 100000 stages of steepest drop minimization with MacroModel and upgraded with OPLS_2005 power field. Docking computations of all mixes were performed by utilizing AutoDock 4.2.2 (Forgione et al., 2020).

Figure 2: Interaction model V-STAT1-STAT2. Heterodimer model of STAT1-STAT2 by the SH2-domain (STAT1 PDB: 1YVL and 3D model of STAT2 from 1YVL and 1BF5). Heterodimer model shows the following residues: Tyr690 and Tyr701 (orange), nuclear localization signal residues (pink), lysine residues to ubiquitylation (Ub) (blue). Interaction of STATs heterodimer with VWT by Trp-motif and STAT2. Interaction of heterodimer with VGly by STAT2, lysine residues (Ub) (blue) (Murrieta et al., 2010).



Murrieta et al. studied the interaction of Urabe AM9 strain of mumps virus V protein with STAT1-STAT2 homodimer protein complex of cell signaling pathway in humans. The V protein has the ability to inhibit the interferon-mediated antiviral response by inducing the degradation of STAT proteins (Murrieta et al., 2010).

Table 1. The compounds of Mimosa pudica used in the docking

Compounds of Mimosa pudica		
Ascorbic-Acid	Linoleic-Acid	Palmitic-Acid
Beta-Carotene	Linolenic-Acid	Riboflavin
Crocetin	Mimosine	Sitosterol
D-Glucuronic-Acid	Norepinephrine	Stearic-Acid
D-Xylose	Oleic-Acid	Thiamin

Hypothetical heterodimer STAT1-STAT2 model was acquired by a docking examination with Hex worker. The putative connection models among VWT and VGly with STAT1-STAT2 proteins were created with PatchDock worker (Molecular Docking Algorithm Based on Shape Complementary Principles) and 1000 hypothetical models were refined on FireDock (Fast Interaction Refinement in Molecular Docking) (Fig 2). Kubota et al. studied the interaction of mumps virus V protein with receptor of activated protein C kinase 1(RACK1). This interaction results in dissociation of STAT-1 from the Alpha Interferon Receptor Complex. It has been stated that the C-terminal Cys-rich locale of mumps V protein (Vsp) is related with obstructing of the interferon (IFN) signal transduction pathway through an abatement in STAT-1 creation.

Table 2. Docking scores after docking the ligands with MuV-HN protein

Ligand	Affinity (kcal/mol)	Ligand	Affinity (kcal/mol)	Ligand	Affinity (kcal/mol)
Ascorbic-Acid	-5.8	Linoleic-Acid	-5.4	Palmitic-Acid	-5.8
Beta-Carotene	-7.2	Linolenic-Acid	-5.8	Riboflavin	-9
Crocetin	-6.7	Mimosine	-5.9	Sitosterol	-10.7
D-Glucuronic-Acid	-6.2	Norepinephrine	-5.9	Stearic-Acid	-5.7
D-Xylose	-5.7	Oleic-Acid	-5.7	Thiamin	-7.5

The intracellular objective of the V protein was researched by utilizing a two-mixture screening framework with Vsp as lure. Full-length V protein and Vsp had the option to tie to RACK1; the cooperation didn't need two WD spaces, WD1 and WD2, in RACK1. A critical association between V protein and RACK1 was likewise exhibited in cells steadily contaminated with mumps infection, and the arrangement of the complex was not influenced by treatment with IFN (Kubota et al., 2002).

Docking Studies Carried Out in this Work: Our docking studies involve hemagglutinin-neuraminidase, which is one the viral surface glycoproteins and has a vital role in entry of mumps virus into host cells. This viral glycoprotein is an ideal target for design of novel inhibitor (Forgione et al., 2020). As the extracts of Indian medicinal plant *Mimosa pudica* has the ability to induce the anti-viral activity against the mumps virus, we performed the docking of hemagglutinin-neuraminidase protein of mumps virus with the several compounds of *Mimosa pudica*. The active compounds were retrieved from the species of plant *Mimosa Pudica* (refer Table 1) (Malayan et al., 2013).

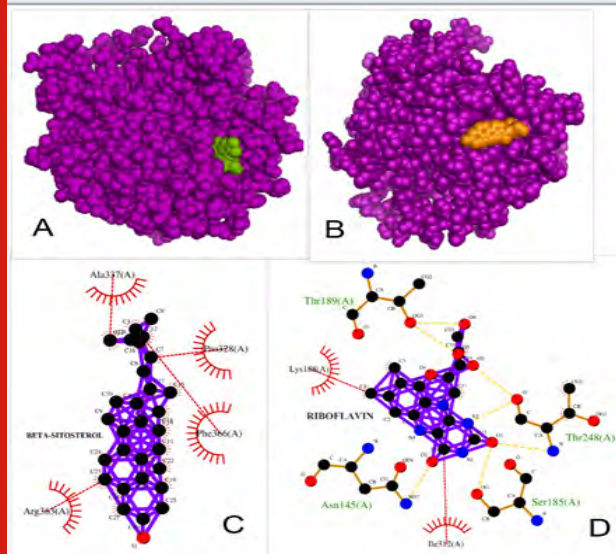
MATERIAL AND METHODS

For molecular docking studies, the structures of ligand and protein have to be retrieved and refined. The most prominent and active compounds (ligands) (Table 1)

present in *Mimosa Pudica* were subjected to molecular docking analysis against the MuV-HN protein that currently serves as a promising target for effective drug development against mumps virus. The X-ray diffraction crystal structure of the MuV-HN head domain in the monomeric form was retrieved from PDB (PDB ID: 5b2c). The water molecules were removed from the PDB file. Then, using AutoDock tools, polar hydrogen atoms and Kollman charges were added. The structure of the phytocompounds (Table 1) were retrieved from PubChem and their respective three dimensional structures were generated through open Babel software (O'Boyle et al., 2011). Then energy optimization and minimization of these structures was performed using PRODRG server (Schüttelkopf et al., 2004). Lastly, using AutoDock tools, Gasteiger charges were added to the corresponding ligand structures.

