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Cross sectional study of screen time on sleep and academic performance in children and adolescents from 6 months to 21 years before and during Covid

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Abstract

Objective: The objective of the study is to analyse the effect of screen time on various aspects like physical health and wellbeing of person and academic performance and sleep before covid and during lock down.

Methods: Prospective descriptive study conducted among 557 eligible participants aged 5 to 21 years through online survey and link was shared to the public. Self-reporting questionnaire consisting of: Socio-demographic information, Validated questionnaire including type of device used, duration, timing and content of the digital media, problems faced after using device and how it affects sleep and academic performance.

Results: The median age of included students was 18 years and 385 (69.1%) girls and 172 (30.9%) boys. 39.9 % of people contribute >4hours/day on mobile phone and 35.8% contribute 35.8% on television.48.3% increase screen time on phone gaming and 16.2% contributed their time on outdoor activities during lockdown. Contribution time for entertainment has increased from 18 to 38% and for academics 9% to 56.7% before and during lockdown. 37% of participants complained of headache following usage of gadgets for >4 hours and 27% complained of neck and back pain.

Conclusions: With a generation being raised to depend upon screens for a connection to the outside world, snooping them away from phones, computers, and televisions can seem an ominous task. Our study indicate that screen time is related to decreased activity, obesity, headache, neck pain, vision problem and suggesting that not only timing even duration of screen time is important.

Keywords: Screen, Physical Activity, Academics, Gadgets, Sleep.

Introduction

The beginnings of mass media and mass communication goes back to 560 years to the "print revolution" that occurred in Europe in the fifteenth century.[1] As we progressed through the centuries, mass communication evolved from a mechanical process to electronic transmission, which paved the way for the digitized world of today. With continued advancement in technology, resulting in an increase in the ownership and use of screen viewing devices. Screens not only entertain but teach and keep children occupied too much use may also lead to problems.

According to the National Sleep Foundation[2] 96% of teenagers between the age of 15 and 17, bring some kind of technology into the bedroom and gets up to nine hours of screen time per day. The cause could be working mothers and their work stress negatively impacting the children and hence they resort to screens in early childhood .According to initial studies published nearly a decade ago, almost half of the children have regular screen time exposure by 3 months of age and this number rises to 90% by 24 months.[3]

Excess screen time exposure in early childhood is associated with harmful effects such as increased sedentary behavior, obesity, poor sleeping habits, and developmental abnormalities. To prevent these harmful effect "Indian Academy Of Pediatric released guidelines recommending no more than one hour of daily screen time for children under the age of 5"[4,5]

As per WHO's recommendation: Infants younger than 1 should never be in front of screens. Kids ages 2 to 4, the international health agency said, should have no more than an hour each day of sedentary screen time.[6]

Musculoskeletal ailments have been ranked tenth according to WHO .Greater screen time are not only linked with the Physical complaints like backache, neck pain headache amid adolescents according to many studies they also cause continuous stress on muscles and lack of convalescence ultimately leads to change in muscle activity.[13,14,15,16]

The pandemic has hampered all our lives in many aspects. It has slowed progress in various spheres and made social contact harmful to a certain extent. [7]It has taken a heavy toll on adults as well as teenagers. Reduced social interaction and shifting of schools to online platform has mandated the use of digital screens by people almost all day long.

There is no much studies pertaining to the screen time usage by children in India though quarter of world's children reside here. Given the rising epidemiology of child obesity- and lifestyle-related disorders in India, it is therefore important to identify its risk factors. Hence, our study aimed to investigate the form of screen time use and its effect on physical, mental health, academic and sleep before and during pandemic.

Aim and Objective

The aim is to study average screen time in children and adolescent and the effect of screen time on academic performance, health and sleep.

Materials and Methods

This cross-sectional study was conducted using a survey questionnaire after approval from the ethical committee. In total, 552 children (5– 21 years of age) participated in the survey during 2019–2020 .The offline survey was changed to digital due to the pandemic. The questionnaire consisted of five sections: (I) details of the participant's age, gender, living location, type of school, educational level ; (II) Question on device used(III) time spent on each activity; (IV) question on screen time before bed(V) Academic performance (VI) Effect on

physical health. The questions were closed-ended with some single responses and multiple response options.

Screen time (ST) is the amount of time spent on devices such as a smartphone, computer, television, or video game. There are screen time questionnaire which was used to quantify the use of such screen-based devices before covid and during this pandemic. All questions were required to be answered before submission.

