Biomedical Communication

Impact of Increased Screen Time on Physical and Psychological Health of Indian Students During COVID-19

Shailly Gupta,[1] Prerna Sharma,[2] Anush Shukla,[3] Richa Hirendra Rai[2] and Ankur Mittal[4]

[1]Department of Physiotherapy, Amar Jyoti Institute of Physiotherapy, University of Delhi, Delhi, India

[2]School of Allied Health Sciences, Delhi Pharmaceutical Sciences and Research University, Delhi, India

[3]Department of Physiotherapy, Manav Rachna International Institute of Research and Studies, Faridabad, India

[4]Department of Physiotherapy, X Cell Physiocare, Delhi, India

ABSTRACT

Now in the 21st century, both physical and psychological health are associated with technology. By the late March 2020, the Indian government announced multiple lockdowns to fight with COVID-19 pandemic which included the shutdown of all educational institutes due to which all schools, college, and universities had shifted all their classes online by using video conferencing apps which also accounted for a large proportion of tasks that resulted in increased screen time after lockdown compared to pre-lockdown during COVID-19. So, the present study was conducted to determine the impact of increased usage of the screen on Psychological and physical health during the COVID-19 among Indian Students. A cross sectional survey was conducted on Indian students by using self- made Questionnaire with snowball sampling method. A total of 210 responses were received online from various schools and colleges students between 15th August to 30th August 2020. The results showed a statistically significant difference between the screen time spent before and during COVID ($t= 19.96$; $p<0.01$). Similarly, a statistically significant positive correlation at 0.01 level was found between screen usage time during COVID-19 pandemic with backache (0.62), neck pain (0.71), headache (0.50), and weight gain (0.52) and with mental health (0.40). Hence the study concluded positive association between screen time with physical and psychological health during COVID-19 among Indian students. It further implies that adequate preventive health measures need to be incorporated among students. There is a scope of further study to identify the impact of over usage of screen on health of individuals of specific population i.e., either adolescents or adults' group and also on the larger sample size to get more reliable and accurate results.

KEY WORDS: CORPOREAL HEALTH, COVID-19, ERGONOMICS, PHYSICAL AND PSYCHOLOGICAL HEALTH.

INTRODUCTION

The musculoskeletal ailments have been ranked tenth by the World Health Organization for number of years with more common physical complaints like back ache, neck pain, and headache amid adolescents. It has been found in various studies that excessive usage of screen are linked with physical complaints. Subsequently, as a period of screen usage increases which leads to continuous stress on muscles and lack of convalescence from such muscle tension and ultimately leads to change in muscle activity (Sjolie 2004; Hakala et al. 2006; Torsheim et al. 2010; Vos et al. 2015). Students have been found more prone to neck pain with the prevalence of neck pain among adults ranging from 12 to 34% because of the attainment of sitting postures for longer duration (Green 2008; Gheysvandi et al. 2019).

Student's mental health is gaining more attention day by day internationally and it has been considered as a public health challenge nowadays (Storrie et al. 2010). Both anxiety and depression are deleterious to academic and social engagement in everyday student's life (Byrd and McKinney 2012; Salzer 2012). Consequences of depressive disorders can be manifested as depressed mood, decrease cognitive function, lack of a sense of subsisting, attentiveness, as well as lack of energy (Grotan et al. 2019). In turn, depression and anxiety frequently influence memory and attentiveness, which makes it tougher to obtain new knowledge and subsist with the examination environment. This will also reinforce

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feeling of fear and insufficiency, and in numerous people, it will undergo the warmth of anxiety and depressed mood in a vicious circle (Rice et al. 2006; Grotan et al. 2019).

Most of the Physical health ailments are associated with new age technology, usually resulting in neck pain and back ache. Children are having sedentary lifestyle due to increased usage of screen making them prone to cardiovascular diseases, cancer, diabetes, etc. The direct impact of increased screen time has led to attainment of same posture for longer duration and monotonous movements (Straker et al. 2008). Excessive neck flexion leads to the increased risk of neck pain and its indirect effects incorporate decrease in energy expenditure that may be accountable for increasing weight (Straker and Howie 2016; Stiglic and Viner 2018). Normal people recognize increased screen time influences their lifestyle negatively which is associated with behaviour that incorporates lesser exercise, over eating which causes deleterious effects on sleep, social well-being, and diet. It also has been found a direct relationship with increased screen time on a variety of health issues that strongly include adiposity, unhealthy diet, depressive symptoms, and quality of life (Marsh et al. 2013; Stiglic and Viner 2018; Ashton and Beattie 2019).