Molecular docking was performed using the AutoDockVina software (Naidoo et al., 2004) (Trott et al., 2010). The ligands were docked to the active region of the MuV-HN protein using a grid based docking method involving a rigid protein receptor and flexible ligand docking protocol. The grid size was set at 100, 100, 100 and the center was set at 90.514, 154.133, -28.032. The ligand-receptor complexes with lowest binding scores were analyzed for studying the interactions using the PyMol software (Naidoo et al., 2004). The ligand-receptor binding interaction results are given in Table 2.

Figure 3: The interaction of riboflavin and sitosterol with hemagglutinin-neuraminidase. A. The interaction of riboflavin. B. The interaction of sitosterol. C. The hydrophobic interaction and hydrogen bonding of sitosterol. D. The hydrophobic interaction (Brown dashed lines) and Hydrogen bonding (Yellow dashed lines) of riboflavin.



RESULTS AND DISCUSSION

The docking analysis showed that for each ligand a consistent binding affinity with specific energy was obtained (refer Table 2). Out of all the ligands riboflavin and sitosterol had the good docking score against MuV-HN (highlighted in yellow, Table 2). These two interactions are shown in Figure 3. Since they have a binding affinity score of less than -7Kcal/mol, they can be used as potential candidates for further pharmacokinetic and pharmacodynamics studies in wet lab against the MuV-HN protein. The hydrophobic interactions as well as hydrogen bonding between these ligands and MuV-HN receptor are depicted in figure 3.

CONCLUSION

A drug designing approach based on protein- ligand interaction was used to find out potential candidates which could serve as an inhibitor against the mumps virus Hemagglutinin- neuraminidase protein. Various phytocompounds derived from the plant *Mimosa Pudica* were analysed as ligands for this purpose. The in-silico studies uncovered positive outcomes for use of these compounds as potential inhibitors of MuV-HN. 15 phytocompounds from *Mimosa Pudica* were used to carry out docking studies with MuV-HN. Out of these, two compounds, namely sitosterol and riboflavin showed high binding affinity towards the pathogenic glycoprotein. The information acquired from thus study can accelerate the development of novel medication against mumps virus which would be a boon for developing nations where mumps outbreaks still occur. The data obtained through this work has to be further

verified by doing in-vitro and in vivo studies for the development of novel inhibitors against mumps virus.

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An Analytical Study on Post Pandemic Economic Challenges and Opportunities in India

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ABSTRACT

The Pandemic has created a very severe impact on Globe. The Precaution parameters with a different type in limitation and Stoppage of all utilities have influenced the global economy severely. Quantity of instances of on-going pandemic ascending round the globe, Unchangeable misfortunes made both Mundane existences just as developing economies. The development Economy of India relies on performance out of on-going business which is exhaustive in strategies and activities. Bend in contamination is somewhat more slowly in our country India however its impact is not fortunate in several ways. There was a deficiency of 4.5 billion dollars consistently in the underlying lockdown period of 21 days. A portion of the organization's country are influenced harshly, and logistics are additionally casualty of the Covid-19.

KEY WORDS: COVID-19, GLOBAL, ECONOMY, PANDEMIC, GDP, WORLD BANK.

INTRODUCTION

It has been observed that there may be a profound effect on monetary movement expansion of the curfew on public authority which may forcefully cut GDP figure of India of the present monetary, constriction over 2% is normal. In the World Bank, Prospects Reports on Global Economic anticipated that GDP of India should decrease by 3.2% in 2020-21. Morley showed mild recuperation to 3.1% development of monetary period 2021-22. According to the data, India's GDP in 2019-20 will be higher than India's GDP in 2021-22.

Problem Statement: There is need for this study as its occurred due to on-going slowdown in economy due to Pandemic, this study will help to analyse the Challenges and Opportunities in Indian Economy.

Objectives

To Study the Economy Challenges and Opportunites of Post-Covid 19 on India: The COVID-19 which has created a pandemic has wilted the Economy of India by carrying to it an end. The effect of the curfew goes from all money classes of the population. A Keen decrease seen in India's mechanical creation from April when the country went into curfew and the majority of the creation unit was closed totally. Record of Production by Industries was shrunk by 55.5% contrasted and a similar period a year sooner which incorporates areas like mining, assembling and power. The keenest decay for the long stretch of June was found in the Production of customer durables products.