The link for the google form was sent to the potential study participants using social media (WhatsApp). The response was automatically captured and entered in MS EXCEL 365 for analysis. The collected data were analysed with IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp. To describe about the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and the mean & S.D was used for continuous variables. To find the significance in categorical data Chi-Square test was used. In the above statistical tools the probability value .059(p=0.05) is considered as significant level.

Results

Demographic Features

In our study 557 filled questionnaires were received from the participants of adolescent age group which included 385 (69.1%) girls and 172 (30.9%) boys. Among the participants,

377 (67.7%) were from nuclear family and 172 (30.9%) from joint family. The mean age of initiation of gadget use is 6 years. The demographic features of the participants in our study are demonstrated in Table 1.

Demographic variable	Category	Frequency	Percentage (%)
Age	5-10 years	10	1.79
	10-15 years	179	32.1
	15-19 years	368	66.0
Gender	Boys	172	30.9
	Girls	385	69.1
Type of family	Nuclear family	377	67.7
	Joint family	172	30.9
	Extended family	8	1.4

Table 1: Demographic Details of Participants

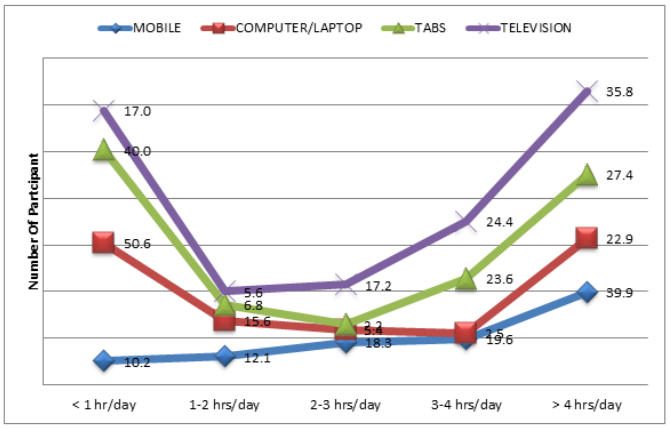

Figure 1: Time spent on different gadgets.

According to the study it has been observed that there is increase screen time usage.39.9 % of people contributes >4hours/day on mobile phone and 35.8% contribute 35.8% on television. As shown in Fig 1 there is upward trend usage of gadgets.

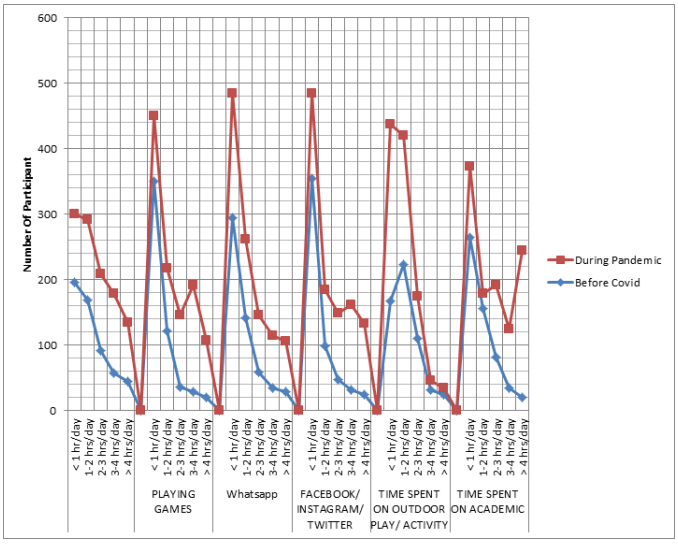

Figure 2: Amount of time spent by participants on each activity before and during lockdown

Change in social network usage before and during lockdown

Fig 2 shows that 21% of population contributed more than 2 hours of their time on whatsapp and 18.5% on Facebook/Instagram/twitter. Showing statistical significance before covid to 43.2% used Facebook/Instagram as a source of communication and for recreation and 44.3% used whatsapp as a source of communication during lockdown.