Increased screen time adversely affects the activities like social contact, physical activity, or may foster a sedentary lifestyle and good sleep hygiene (Costigan et al. 2013; Lissak 2018). It has been found a positive relation between screen time duration and severity of anxiety and depressive symptoms (Hoare et al. 2016; Stiglic and Viner 2018). There is also evidence that high screen time is associated with adverse effects on peevishness, depressed mood, cognition and socio-emotional evolution, leading to low grades in exams (Ashton and Beattie 2019; Smith et al. 2020). By the late March 2020, Indian government announced series of lockdowns to combat with COVID-19 pandemic declared by the World Health Organization on 11 March, 2020 after spreading to various countries, which included closure of all public activities that required public gatherings like malls, schools, colleges, offices etc (Kumar and Dwivedi 2020).

This resulted in most people working from their home through digital media or the internet to continue their job and work (De et al. 2020). Even though, the cases of pandemic has been reduced in many countries, but in case of India, the number of cases of COVID 19 is still surging continuously but still some activities throughout the country has been allowed by taking appropriate measures using WHO guidelines (Kumar and Dwivedi 2020). In terms of education, there is increase in the usage of online services during and after lockdown as compared to pre-lockdown as schools, colleges, universities have shifted all their classes online by using mode of video conferencing apps which also constitutes a large proportion of work i.e. assignments, teaching, examinations etc. (De et al. 2020; Khan and Smith 2020; Pandya and Lodha 2021).

It has taken a dramatic shift in digital usage which impact on all aspects of work and life during COVID-19 pandemic. During this COVID-19 pandemic, there is growing concern about the impact of increasing exposure of screen on health of children and young adults as physical activity outside home was not permitted due to increased chances of getting infected (Chen et al. 2020; Guo et al. 2021). Moreover, the association of screen time with limitation of Physical activity, adiposity, increase in energy intake or reduction in metabolic rate has been found (Iannotti et al. 2009; Guo et al. 2021). Thus, the objective of present study intent to evaluate the effect of increased usage of the screen on Psychological and physical health midst of COVID-19 pandemic among Indian Students.

MATERIAL AND METHODS

An observational cross-sectional study was conducted to evaluate the effect of increased screen time on the physical and mental aspects of health of Indian students during COVID 19 pandemic. This study was approved by the Ethical Committee of Xcell Physiocare and followed the Declaration of Helsinki ethical principles for Medical Research Involving Human Subjects. Snowball sampling method was adopted to assemble the samples. The self -made questionnaire was framed as Google form having consent, demographic details, and 2 sections. The questionnaire was carried forward through various social networking platforms to college and school students of India and requested to share further among their peer groups respectively. A total of 210 responses of students were received online from various schools and colleges between 15th August to 30th August 2020. The physical and mental health of students having increased usage of the screen was assessed on 5-point Likert scale questionnaire comprising of two sections. In the first section, students were asked about the mode and duration of screen time for study purposes daily. The second section included questions on student's physical and mental health while using the screen for study purposes during COVID-19 pandemic.

Table 1. Demographic Variables of Participants

Variables	Participants, N (%)
Gender	
Males	69 (32.8)
Females	141 (67.14)
AGE (In Years)	
≤ 12 Years	25 (11.90)
12 – 24 Years	97 (46.19)
25 – 38 Years	88 (41.90)
>38 Years	0
Qualifications	
Primary	21 (10)
High School	19 (9.04)
Diploma	4 (1.90)
Graduate	75 (35.71)
Post Graduate	88 (41.90)
Doctorate	3 (1.42)

For the data analysis: The data of the study was compiled in the Microsoft Excel sheet and then it was analyzed on descriptive statistics of SPSS version 26.0. The reliability

of the questionnaire was tested using Cronbach alpha (α). The demographics of the respondents were analyzed using descriptive statistics. Spearman correlation was applied to determine the correlation between screen usage time during COVID and physical health problems (neck pain, weight gain, backache, and headaches) and mental health. A paired t-test was applied to find the difference in screen time usage before and during COVID. The level of acceptable significance was set at $p < 0.01$.