An extreme decline was seen in the Business movement of the administration's area in May 2020 as the on-going covid-19 thwarted activities negligible interest on the lookout. A Keen decrease was likewise seen in the travel

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of Domestic and the travel industry areas which added to the decline in administrations commerce movement. Agreeing measurements of "Society of Indian Automobile Manufacturers", vehicle fabricating area experienced the day-by-day turnover of losses for approx. \$300 million everyday conclusions by the curfew. GDP of India is all set to contract everywhere and somewhere in the parameter of 5% and 10% this year – without example for 40 years. With business, transport, shops, and shopping-centres closed, India's monetary action will come to an end in March 2021. There an absolute crash of utilization, which contribute GDP approx. 57%. Pay cuts and spending cuts, coupled with a lack of purchasing, have culminated in a fully disintegrated request.

In India, work accessibility has consistently been a significant issue with the business opening being vigorously dwarfed by the unemployment up-and-comers. Indeed, even during the curfew, the Economy in Indian confronting jobless development for example circumstances where develops GDP yet work stays stale or falls and if this pattern proceeds further, the monetary recuperation will take quite a while. Without enough positions, families' earnings will be under strain and the monetary recuperation will be drowsy. The decline in family use since lockdown damagingly affects more modest organizations, which have effectively been influenced by the demonetization strategy of 2016, and the merchandise and enterprises charge (GST) being presented by the public authority in 2017.

With the organizations the country over managing misfortunes, there are new difficulties to handle the unfurl of pandemic returns in a growth economy. Infection is escalating more noteworthy speed across the nation, which may not readily bear the cost of additional limitations and the monetary movement re-establishes. "Danger will exude for the life span through the pandemic degree for mark brought about in the economy." said "Harshad Borawake, head of value research at Mumbai-based shared asset Mirae Asset Investment Managers India". He again commented that there may be deferral or wrecking in recuperation interaction if the curfew gets again implemented in the important states.

On due occasion, monetary interruption goes on for quite a while bringing about a few exercises being renounced as opposed to being conceded. In such a condition, and accepting salaries and occupations are not forever lost, the monetary development recuperates forcefully and gets back in a way that creates a flow of disturbance. Which is known as "V"-moulded recuperation. On the off chance that this recuperation is the increasingly slow additional time because the financial disturbance brought about a few positions being cancelled and individuals' earnings are dropping, disinvestment funds and so on, at that point "U"-moulded way will be created in the economy.

For a situation like this, underlying declining recuperation is slow before recovering its energy. On the off chance that this interaction is more-since quite a while ago

drawn than it hurls the "stretched U" shape. Considering the Covid-instigated disturbance, there is a chance of "W"-formed recuperation too. This shape considers the chance of a V-moulded recuperation, fixed supported by the second rush for diseases obviously, recuperates subsequent on timely bases. Lastly in this situation, one policymaker generally fears known as "L"-moulded recuperation. Also, the economy neglects to recapture GDP degree even after years, a long-term loss of a company's ability to deliver, even though the market is stable in the current fiscal year.

The distinction in assessment just for the degree of compression. To reach fluctuates in the range less than 4% to more than 14%. Numerous business analysts assess in the wake of arriving in a desperate predicament the current year, the begin recuperation following the monetary year of 2021 and 2022. As per a nitty gritty examination by "Pronab Sen", previous Chief Statistician of India, distributed course of the end of the week, "As things stand, and the public authority holds the 2020-21 consumption spending plan for 2021-22 too, almost certainly, 2021-22 will observe a GDP development pace of - 8.8%. This is a startling impression since it implies that the nation could encounter an out and out wretchedness, the first in our set of experiences as an autonomous country," Sen composes this in his investigation. Provided a shortcoming emergency just not exactly a satisfactory monetary upgrade, India is probably going to wind up with a "lengthened U-shape" recuperation.

Literature Review: "According to President, of Federation of Indian Micro and Small & Medium Enterprises (FISME), simply 30 to 40% MSME units had opened for work in Unlock Phase 1. Most MSMEs have a set number of individuals and the vast majority of them are actually qualified and you need them to run your activity. Around 30 to 40% units have opened and work had started as they had some incomplete orders to finish, which they couldn't do in light of the closure however buyer interest and reimbursements of credit actually stay an extraordinary worry for the MSMEs who are consistently experiencing monetarily COVID-19 pandemic." (Animesh Saxena, 2020).

"Most forecasters are overhauling their development projection for the current monetary year. The Reserve Bank of India in its most recent month to month release noticed that the Indian economy can break out of constriction in the current quarter – one quarter sooner than its prior figure. The authority information for the July-September quarter (Q2) will be delivered for this present week, which will give a clearer feeling of the condition of the economy. Corporate area execution during the quarter astonished on the potential gain, and it is conceivable that (GDP) information would likewise be on comparable." (Rajesh Kumar, 2021)

RESEARCH METHODOLOGY

The present study used Secondary data from Data

Analysis & Interpretation from sources like World Bank, National Statistics of India, RBI etc.