ENTERTAINMENT		Before Covid	During Pandemic	Chi(df=4)	Pvalue
	< 1 hr/day	196	104	78.3	< .00001.
	1-2 hrs/day	169	123		
	2-3 hrs/day	91	118		
	3-4 hrs/day	57	122		
	> 4 hrs/day	44	90		
PLAYING GAMES					
	< 1 hr/day	350	101	314	< .00001
	1-2 hrs/day	122	96		
	2-3 hrs/day	36	110		
	3-4 hrs/day	29	163		
	> 4 hrs/day	20	87		
Whatsapp		Before Covid	During Pandemic		
	< 1 hr/day	295	190	73.5	< .00001
	1-2 hrs/day	142	120		
	2-3 hrs/day	58	88		
	3-4 hrs/day	34	81		
	> 4 hrs/day	28	78		
FACEBOOK/ INSTAGRAM/ TWITTER					
	< 1 hr/day	355	130	239	< .00001
	1-2 hrs/day	99	86		
	2-3 hrs/day	47	102		
	3-4 hrs/day	31	131		
	> 4 hrs/day	25	108		
TIME SPENT ON OUTDOOR PLAY/ ACTIVITY					
	< 1 hr/day	168	269	48.4	<

Table 2: Corelation between Screen time Usage and various parameters.

15.3% used to spend >2 hours of time on playing games on phone and 23.3% on outdoor play activity before covid to 16.2% contributed their time on outdoor activities and 64.6% on games on phone indoor during lockdown.

Table 3: Association between Entertainment and Academic Before and During Covid

Before Covid Screen Time Usage For More Than 3 Hours		During Lockdown Screen Time Usage For More Than 3 Hours	
Entertainment	Academic	Entertainment	Academic
101	54	212	316
Total -557	557	557	557
Z Score=4.0688		Z Score=6.2404	
P<0.00001		P< 0.00001	

There is a significant difference in proportion for entertainment and academic before and during lockdown. The contribution time for entertainment has increased from 18 to 38% and for academics 9% to 56.7% before and during lockdown.

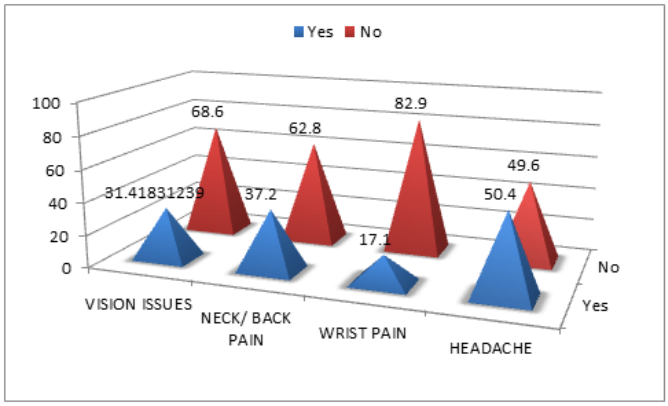

Fig 3: Problems faced with gadgets usage before and during lockdown 37% of participants complained of headache following usage of gadgets for >4 hours and 27% complained of neck and back pain. 23% had vision issues.

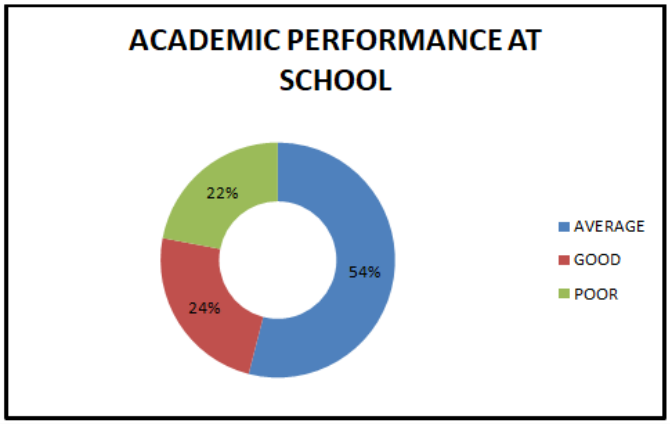

Fig 4: Effect of Screen Time on Academic Performance.

Screen Time Vs Academic Performance

As outlined in Fig 4, 300 children and adolescents had average school performance and 122 (22%) had poor academic performance.

