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In vitro anticariogenic activity of commercially existing anticavity tooth pastes and tooth powders against *Lactobacillus acidophilus* isolated from childhood caries

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ABSTRACT

Primary childhood caries constitute a burden for the dental profession and public health administrators, as many authors report that the situation in primary dentition has not improved over the last decades, impacting children's quality of life and future oral health. Biological as well as socio economic factors are related to the development of dental caries, and are both relevant in understanding the disease process and is the main reason the rural preschool children's are admitted to hospitals. The early stages of invasion infection caused by *Lactobacillus acidophilus* also play major role in this process. This study was carried out to access the invitro antibacterial potential of the different tooth paste and tooth powders available in local market against the isolated oral micro flora *Lactobacillus acidophilus* from hundred different samples (including tooth scraping and swabs) collected from various dental clinics and from rural preschool children with different age group ranging from 5-17yrs. A total of hundred isolates were selected and screened for their ability to produce antimicrobial substance. The antimicrobial activity of eleven different tooth pastes such as Pepsodent, Colgate advance, Meswak, Vicco, S.V Namboodiri, K.P. Namboodiri's, Babool, Dabur Red, Close up, Himalaya herbal complete care and Cheerio gel and four different tooth powders namely Herbal JM, Gopal, Pyorea and Injection were evaluated on cariogenic lactic acid bacteria. The antimicrobial properties of tooth paste were tested with cariogenic biofilm producing microbial strain *Lactobacillus acidophilus* using well diffusion method. Each tooth paste was tested at different concentrations (2%, 4%, 6%, 8%, 10% and 12%). This investigation showed that all dentifrices selected for the study were effective against the entire test organisms but to varying degrees. Pepsodent – Germi Check tooth paste gave a reading of 45 mm at 10% concentration of tooth paste as the zone of inhibition which was highest amongst all of the test dentifrices followed by Colgate advance dentifrice recorded a larger maximum zone of inhibition, measuring 40 mm compared to other tooth pastes. All other dentifrices showed the zone of inhibition to be between 20 mm to 37.5 mm in 10% concentration of tooth paste respectively. The data obtained from the complete investigation showed that tooth paste formulations have more effective active ingredients to control the oral micro flora whereas, herbal based products are equally effective as the other formulations but are not superior to them, whereas the tooth powder formulations were 100% less effective in controlling the oral flora.

KEY WORDS: ANTICARIOGENIC ACTIVITY TOOTH PASTES *LACTOBACILLUS ACIDOPHILUS*

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INTRODUCTION

WHO declared that deprived oral health and its related diseases may have dreadful effect on common health as well as eminence of life. Dental caries is an infectious, communicable disease resulting in destruction of tooth structure by acid forming bacteria found in dental plaque, an intraoral biofilm, in the presence of sugar. The infection results in loss of tooth minerals that begin on the outer surface of the tooth and can progress through the dentin to the pulp, ultimately compromising the vitality of the tooth. Various literature has proved that *Streptococcus mutans* and *Lactobacillus acidophilus* were the main causative agent for dental caries (Fitzgerald and Keyes, 1960). The early manifestation of the caries process is a small patch of demineralised enamel at the tooth surface, often hidden from sight in the fissures of teeth or in between the teeth. The destruction spreads into the softer, sensitive part of the tooth beneath the enamel (Yadav and Prakash 2017 and Tasie *et al.,* 2017).

These bacteria are strongly stimulated by sucrose and are known as the main organisms responsible for human tooth decay. Biofilm formation is a natural process in the oral environment, but needs to be controlled through regular brushing in order to prevent the development of caries and periodontal diseases. Most of the people use toothpaste without knowing their potential efficacy, bacteria form an important group of microorganisms found in both healthy and diseased mouths. There have been more than 300 types of bacteria found in the mouth; it's a very serious matter to select the effective toothpaste or powder to prevent teeth from microbial attack preventing the principle dental diseases like dental plaque, dental caries, gingivitis and periodontitis.