Figure 1: Forecasted quarterly bases effect arising out of Post Pandemic Scenario on GDP of India's growth in financial year 2020-21:

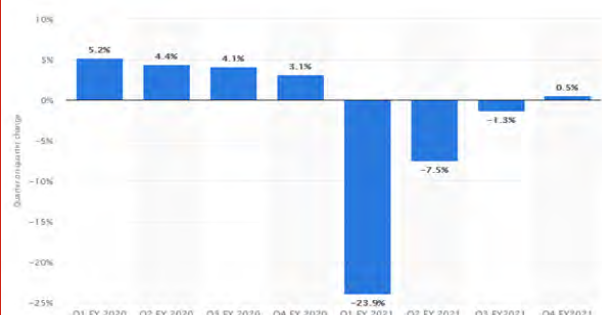


Figure 2: Countries of BRIC: Rate of the growth real gross domestic product (GDP) from 2015-25:

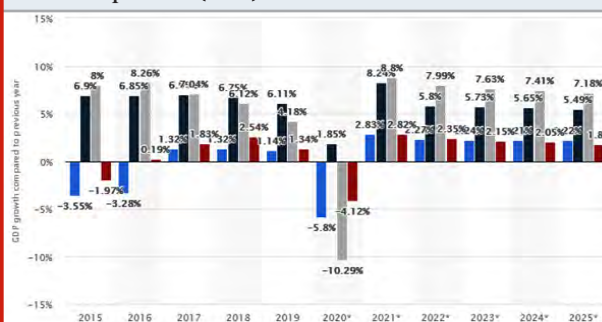


Figure 3: Inflation rate in India, projected till 2025:



Inference: The new patterns show that India's monetary recuperation is bound to be a 'W' or 'U' formed instead of 'V' effect of a pandemic may be significant in the country at that point battling for development preceding the pandemic. According to the results of Centrum Institutional Research (CIR), "Before the beginning of COVID, Indian economy had eased back down to 4.5 percent GDP development, not taking part in the worldwide resurgence of 2018 and 2019". The flare-up in COVID-19 all things considered an inauspicious moment of economy gave incipient indications recuperation striking measures, public authority and the RBI. Rustic probably going to recuperate quicker for economy metropolitan. In normal estimate an ordinary rainstorm,

opportune beginning combined possibilities for guard yield crop alongside least help value (MSP) climb and as of late reported provincial centered projects to forecast well for the economy of the country.

This looks good for rustic pay and request. These improvements are probably going to cheer ranchers and strategy which may decrease the impact of a going pandemic. As reported by CIR, "These patterns arise as a silver covering amid an inevitable development compression in FY21". The eventual fate of the Indian Economy will exceptionally rely upon significant elements like the general length of the pandemic, the impact on positions and family unit salaries, the degree of monetary upgrade given by the public authority, and so forth Further, the bundle will do little to invigorate development except if it incorporates arranged expenditure of governments and advantages a few parameters required for just found in the middle category. Moreover, relies upon approaches acquainted public authority with secure MSMEs and casual area in the country and to help customer interest. A portion of the ventures who have confronted the most noticeably terrible result during the troublesome COVID-multiple times additionally requests encouragement from the public authority to guarantee their restoration and recuperation.

The government of India chooses to eradicate the vast majority of boundary been provided genuinely vital to uplift organizations, huge & little. Notwithstanding lockdown proceeds in the wake of seeing instances increase of Pandemic through India. Anyway, rebound one year from now. As indicated by "Vishrut Rana", "a business analyst at New York settled S&P Global Ratings, the resumption of ordinary financial movement will drive a large part of the development". He further commented "Families will spend all the more regularly instead of careful and restricted spending amid the Covid-19 flare-up. Firms will likewise restart deferred ventures and as utilization restores, credit score offices expect India's financial development to bounce back.

Genuinely not discovered a solution for on-going pandemic at this point, till we are watching the globe discovering approaches for attempt get back for 'New typical', "as work from home" get the best of choice for churning economy during the troublesome pandemic-multiple events. Work in Office, Academics, Vegetables and Fruits markets and so forth utilizing on the web method, anyways likewise openings & challenges. Most significant enterprises avionics, diversion & genuine had seen lasting harm for appearance in a pandemic, adjusting dynamic occasions get proficient adapt to the Covid-19 & guarantee restoration of the country is by all accounts the most pragmatic way, which is a test just as a chance for Indian Economy post-COVID-19.

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Supply Chain Gaps In After Sales Services with Special Focus on Consumer Durables: A Study

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ABSTRACT

After-sales service business growth has been on rise and it has become one of the most important drivers of business revenues. Improvement in the quality of service leads to enhanced customer satisfaction, which, ultimately increases the sales of a newly introduced product. With the growing trend of outsourcing and cut-throat competition in the manufacturing industry, quality after-sales service has become an integral way of enhancing customer value. However, when it comes to after sales services not much research work has been done. Technology has moved into every part of the business but yet to fully embrace after sales services. Similarly supply chain improvement have been seen on many products but a lot of work has to be done in improving the supply chain efficiencies in the after sales services domain which is a big revenue source for manufacturers. Efforts have been made by the researchers to find out the gaps in the supply chain in the after sales services domain especially in the consumer durable product and appliances. The output of the research would help the professionals in after sales service industry to reduce the gaps by deploying process improvements tools or by using technology to bridge the gap

KEY WORDS: SERVICES SUPPLY CHAIN, AFTER SALES SERVICES, SERVICES GAPS IN AFTER SALES SERVICES.