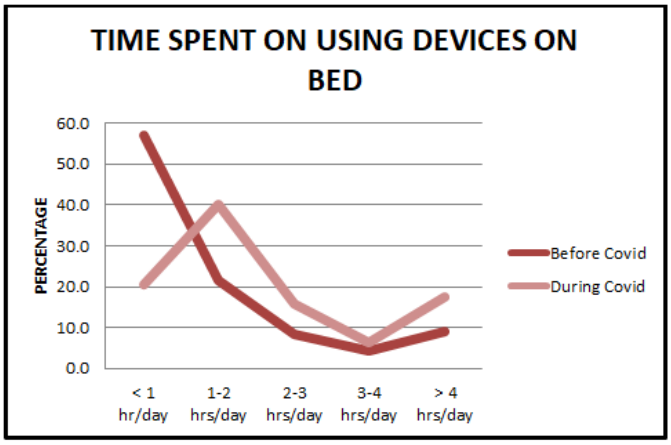

Fig 5: Time Spent On Using Devices on Bed

As shown in Figure 5, 4.5% used screen for >4 hr before sleep to 30.3% of students reported inadequate sleep during COVID. Stratified by grades, the highest proportion of students with inadequate sleep was reported by high school students (66%), while the lowest prevalence was reported by lower grades of primary school students (1.79%). Generally, the proportion of students who reported increased sleep duration decreased with increased grades, whereas inverse trend was observed for reduced sleeping time.

Discussion

The present study is an attempt to assess the impact of screen time before pandemic and to how covid imposed lockdown had effect on Physical health and digital media exposure time. It was observed that there was significant decrease in physical activity more frequently among students in higher grades.

In the United States, a national random sample of 40,337 children 2-17 years of age was assessed and it was found that moderate use of screens (4 hours/day) was associated with lower psychological well-being, including less curiosity, lower self-control, more distractibility, difficulties in making friends, less emotional stability, being more difficult to care for, and inability to finish tasks.[11].

Home-based digital learning is no longer a supplementary activity but instead a necessity in everyday learning. Moreover, many schools request their parents to increase their children's access to screen-based devices to perform home-based learning programs.

A strong association between physical complaints and screen overuse was found similar to our study, 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 .[14,16,17,9]

Palm et al.[18] analyzed associations between computer use and health problems in students (16 and 18 yr old) and they found that headache was by 51% and 24%, of the females and males, respectively. Watching television more than 3 h reported having a headache significantly more frequently in comparison with those watching television less than 2 h ($P < 0.01$).

Increased digital screen time, near work, and limited outdoor activities were found to be associated with the onset and progression of myopia and other issues related to gadget usage, and could potentially be aggravated during and beyond the COVID-19 pandemic outbreak period. [12].

Research has delineated negative impacts of increased screen time on physical and mental health. Problematic screen time is characterized by obsessive, excessive, compulsive, impulsive and hasty use of digital devices [10]

Given that adolescents usually place elevated value on peer interactions [19], there is a far greater need to maintain social connections despite the COVID-19 lockdown. They are far more susceptible to peer

influence and peer expectation, which often heightens their risk taking behaviours however these behaviours are only exacerbated in stressful times. [20]

It was estimated from this study that there was sleep bedtime delay with each additional hour of screen time in bedroom which was associated with day-time tiredness or sleepiness.[21]

While the world staggers from the global impact of COVID-19, governments are adjusting to allow everyday life to continue, such as the closure of schools with the education being delivered through online platforms. In this regard, digital technology has been immensely beneficial in cushioning the disruption to school education, but it is crucial to be apprised of the impact of increasing dependence on digital devices.

While school closures may be short-lived, increased access to, adoption of, and dependence on digital devices could have a long-term negative impact on childhood development. The results of this study showed compulsive internet use and increased social media use had a strong impact on children and adolescents. The gaming addiction was reported to be increased during the pandemic are likely to have a negative effect on their mental health and even quality of sleep.

Limitations

First, the present study is a cross–sectional design with a small sample size making it onerous for drawing any conclusions on the association. Second, using final grades to index academic achievement with objective information makes it difficult to compare with standardized tests used by others authors. Third, didn't measure screen time usage association with mental health. Finally, data obtained was by self-reported questionnaire through online survey which may not provide an accurate overall representation of these important variables.

Conclusion

Peer interaction has an elevated value among adolescent there is a far greater need to maintain social connections despite the COVID-19 lockdown. They are more susceptible to peer influence and peer expectation, which often enhances their risk taking behaviours however they are only exacerbated in stressful times.

The results from this study showed that adolescents increased their use of social media contact across different parts of the globe, with many teens reporting use of social media (Instagram, Facebook, Snapchat) to stay in touch with their peers. This could likely help young people and adolescents stay connected and cope with the pandemic.

Contribution

This article topic was suggested and given by Dr. Prema and she guided me in editing the completed article and helped me in analysis of the data.

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