The purpose of oral hygiene using toothpaste is to reduce oral bacterial flora, mouth bacteria have been linked to plaque. Plaque is a complex biofilm found on the tooth surface that is a major cause of the development of dental caries (Benson *et al*., 2004). The accumulation and development of plaque depends upon the outcome of the interactions between the adhesiveness of plaque to the tooth surface and the physical shear forces which serve to dislodge and remove the plaque (Roberts *et al*., 2005). Tooth paste is classified as drug not as a cosmetic, different brands of tooth pastes and tooth powders contain effective antibacterial ingredients as broad spectrum antibacterial agents which effectively reduce oral bacteria and contribute to dental health (Regos *et al*., 1974). The common method for maintaining good oral hygiene is brushing the teeth with dentifrices that have antimicrobial properties and can prevent the degradation of tooth enamel (Vyas *et al*., 2017).

Tooth brushing with toothpaste is the most widely practiced form of oral hygiene in most countries (Pannuti *et al*., 2003). The success of any toothpaste, in part, lies on its ability to eliminate pathogenic oral micro flora. Fluoride dentifrices have been widely used all over the world and extensive research has established their abilities in terms of caries resistance (Itthagarum and Wei, 1996). A wide range of chemicals, mainly antimicrobial agents, have been added to tooth pastes in order to produce a direct inhibitory effect on plaque formation (Fine *et al*., 2006; Pannuti *et al*., 2003), clearly, most individuals find it difficult to maintain an effective level of plaque control and this is reflected in the levels of periodontal disease in the population. The addition of antimicrobial agents to tooth paste has been suggested as one possible method to improving the efficacy of mechanical tooth-cleaning procedures (Fine *et al*., 2006; Moran *et al*., 1988), aiding the control of dental plaque and preventing dental caries and periodontal diseases (Ozaki *et al*., 2006; White *et al*., 2006).

When these substances are added to oral products, they kill microorganisms by disrupting their cell walls and inhibiting their enzymatic activity. They prevent bacterial aggregation, slow multiplication and release endotoxins (Bou-Chacra *et al*., 2005; Ozaki *et al*., 2006). Our day begins with the tooth paste, hence the objective of this current study has made an effort to argument out the components of conventional tooth pastes should be as safe as those of herbal tooth pastes and able to maintain the good dental hygiene by use of tooth paste because dental care is one of the aspects of human sanitation, which unfortunately receive scanty attention to provide efficient protection against cariogenic microorganisms to enhance biofilm control, and prevent dental caries.

MATERIALS AND METHODS

Fifty different dental clinical samples from various dental clinics and from the patients having dental caries who come for the dental treatment of different age groups ranging from 5-17 years were collected with the help of an excavator and immediately transferred to 3 ml of saline solution in sterile glass vials. Information of patient's dental case history was also recorded along with his/her consent. After inoculation, vials were capped and sealed by Parafilm. The packed vials were brought to the laboratory immediately and kept in incubator at 37°C for 24 hours for bacterial enrichment. he cariogenic biofilm producing *Lactobacillus acidophilus* were screened, identified and purified by series of subculture on specific media such as Man Rogosa Sharpe agar and Nutrient agar were incubated aerobically at 37°C for 24 hours. The identification of all the microbes was confirmed by standard biochemical and staining methods (Aneja, 2003). All the pure cultures were stored and maintained in nutrient broth at 4˚C for further use.