INTRODUCTION

We are in an era where services sector is dominating and most of the contribution to our GDP is coming out of services sector. Services industry works mostly on the parameters of trust, experience and reliability. It has been shared earlier by many researchers that gaps in the services appear as one of the components which is stated by Servqual model. Trust and loyalty can be developed only when experiences with the service are

good and services provider is in a position to establish relation with the customer. Communication gap being one of the root causes of all the problems, instead of focusing on reducing this major gap, it is often assumed that once the technical systems are properly established, they will take care of the harmonial relationships within as well as between organizations in a supply chain. However, the fact remains that relationship management is very crucial and still often neglected in supply chain management. Relationship management along with process management becomes very important ingredient for effective supply chain management. This has the capacity of building confidence in the other members of the ecosystem. It is extremely difficult to deliver results without positive interpersonal relationships.

Collaboration with regards to supply chain management has the potential of bringing together capabilities and investments of partners in time, infrastructure, money, and intellectual capital that can enable organizations

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create that value which standalone organization may find it extremely difficult to achieve. This value creation by creating of service attitude which actually becomes a big differentiator to achieve long term sustainable competitive advantage for the organization. Continuous development in the organization with regards to services providers and relationship management in services ecosystem becomes the most important parameter for generating revenues and also for competitive advantage not only for self but also for partner organization. In the era of globalization where we face cut throat competition, ability to deliver unique value purely depends on productive collaboration. Some of the other vital ingredients to create value in the services supply chain include application of joint innovative programs, quality processes, objective oriented frame works, focus on new technology and services attitude.

Literature Review: Services sector has a huge competition and hence gaps in the supply chain should be eliminated to the extent possible. A lot of authors have their view with regards to services gaps some of them have been referred in this paper as well. The competitive criteria are largely defined as “a consistent set of priorities that a company chooses to compete in its market place” (PAIVA et. al, 2004). Usually competitive criteria include cost, speed of delivery, quality, dependability and flexibility. Wheelwright (1984) identified that many researchers in operations management literature (NEW, 1992) treat dependability criterion as a symbol of confidence that the physical good or service product would operate according to the specifications.

For service, it is important to have the deliveries at the promised time and also to ensure that the problem is solved within the shortest time-span. (WHEELWRIGHT, 1984). There are always minor changes of this competitive criteria group as services sector itself is subjective. (HAYES; PISANO; 1996, PAIVA et al., 2004). Few researchers feel that time delivery should be treated as one of the most important criterion from competition view point instead of the dependency on the criterion. SERVQUAL model (PARASURAMAN ET AL., 1988) is a unique scale which identifies gaps in the service. There are five criteria recognized by the researchers, viz: tangibility, reliability, responsiveness, empathy and assurance. Fitzsimmons and Fitzsimmons suggested performance criteria as: availability, convenience, dependability, price, customization, quality, reputation, and security and last but not the least speed in 2020.

Brooks mentioned in the International Maritime Transport in 1993 that service outcome is influenced by the interaction between the buyer and supplier that include communication, security, as well as the dependability. The similar factors were identified by Mentzer et al. (2003) regarding the implementation of the supply chain management. Interactions between the buyer-supplier is vital to the length of relationship and favorably impacts service outcomes. It shows a need for investments in employee qualification and also about upgrading the technology platform. Security as perceived

by both buyer and seller and dependability also are important factors that enable relationship building and boost confidence. Few significant managerial decisions, such as why is it important to invest with respect to traceability based on information technology. In some of the cases it is observed that relationship continuity is negatively correlated with service performance when the service perceived took things for granted.

Relationship management related to Service outcome is very close to the traditional manufacturing supply chains. The parameters often used such as dependability, delivery and cost depend on managing the relationships. This involves transparency in the exchange of information and trust. According to Dyer and Nobeoka (2000), “the change is desired for a new mindset in service industry, which not only is related to the competitive approach but with a new thought process of relationship management”.

RESEARCH METHODOLOGY

This paper is attempted by using secondary data involving summary, gathering and combination of published/unpublished research. Various resources like national and internal research papers/articles, journals, relevant websites were observed in order to extract information for this paper. With the help of this research, the paper aims to study after-sales service, observe the service gaps in it, and finally arrive with practical discussion & recommendations.

After Sales Service: The producers and sellers of capital as well as consumer goods cannot assume that their job ends once the product/service is sold. They must realize that they need to provide a range of supporting after-sales services to their customers. The market for after-sales service in case of some industries is found to be four to five folds bigger, than the market for product sales, when observed from the economic perspective (Bundschuh and Dezvane, 2003). Similar finding were reported by Wise and Baumgartner (1999) and Alexander et al. (2002), who were of the opinion that after-sales service can provide more profit than product sales. In 2002, Rolls-Royce's aero-engines generated 50% of its business revenues from the services provided. Lewis et al.(2004) came across similar observations in the elevator industry. In the context of competitive world market and lower profits generating from the sales of the product, after-sales service can constitute as an avenue of generating profit. It can be considered as a key differentiator for production houses. This has resulted in most of the manufacturing companies shifting their traditional approach of being a product-centric organization, to a customer-centric organization (Lele, 1997).