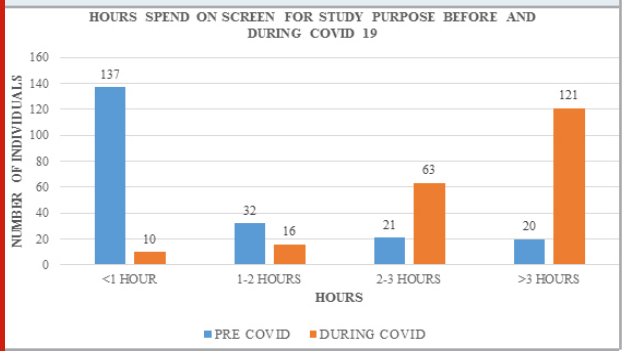
RESULTS AND DISCUSSION

The questionnaire was found to be reliable as the value of Cronbach alpha (α) came out to be 0.7 respectively.

Demographic Data: With the help of various social networking sites, 210 individual's responses were collected. The number of female's respondents (67.14 %) were more than the number of male respondents (32.8%). A good chunk of respondents belongs to the age group of 12-24 years. Majority of the respondents belong to Delhi. Table 1 depicts the Demographic details of the respondents respectively.

Section A: Screen usage time: This section of the questionnaire concerned about the time used on the screen for study purposes before and during COVID. The bulk of them were spending more than 3 hours on screen for study purpose during COVID. The comparison of time spent on screen before and during COVID is illustrated in figure 1. A statistically significant difference in time duration spent on screen before and during COVID was observed ($t = 19.96$; $p<0.01$) (Table 2). Another question in this section includes the mode of the screen mostly used for study during COVID. Most of the respondents used mobile phones (64.2%), whereas 33.3% were using laptops, 1.9% were using computers and 0.4 % responded tab as their mode of the screen widely used for educational purposes during this pandemic.

Figure 1: Hours spend on screen for study purpose before and during COVID 19

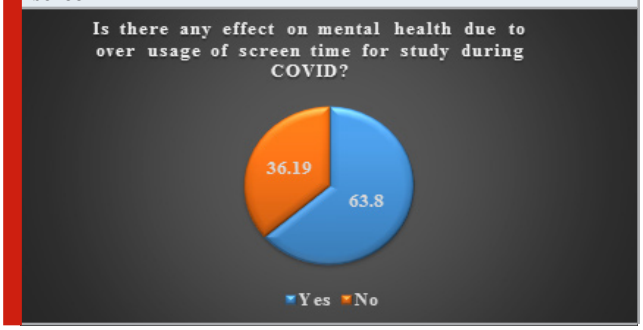


Section B: Physical and mental health: The section includes questions that determined the impact of screen usage on physical as well as mental health. On asking about the physical health issue which was faced most due to increased screen usage during COVID, the majority of people reported neck pain (63.3%) as the major issue faced due to screen usage. This was followed by eye problems (59.04%), headaches (56.19 %), and backache (29.52 %). Another question asked about was "How often do you feel a problem of neck pain while studying on-screen during COVID?"54.76% of respondents felt neck pain every time they used screens during this pandemic.

Table 2. t-test for time spend on screen pre and during COVID 19

PARAMETER	T	p-value
Screen usage time pre and during COVID	19.968	0.00*
*= value is significant at 0.01 level		

Figure 2: Effect on mental health due to over usage of screen



Another question stated, "How often do you feel a problem of backache while Studying on-screen during COVID?" 44.7 % responded that they felt backache every time. In other questions asking about eye problems and headache, 53.33 % of individuals responded they felt eye problems most of the times whereas 39.04 % responded they had headache every time while using the screen for study purposes during COVID. Another question asked whether there was any change in their weight during COVID as compared to pre-COVID. The majority of them responded that their weight was increased as compared to pre-COVID (61.42%). On another question asking about physical activity, 88.5 % responded that their physical activity was affected due to increased screen time during COVID.

On another question regarding the sleep quality, 46.6 % answered that their quality of sleep was hampered most of the times during COVID due to increased usage of screen. In the question concerned about mental health, 63.8 % responded that their mental health was affected due to over usage of screen during COVID. (Figure 2). Other question in this regard stated "if they felt that their mental health is affected due to over screen usage, then which problem you are facing due to over usage of screen time for study during COVID?" 69.9% responded they felt anxious due to over screen usage whereas 48.8 % responded lack of confidence as a major issue faced by them followed by panic disorder (24.8 %), depression (23.3 %), while 5.2 % responded to other problems which included lack of concentration, feeling agitated, and irritated due to over screen usage. These responses to the questions concerning physical and mental aspects of the health can be seen in Table 3.