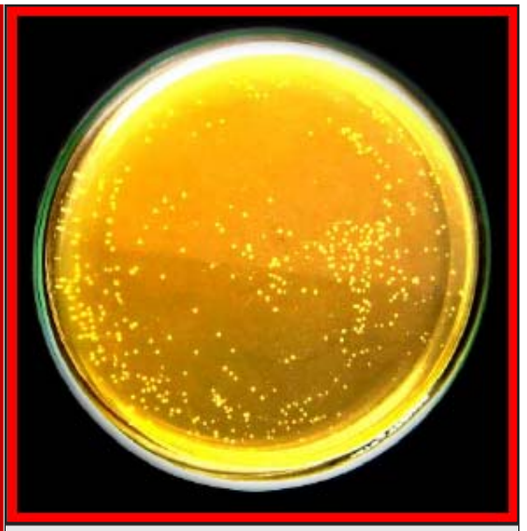

FIGURE 1. Colony of *Lactobacillus acidophilus* on Man Rogosa Sharpe agar

All leading conventional, herbal tooth paste and tooth powder brands were purchased from local market. The care was taken to procure the completely herbal (organic) toothpastes only. Fifteen samples namely Pepsodent, Colgate advance, Babool, Vicco, Dabur red, Herbal JM, Pyorea powder, Himalaya herbal complete care, S.V. Namboodiri's, K.P. Namboodiri, Gopal powder, Close up, Cherriogel, Meswak and Injection powder were collected.Different concentration of (2%, 4%, 6%, 8%, 10% and 12%) tooth pastes and tooth powder samples were diluted in sterile distilled water, shaken and kept as a stock solution. The distilled water employed as the negative control.

The antibacterial activity of the different concentrations: 2:100, 4:100, 6:100, 8:100, 10:100 and 12:100 (prepared by mixing 2g, 4g, 6g, 8g, 10g and 12g each of the toothpastes and tooth powders in 100 ml of sterile distilled water respectively) of the various tooth paste and tooth powder brands namely: Pepsodent, Colgate advance, Babool, Vicco, Dabur red, Herbal JM, Pyorea powder, Himalaya herbal complete care, S.V. Nambood-

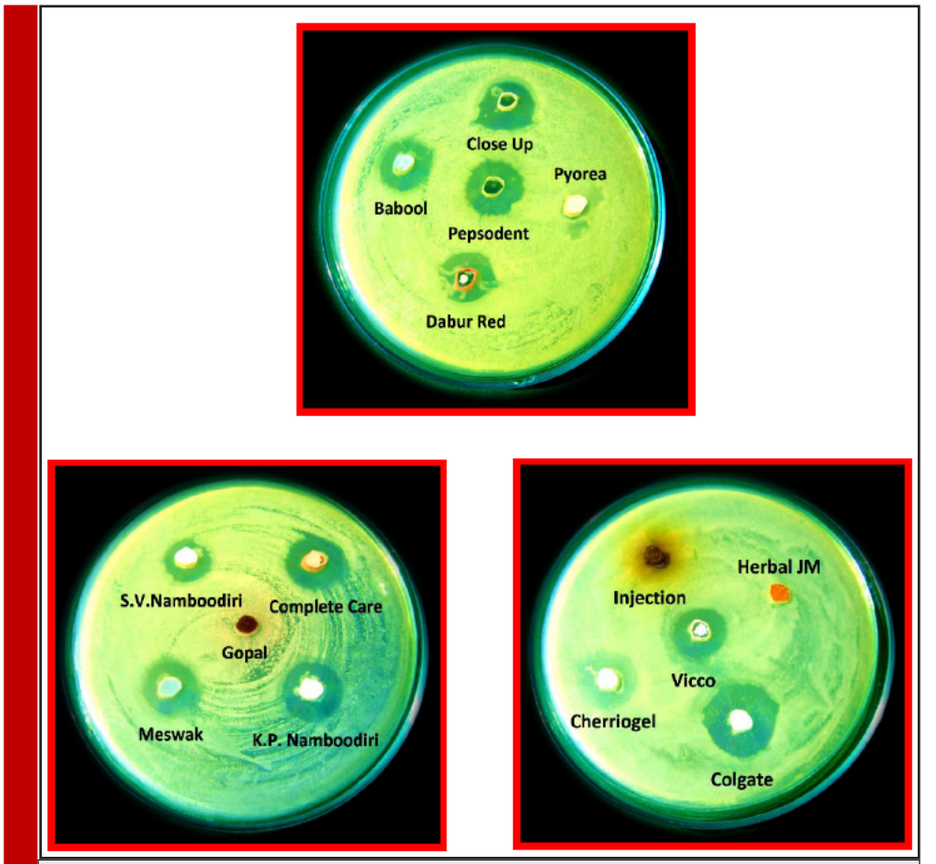

FIGURE 2. Anticariogenic activity of different dentifrices against *Lactobacillus acidophilus*