The Role of After-Sales Service: As stated by Gallagher et al. (2005), the executives who manage the after-sales & service businesses are very often not involved in the discussions and decisions regarding sales and product which affects the profit and the capacity to serve consumers. In order to evaluate “the total revenue

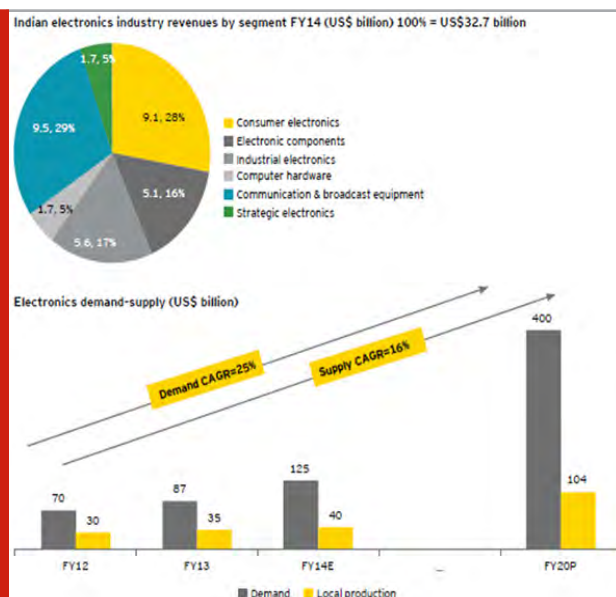
that can be generated from the time when the original product is sold, till it is retired from the field, and thus to maximize profit opportunities, collaboration and close communication is important among after-sales, sales and product development teams". It also means the increase in the technical resources required for the after-sales function. Thus, the 'cross-functional communication' is very crucial to fully exploit the potential of after-sales. The receptiveness to evaluate the feedback and data received through after-sales is also vital, especially regarding the functions mentioned below:

Reasons for the growth in electronic segment:

- Growing demand
- Production costs being on rise in alternate markets
- Major demand for electronic products is currently being met by importing them.

1. **Development of a New Product and Redesigning of the existing product and/or process:** Redesigning of a product and component as well as the development of new products can have its strong foundation in the reliable data that comes from the users. It is also useful for maintenance activities.
2. **Sales:** Data Analytics is being the new trend in the business world. Customer data can help in generating more sales and also in promotion activities.
3. **Marketing:** The information thus generated, is helpful for managing relations with the customers and can enhance the customer satisfaction which ultimately leads to customer lo.

Consumer electronics segment in India is vast, increasing and is majorly driven by imports.



Note: Consumer electronics includes TVs, DVD players, MP3 players, digital cameras, and other household appliances.

Source: DeitY reports; MoC reports; Make in India

website, <http://makeinindia.com/sector/electronic-systems-design/>, accessed 25 February 2015.

Consumer durables market in India is traditionally a "high spend", priority sector

More than 40% of the end consumer spending in India comes from the consumer durables.

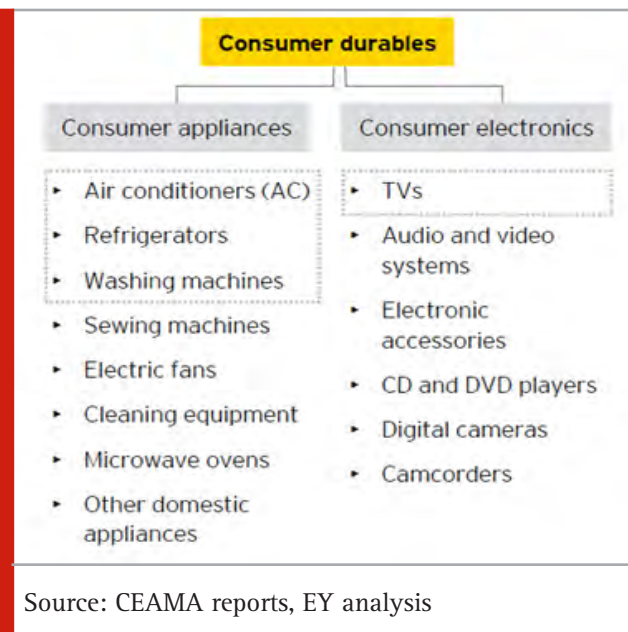
This sector contributes to more than 5.5% of IIP.

For everyone direct job, it creates 3 in-direct employment opportunities.

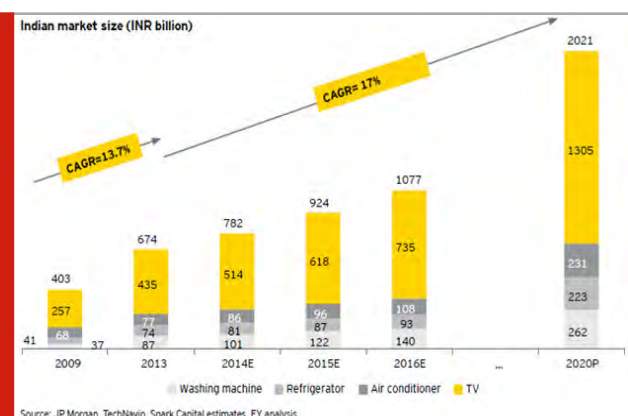
Import intensive sector and second top contributor to the current account deficit.

Major part of consumer durables comes from the urban market in India. However, in future the growth is expected to come in from the rural markets.

* The document refers to AC, washing machines and refrigerators as white goods.