A statistically significant positive correlation was found between the screen time usage with back ache (r=0.62), neck pain (r= 0.71), headache (r= 0.50), weight gain (r=0.52) and mental health (r= 0.40) respectively (Table 4). This study was conducted to determine the impact of increased usage of the screen on psychological and physical health during the COVID-19 pandemic among indian students as it has been observed that there was a dramatic shift in digital usage in the education system during the outbreak of the COVID-19 pandemic due to the closure of schools, colleges, and other educational institutions (De et al. 2020; Khan and Smith 2020). So in order to preserve the regularity of education, all education institutions have switched classes and all assignments work to the online mode which was responsible for increasing screen time during COVID 19 as compared to pre-COVID times which further led to various physical and psychological problems among students. This study has also found a significant increase in the time duration spent on-screen during COVID 19 as compared to pre-COVID which was in line with findings of some studies (Schmidt et al. 2020; Guo et al. 2021).

Table 3. Impact of over screen usage on Physical and Mental health

Variables	**Every time**	**Most of the time**	**Quite often**	**Rarely**	**Not at all**
How often do you feel a problem in your eyes while studying on-screen during COVID?					
N (%)	23 (10.95)	112 (53.33)	50 (23.80)	18 (8.57)	07 (3.33)
How often do you feel back pain while studying on-screen during COVID?					
N (%)	94 (44.76)	36 (17.14)	31 (14.76)	17 (8.09)	32 (15.23)
How often do you feel neck pain while studying on-screen during COVID?					
N (%)	115 (54.76)	46 (21.90)	25 (11.90)	16 (7.61)	08 (3.80)
How often do you feel headache while studying on-screen during COVID?					
N (%)	82 (39.04)	59 (28.09)	20 (9.52)	25 (11.90)	24 (11.42)
How often do you felt that your sleep quality has been affected due to increased screen time because of studying during COVID?					
N (%)	25 (11.90)	98 (46.66)	62 (29.52)	17 (8.09)	08 (3.80)
Variables	**Increased**		**Decreased**	**Same as before**	
Do you feel any change in your weight during COVID as compared to pre-COVID?					
N (%)	129 (61.42)		47 (22.38)	34 (16.19)	
Variables	**Yes**		**No**		
Do you think increased screen time for study affects your physical activity during COVID?					
N (%)	186 (88.57)		24 (11.42)		
Variables	**Backache**	**Neck pain**	**Eye problems**	**Headaches**	**Others**
Which problem do you face most while studying on-screen during COVID (You can respond to more than one option)?					
N (%)	62 (29.52)	133 (63.33)	124 (59.04)	118 (56.19)	04 (1.90)
Variables	**Anxiety**	**Depression**	**Loss of confidence**	**Panic disorder**	**Others**
If you think that your mental health is getting affected, then which problem you are facing due to over usage of screen for studying during COVID (You can respond to more than one option)?					
N (%)	93 (69.92)	31 (23.30)	65 (48.87)	33 (24..81)	07 (5.26)

The analysis of this study revealed a strong association between physical complaints which included backache and neck pain with overuse of screen for study purpose which was similar to the results found in other studies indicating that the use of computer/ laptops for more than 2 hours a day is a threshold for neck pain and more than 5 hours per day for lower back pain (Hakala et al. 2006; Torsheim et al. 2010). Another study has been done in this regard in which the reported time spent on screen i.e. computer/ laptops for educational purpose (17.9 ±12 hours per week) were associated with both chronic neck and back pain as most of the time digital academic studies required sitting position for longer duration which is responsible for causing muscles to stress in a particular position which further led to musculoskeletal related problems (Casas et al. 2016). It is a specific risk factor but not a sufficient or mandatory cause of physical health problems among students.

Further, more use of electronic devices has been considered a risk factor associated with the presence of migraine or other types of headaches. Xavier MK found the usage of the screen for more than 4 hours were directly associated with headache (Xavier et al. 2015). Singh and Balhara (2020) also suggested that it is the time to revisit the recommendations on Screen time for Children & Adolescents by WHO (Singh and Balhara 2020). The present study also found a significant association of headache with increased time spent on screen for studies due to which students tend to get

a very little time for recreational activities. This encourages them to maintain faulty body postures for a long time for study purposes that leads to overload on a visual system that triggers headache among students especially during the time spent on the screen (Oksanen et al. 2007; Smith et al. 2009).