FIGURE 3. Dentifrices used in this study

iri's, K.P. Namboodiri, Gopal powder, Close up, Cherriogel, Meswak and Injection powder was determined by modified agar well diffusion method as described by Prasanth, (2011). In this method Muller Hinton agar plates were seeded with 0.5ml of 0.5 McFarland standards (approx., 10^8 cfu/ml) of cariogenic biofilm producing *Lactobacillus acidophilus*). The plates were allowed to solidify. A sterile 8mm cork-borer was used to cut one central and five wells at equidistance of the plates. 0.2ml of the tooth paste and tooth powder dilutions was inoculated to each of the five wells while the same amount of sterile distilled water was introduced in to the first well as control. The efficacy of anticariogenic tooth paste and tooth powder extracts against bacteria was compared with the broad spectrum antibiotics ampicillin, tetracycline and chloramphenicol (positive control). The same procedure was used for the broad spectrum antibiotics and the plates were incubated at 37˚C for 24hours. The antimicrobial activity was evaluated by measuring the diameters of zone of inhibition (in mm). An organism was interpreted as highly susceptible if the diameter of inhibition zones was more than 30 mm, intermediate if diameter was 25 to 30 mm and resistant was less than 25 mm.

RESULTS AND DISCUSSION

Amongst 100 clinical decay samples, 100 positive *Lactobacillus acidophilus* were isolated from different age group ranging from 5-17yrs. All the decay samples were tested on Man Rogosa Sharpe agar (MRS) for the isolation of *Lactobacillus acidophilus* and confirmed according to Bergy's manual of Bacteriology. Isolated cariogenic *Lactobacillus acidophilus* isolates were tested *invitro*

FIGURE 3. (*Continued*)

to determine anticariogenic activity of tooth paste and tooth powder by well diffusion method. There are different concentration (2%, 4%, 6%, 8%, 10% and 12%) of tooth paste and tooth powder were tested namely Pepsodent, Colgate advance, Babool, Vicco, Dabur red, Herbal JM, Pyorea powder, Himalaya herbal complete care, S.V. Namboodiri's, K.P. Namboodiri, Gopal powder, Close up, Cherriogel, Meswak and Injection powder. Totally 12 tooth pastes and 3 tooth powders were used to identify the potential efficacy of tooth pastes and tooth powders against the selected *Lactobacillus acidophilus*.

The results of antibacterial activity of different brands of anticavity tooth pastes and tooth powders against cariogenic bacteria are shown in Table 1 - 10. Among three brands, Brand – A Conventional tooth paste formulation include Colgate advance, Pepsodent, Close-up and Cherriogel was perceived maximum zone of inhibition (40, 47.5, 30 and 37.5 mm respectively) in 10% concentration followed by minimum zone of inhibition was scattered in 2% concentration of tooth paste.

In Brand – B, 7 dentifrices: Vicco, Dabur Red, Babool, Meswak, Himalaya herbal complete care, K.P. Namboodiri and S.V. Namboodiri were showed maximum activity (20mm, 31mm, 30mm, 31.5mm, 27.5mm, 30.5mm and 25 mm) in 10 % concentration of herbal based tooth paste followed by minimum zone of inhibition was dotted in 2% concentration of Vicco, Dabur Red, Babool, Meswak, Himalaya herbal complete care, K.P. Namboodiri and S.V. Namboodiri was significantly resistant against the tested cariogenic isolates get equally 0 mm zone of inhibition.