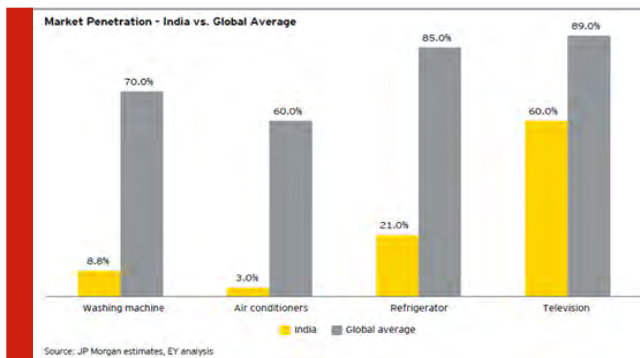


The market for white goods* and televisions is on rise, but currently under-penetrated



Service Supply Chain: Turning Potential into Profit: An increasing number of experts in the finance and

production domains, are of the opinion that the potential for profit is more in the service business. However, transformation of this potential into profit, remains a challenge. A recent AMR Research study reports that though after-sales service, represents 24 percent of the total revenue, it creates 45 percent of the profit. Today products are getting commoditized, new products which are being manufactured have lesser margins and are getting harder to sell. This gives rise to opportunities to make profit through better customer service. After-sales service can be seen as a low-risk, long-term revenue model, especially for industries such as aerospace, where an approximate lifecycle of a product is around 25 to 30 years. Improved service quality will lead to enhanced customer satisfaction. This will increase new product sales. With growth in outsourcing and increased competition in manufacturing, efficient after-sales service can be seen as driving force to enhance customer value.



A Supply Chain's Unique Requirements: The service supply chain, often underestimated by most executives, is complex and involves field service, reverse logistics, network design and crucial inventory location decisions that are bonded with service level agreements (SLAs). This is not the case in case of the supply chain of a manufacturing unit.

The service supply chain is more complex than the manufacturing supply chain

Frequently, organizations use the same efficiencies of the outbound supply chain for a new product as well as the after-sales service parts. While existing operations must be leveraged for after-sales services & support, they cannot be effective for handling the nuances of after sales activities. Companies must be prepared to deliver aggressive field service capabilities, depending upon the type of after-sales service supply chain they use. To fulfill the commitments related to services, after-sales service has to be more than merely reversing the processes being currently used. It has to be done in a systematic and exhaustive manner with special emphasis on Customer Centricity, Mean Time To Repair (MTTR), Uptime reduction and moving Downtime towards zero, by offering preventive maintenance and support service.

8. Customer Centricity: In the era where customer has become the most powerful element in the business ecosystem there is a need from the organizations to continuously evolve. Organizations cannot rest on their past laurels and become complacent. Companies will have to be high on customer centricity by continuously monitoring its activities around the customer. Companies will also have to understand the changing customer and be adaptable. The organizations which realize and are ready to create supply chains with this new insight, shall have a sustainable competitive edge, in the brutally aggressive market. In future, the companies that focus on customer service and after-sales support, will be successful. Customers are very conscious about the life of the product and are evaluating Total Cost of Ownership (TCO) of the product while making purchase decisions. It indicates that customer wants to enjoy their investment in the product for a long duration subject to product delivers all what is expected out of it. Provision should be made for upgrading the same product with minor modifications at the customer's site to help customer advance with time and technology. This will enhance the PLC of a product and will encourage the companies to increase their after-sales revenue and profits from the same customer, thereby reducing the cost of marketing and new customer acquisition.

9. After sales Service Gaps: It has been observed that poor performance of many organizations is due to lack of capabilities with respect to planning, managing, and monitoring the service business. Majority of the organizations can't predict the requirements of parts business. This results in inefficiency in managing customer expectation of after sales services, spare parts, and ability to serve the customer satisfactorily. Many organizations consider lack of supplier responsiveness and long lead times as the obstacles to service excellence. Many a times companies do not have the necessary capabilities to build profitable customer relations that deliver sustained customer satisfaction and of course customer loyalty. Formulation of the plan, its execution and its implementation are challenges as well.

Indian customer has been considerate to a large extent when it comes to after sales services but with the expectations of the customer increasing some of the obvious service gaps in after-sales services are as below:

- **Capability Gap:** This gap occurs when the growth of the company or growth of new product development is faster than anticipation and organization is unable to cope with the changes and occurs a capability gap. This could also result sometimes due to lack of a particular skill set in an organization. Lack of proficiency or sufficiency may be another reason due to which this gap is observed.
- **Design Gap:** Designing a service process especially in an environment where customer may become part of the process is extremely challenging. Design always requires a lot of vision and foresight. The most important part of the service design is the

element of flexibility which is a requirement in the services sector.