The study showed a significant positive correlation between the increase in weight with increased time spent on the screen during COVID. Various studies support our findings in which they reported an association of overweight and obesity with screen time as it requires prolonged sitting for studying during the pandemic (Duncan et al. 2012; Stiglic and Viner 2018). One of the underlying reason could be the adoption of a sedentary lifestyle by the people in order to combat with this pandemic by maintaining social distancing due to which opportunities for physical activities were reduced with the closure of gyms, and parks especially in urban areas where they lived in a small apartment or likely they don't have access to safe outdoor space where they can maintain social distancing (Marsh et al. 2013; Rundle et al. 2020). However, on the contrary, in Germany, due to their increase in habitual Physical Activity, their overall Physical activity duration was found out to be more than they used to do earlier (Schmidt et al. 2020). Lesser Physical activity has affected the health-related Quality of life during COVID times as compared to before (Wunsch et al. 2021).

Recently, Kovacs et al. (2021) also found similar patterns where online Physical Education increased the odds of healthy levels of Physical activity and screen time in moderately affected European countries (Kovacs et al. 2021). Apart from this finding, our study also showed the impact of screen time on physical activity and sleep quality. Similar findings were reported by Guo et al. (2021) Most of the respondents reported that their sleep quality was affected. This could be due to the lack of physical activity in which they have stated that sleep quality among the Indian population was affected due to a decrease in physical activity during this pandemic (Sharma et al. 2020; Guo et al. 2021).

Table 4. Correlation between screen usage time and various parameters

Parameters	Correlation (R)	P-Value
Screen usage time during COVID and backache	0.622	0.00*
Screen usage time during COVID and neck pain	0.719	0.00*
Screen usage time during COVID and headache	0.503	0.00*
Screen usage time during COVID and Weight gain	0.524	0.00*
Screen usage time during COVID and mental health	0.406	0.00*

*= Correlation is significant at 0.01 level

COVID-19 is a crucial time for everyone but for students, it is difficult to cope up with this time as they are worried about their future, exams, classes, etc. To maintain the continuity of their education they need to spend more time on screen as compared to pre-COVID-19 for classes, assignments, etc. which leads to lower psychological well-being. More usage of the screen is likely to develop poor emotion regulation, lower self-control, less socially active in making friends, and low curiosity in other things (Twenge and Campbell 2018). Also, Parents do play a major role during this juncture of time. It has been seen that Mother, who usually is the closest to child, have higher screen time then child will also have the higher screen time. As technology is not confined to the educated or technology geeks, preschool children usage was found to be higher than school going children. Various studies depicted the trend of Increased screen time affecting paediatric patients and different age groups simultaneously. (Ishtiaq et al. 2021; Sultana et al. 2021; Lim 2021).

The present study has found a significant positive correlation of screen time during COVID-19 with mental health. Various studies have also found the diagnosis of depression, anxiety, behavioural problem, poor mental health and various other mental health illness among children and adolescents with more screen time in comparison with the low users of the screen. However, the ones having known mental ailments were affected worse than normal ones. (Allen and Vella 2015; Babic et al. 2017; Pandya and Lodha 2021; Neophytou et al. 2021; Henson et al. 2021). As continuously growing concerned on online education during pandemic, students are not able to adapt themselves in the environment of online education and therefore the basic expectation of the students from the online education curriculum was not fulfilled, ultimately leading to mental health ailments and negativity about themselves. By virtue of the observation, the present study depicts general health care issues among the students who were taking classes online during this pandemic.

Limitations and future scope of the study: Some limitations of this study include: Self-reported data from selected participants and relying on other networks for sharing the Questionnaire. The age group is not specified as it involves both adolescents and adults group. There is a scope of further study to identify the impact of over usage of screen on health of individuals of specific population i.e., either adolescents or adults' group and also on the larger sample size to get more reliable and accurate results.

CONCLUSION

The findings of the present study concluded that the increased time spends on the screen has a great impact on physical and mental health. Among the physical health problems, major issues faced by students are mainly backache, neck pain, and headache. Whereas, anxiety is the major mental health issue reported by students. With this study, we can imply that proper preventive measures should be incorporated into the daily schedules to prevent students from physical and mental ailments. Also, the college authorities should plan the schedule of teaching and assignments in such a way that it should be compatible with the students

Conflict of Interest: Authors declare no conflict of interests to disclose.

Data Availability Statement: The database generated and /or analysed during the current study are not publicly available due to privacy, but are available from the corresponding author on reasonable request.

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