The findings from the present study the Brand – C include four diverse tooth powders namely Herbal JM, Injection, Gopal and Pyorea was notably degree of resistant against test pathogen *Lactobacillus acidophilus*. Awareness of this research was investigated to choice the best tooth paste, were using every day to reduce proliferation microorganisms in mouth as well as bad smell of mouth because of presenting microorganism in mouth and were found food between teeth .In the present study, three different brands of tooth pastes designated as A, B and C was tested for antibacterial activity against ten dental pathogens. All type of different tooth paste and tooth powder were found to be effective against 10 cariogenic pathogens to varying degree.

Tooth paste brand A (Type – Conventional) was significant in controlling the *Lactobacilli* infection from low concentration of 2% it exhibit significant degree of resistant against test pathogen showing there is no zone of inhibition observed in Strain No. 1 MTLACVG02 (Close up and Cherriogel), Strain No. 4 MTLACVG36 (Cherriogel), Strain No. 5 MTLACVG38 (Cherriogel), Strain No.10 MTLACVG100 (Close up) and increased with concentration showing 25 mm zone at 10 % in Strain No. MTLACVG100

Table 1. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG02.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	0	14	15	17.5	19	15
	Vicco	0	10	12.5	14.5	17	0
	Dabur	0	15	16	20	22	0
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	0	12	15	15.5	25	0
	S.V. Namboodiri's	0	16	17.5	20	20	0
	Pepsodent	19.5	21	23	41.5	47.5	15
	K.P. Namboodiri	0	14	15	16.5	25	0
	Gopal powder	0	0	0	0	0	0
	Close up	0	14	15	18	30	0
	Meswak	0	12.5	13	17.5	31.5	13.5
	Injection powder	0	0	0	0	0	0
	Cherriogel	0	12.5	17	17.5	25	11
	Colgate advance	21	22.5	23	24	30	21

Table 2. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG06.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	15	15	15	16.5	20	15
	Vicco	10	11	13	13	15	12
	Dabur	14.5	15	15	16	20	14.5
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	12	15	19	20	27.5	11.5
	S.V. Namboodiri's	12	14	15	20	22.5	11.5
	Pepsodent	18	21	28.5	30	35	15
	K.P. Namboodiri	11	12	13.5	14.5	15.5	14
	Gopal powder	0	0	0	0	0	0
	Close up	14	15	15.5	19	27.5	11
	Meswak	10	10	13	13	21.5	13
	Injection powder	0	0	0	0	0	0
	Cherriogel	11	13	13	20	25	13
	Colgate advance	21	22	26.5	29	36.5	18

Table 3. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG17.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	12	13	14.5	15	17.5	12
	Vicco	10	12	12.5	15	17.5	12
	Dabur	10	12	16	16	30	10.5
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	12	15	15.5	18	18.5	18
	S.V. Namboodiri's	12	14.5	15	18.5	23	8
	Pepsodent	15	17.5	25	29.5	31	13.5
	K.P. Namboodiri	12	12	12	15	15	10.5
	Gopal powder	0	0	0	0	0	0
	Close up	13	15	15	16	16	10
	Meswak	9	10	14.5	15	17.5	15.5
	Injection powder	0	0	0	0	0	0
	Cherriogel	13	14.5	15	16.5	20	9
	Colgate advance	16.5	20	23.5	24.5	27.5	11.5

Table 4. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG36.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	0	13	19.5	20	20	0
	Vicco	9	10	13	15.5	16	0
	Dabur	10	14	17.5	21	30	0
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	0	18	19	19.5	22.5	0
	S.V. Namboodiri's	0	14	16.5	18.5	22.5	0
	Pepsodent	17	23.5	25	27.5	30	0
	K.P. Namboodiri	11	12.5	14	15.5	16	0
	Gopal powder	0	0	0	0	0	0
	Close up	15	16.5	17	20	30	0
	Meswak	11	12	15	18	20	0
	Injection powder	0	0	0	0	0	0
	Cherriogel	0	14	15	20	37.5	0
	Colgate advance	18	18	27.5	27.5	40	16