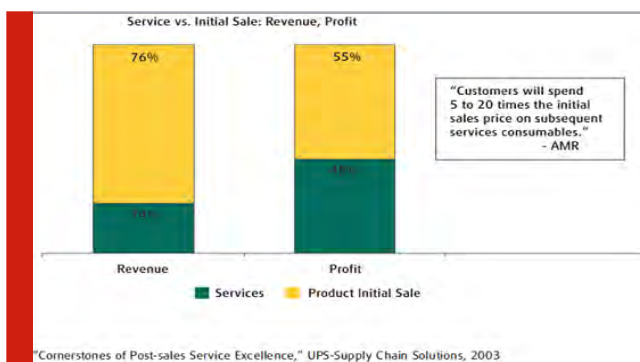
- **Response-delivery gap:** Responding the customer at the click of the mouse is the expectation of the customer today. Thanks to technology a lot of things have been made possible especially in the financial sector. In case of after sales services response to customer call is the fundamental requirement. The challenge is not many service providers understand the value of this response. The delivery gap occurs because of the poor mindset of the services provider and also due to lack of planning at the execution stage in the services.
- **New Product Development:** Acquisition of new knowledge to repair/service the new product is always a challenge. Moreover, the increasing frequency of types/versions of a product adds to the challenge. Therefore this is another gap which can be taken care by continuous training on skill building and planning to train the services provider before the product is launched so that response time to customer is also reduced.
- **Inventory & Spares management:** One of the most discussed topics in operations management is inventory. The more the product variety in the market the chances are more the inventory. Here inventory is all about the spares available throughout the distribution chain. It could be at services centres which again seems to be important from services point view.
- **Tailored Services / Customization:** Today's customers aren't just happy with standard products and services, but they are on lookout for new types of products which can help them reduce their pain points. In some of the categories, customer expect that down time should be as low as zero. With this ever increasing expectation of the customer of even customizing the product and services creates a lot of stress in the system and hence services failure gap occurs in the supply chain.

Drivers of growth:

- Urbanization coupled with growth in income.
- Introduction of the product that suit the Indian society with the affordable prices of products.
- Innovative products and availability of new kinds of products
- Ease in consumer financing
- Organized retail sector being on rise

Market penetration:

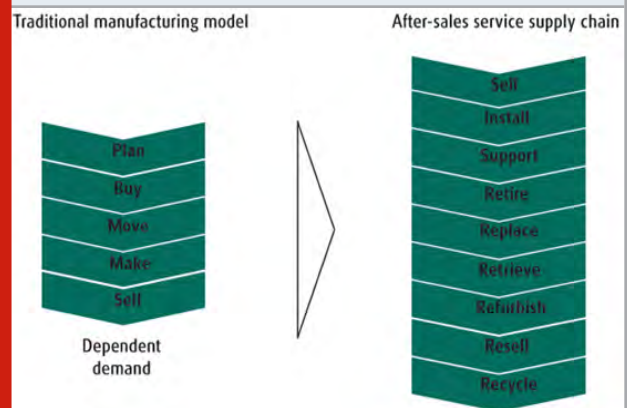
- India is still a market that remains underpenetrated.
- Primary sales will be used for local consumption and market penetration as against the replacement sales, that dominates the urban markets.
- Key to success will be reduced total cost of ownership.



DISCUSSION

It is often seen that after sales services have been termed as a support system which is very important from customer perspective but not very important from organizational view. Service operations suffer due to two major factors, first one being the under-staffing and second one being the low investment. Today customers are as demanding about the after-sales service as they are about the products and services they purchase, even when the transaction takes place online. Though there is a growth in the customers' expectations with respect to after-sales service, it is observed that most of the times they are disappointed and get frustrated with the kind and quality of customer service they get. It has also been noted during the research that many

The service supply chain is more complex than the manufacturing supply chain



companies do not keep the track of their customer once the customer's query is resolved by their call centre. Services providers have a great opportunity to earn from warranty cost which is built in the system that are borne by the company for attending calls for products under warranty. Income from repairing stocks at dealers and distributors, usually repairs due to transit damages, is another source of income. Service department can also earn through servicing products and services which are out-of-warranty through chargeable calls and annual maintenance contracts.

CONCLUSION

In manufacturing sector supply chain has seen a large percent of the IT investments while only a small percent has been applied to customer annuity. The customer annuity supply chain is substantially more complex, but the after-sales service markets represent enormous opportunity for services business providers. There is a clear opportunity for all the companies in general and manufacturers in particular, to capture lost profits and positively create an annuity stream of revenue from customers.

The barriers should be overcome and there is a need to create a suitable culture where people have a complete understanding of the supply chain, and a framework to follow for execution. The manufacturer that focuses on customer annuity should build loyalty that supports the rapid product lifecycle changes created by technology. The company that has the potential to adapt the current situation can implement an effective customer annuity program. This will help receive rewarded with increased profits and a definite competitive advantage that will be hard for others to duplicate.

Recommendation: As we are aware that technology has taken into grip all the sectors of the industries and after sales service supply chain cannot be far away from deploying technology to improve the overall efficiency of the after sales services. Focus on capability management, improving service attitude of the services provider, investing in services process design, understanding of tangibility and intangibility elements in services are some of the most important areas where one needs to look into, for improving service supply chain. It is also recommended to align the service and support performance with today's online consumer behavior. It is suggested that one of the ways to enhance the service experience is to open newer service channels.

Social media and other technology tools should be used to be close to the customer. Internet of everything (IOE) which talks about artificial intelligence could be utilized to enhance experience of the customers. Machine-to-machine connectivity through Bluetooth devices and inexpensive sensors have helped improve servicing the customer better. Service operations must build "digital-relevant" speed and agility to be in line with digital consumer of today. This would be the way in which organizations can deliver the enhanced after-sales service experience that will be fondly remembered by the customers and would help in generating customer loyalty.

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