Table 5. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG38.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	10	15	16.5	19	22	13.5
	Vicco	13	13	14	15	18	12
	Dabur	13.5	14	15	17	20	15
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	12	15.5	16	20	24	14.5
	S.V. Namboodiri's	0	15	17.5	18	20	12.5
	Pepsodent	23	23	33.5	34.5	41.5	14
	K.P. Namboodiri	0	11	14	15	25	13
	Gopal powder	0	0	0	0	0	0
	Close up	14	15.5	19.5	20	22	13.5
	Meswak	12	13	13.5	14	17.5	13.5
	Injection powder	0	0	0	0	0	0
	Cherriogel	0	13.5	16.5	20	22	13.5
	Colgate advance	20.5	22.5	25	25	30	18

Table 6. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG75.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	12.5	14	14	18.5	30	14.5
	Vicco	10	13	13	14	15	15
	Dabur	13	15	15	19	31	15
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	11	15	15	17.5	22.5	16
	S.V. Namboodiri's	9	14.5	15	17.5	20	14.5
	Pepsodent	17.5	20	24	25.5	39	12.5
	K.P. Namboodiri	11	13	14	15	15	13
	Gopal powder	0	0	0	0	0	0
	Close up	13	15	15	19	32.5	11
	Meswak	10	12	12.5	15	16	13
	Injection powder	0	0	0	0	0	0
	Cherriogel	12	14	15	20	20	15
	Colgate advance	18	21	25	25.5	30	15

Table 7. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG85.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	14.5	17	19	20	25	11
	Vicco	8	14	14	15	17	12
	Dabur	12	14	15.5	17	19	14.5
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	13	18.5	19	20	22	14.5
	S.V. Namboodiri's	11	15	17	17	17.5	14.5
	Pepsodent	20	25.5	26	27.5	30	12
	K.P. Namboodiri	12	14	16.5	20	20	12.5
	Gopal powder	0	0	0	0	0	0
	Close up	13	15	15.5	16.5	17	14.5
	Meswak	0	13	13	13.5	17.5	14
	Injection powder	0	0	0	0	0	0
	Cherriogel	9	14	16.5	20	20	13.5
	Colgate advance	17	19.5	25	26.5	27	20

Table 8. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG95.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	14	15	16	20	24.5	15.5
	Vicco	9	10	14	14	13.5	15
	Dabur	10	18.5	20	20	20	18
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	13	15	16.5	19	20	0
	S.V. Namboodiri's	15	17.5	18.5	19	25	15.5
	Pepsodent	19	20	22.5	27.5	28	14.5
	K.P. Namboodiri	10	12.5	15.5	17.5	18	14.5
	Gopal powder	0	0	0	0	0	0
	Close up	13	14	17	17	20	13.5
	Meswak	7	12.5	15	16	17	14.5
	Injection powder	0	0	0	0	0	0
	Cherriogel	9	14	16.5	20	20	13.5
	Colgate advance	17	19.5	25	26.5	27	20

Table 9. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG97.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	13	15	17	18	19	14.5
	Vicco	7	12.5	15	16	16.5	13.5
	Dabur	14	17.5	18.5	20	23	15.5
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	18	19	19.5	20	22	22
	S.V. Namboodiri's	14.5	15	16	16.5	18	13.5
	Pepsodent	19	21	22.5	22.5	30.5	13.5
	K.P. Namboodiri	19	21	22.5	22.5	30.5	13.5
	Gopal powder	0	0	0	0	0	0
	Close up	12	15	16.5	18	19	20
	Meswak	11	13	15	17.5	17.5	15
	Injection powder	0	0	0	0	0	0
	Cherriogel	9	14.5	20	20.5	22.5	15
	Colgate advance	0	18	25	35	40	16

Table 10. Antibacterial activity of tooth pastes and tooth powders against cariogenic strain MTLACVG100.

S. No.	Test Dentifrices	Zone of inhibition (mm) at different concentration of tooth paste and tooth powder					
		2%	4%	6%	8%	10%	12%
	Babool	0	13	14	20	22.5	0
	Vicco	0	10	13	13	20	0
	Dabur	0	12	15	17.5	24	0
	Herbal JM powder	0	0	0	0	0	0
	Pyorea powder	0	0	0	0	0	0
	Himalaya herbal complete care	15.5	0	15	16.5	17	36.5
	S.V. Namboodiri's	0	15	15	19	25	0
	Pepsodent	25	25	25.5	35.5	45	15
	K.P. Namboodiri	0	12	15	15	17	0
	Gopal powder	0	0	0	0	0	0
	Close up	0	15	15.5	20	20	0
	Meswak	0	12.5	13	16.5	18	0
	Injection powder	0	0	0	0	0	0
	Cherriogel	13.5	15	20	20	21	0
	Colgate advance	20	24	24	32	15	0

Table 11. Tooth paste brands used in this study

S. No	Brand	Type	Tooth Paste
1.	Brand – A	Conventional	Colgate advance, Pepsodent germi check, Close up, Cherriogel.
2.	Brand – B	Herbal	Vicco, Dabur Red, Babool, Meswak, Himalaya herbal complete care, K.P. Namboodiri and S.V. Namboodiri.
3.	Brand - C	Powder	Gopal, Herbal JM, Pyorea and Injection

somewhat similar with dissimilar results was obtained in case of *Lactobacillus* spp., this results are in accordance with the results of (Sohail and Khan, 2013) they stated that some tooth paste shows better antibacterial activity against the flora and activity of tooth paste because of active ingredients such as fluoride.

The results regarding the brand B (Type – Herbal) is Herbal based products and exhibited least effectiveness as compared to other test formulations. The decay pathogen shows maximum zone of inhibition against ten cariogenic *Lactobacillus acidophilus* it exhibit better results was shown in 8% and 10% concentration rather than the lowest concentration (2%, 4% and 6%). This may be due to the ingredients present, the herbal formulation studied appeared to be equally effective as the fluoride formulations but not superior to them. Almas *et al*., (2001) reported that the antimicrobial activity of the herbs may be due to the presence of secondary metabolites such as alkaloids, flavonoids, polyphenols and lectins. Using natural medicines to cure various diseases so, hence herbal medicine had made significant contribution to modern medical practice.

Formulation brand C (Type – Tooth powder) include some dentifrices are listed in (Table 11). Among 2% - 10% concentration of tooth powders are strongly exhibit significant degree of resistant against ten cariogenic isolates (MTLACVG02, MTLACVG06, MTLACVG17, MTLACVG36, MTLACVG38, MTLACVG75, MTLACVG85, MTLACVG95, MTLACVG97 and MTLACVG100) it shows there is no zone of inhibition observed in all cariogenic isolates. Similarly, Sohail and Khan, (2013) also stated that tooth powder formulation is less effective to control the oral microorganisms compare than other conventional and herbal tooth paste formulations. The data obtained from the complete investigation it had shown that tooth paste formulations having more effective active ingredients to control the oral micro flora whereas, herbal based products are equally effective as the other formulations but not superior to them, whereas the tooth powder formulations was 100% less effective in controlling the oral flora.

CONCLUSION

The present study demonstrated that the antibacterial properties of fifteen dentifrices used against the dental pathogen and concluded that conventional tooth paste formulation (Brand – A) has promising anticariogenic effects compare than other formulations (Brand – B and Brand – C) to some extent to benefit anti plaque action. Further study is needed to determine the bioactive compounds which are responsible for this anticariogenic activity.

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