

Association of Digital Screen Time with Quality Of Sleep And Headache In Children—A Cross Sectional Study

Aswin L¹, Chandru Baskar V², Jakanattane V³, Mathivanan M⁴

¹(Paediatrics, Aarupadai Veedu Medical College, Puducherry, India)

²(Paediatrics, Aarupadai Veedu Medical College, Puducherry, India)

³(Paediatrics, Aarupadai Veedu Medical College, Puducherry, India)

⁴(Paediatrics, Aarupadai Veedu Medical College, Puducherry, India)

Abstract:

Background - Modern culture is dominated by digital media and screens in all of their forms, which has an impact on both children's and adults' lives. The excessive use of screens have been associated with behavioural problems, obesity, sleep disorders, and impaired cognitive growth in some individuals. While a few earlier studies have suggested that sleep issues are becoming more prevalent in children, very few studies have looked at the relationship between children's screen time and headache and sleep quality. The current study was done in order to determine whether there is a connection between more screen time and various symptoms in children.

Materials and Method – We conducted a cross-sectional study in the paediatric department of the AVMC. The study comprised the paediatric population of children between the ages of 3 to 12 who were attending an outpatient clinic at the time. Children who presented with CNS- and eye-related symptoms were employed in the data collection, which also included screen-related questionnaires and socio-demographic data.

Results - A total of 225 children participated in this survey with a response rate of 100 %. The mean age of the children was 5.85 ± 2 . More than half children were females 51.6%, and male children were 48.4%. The association of screen time was found to be non-significant with the parameters such as family types and itching of eye. The other parameters such as usage of TV in bedroom (p -value <0.001), usage of mobile phone at bed time (p -value <0.001), headache (p -value <0.001), complaint of eye pain (p -value 0.037) was found to have significant association with the screen time recorded in the study population.

Conclusion- Children who spend more time on screens get headaches, eye discomfort that can evolve into migraines, and refractive error. There was no correlation between screen use and sleep duration in children. Therefore, extensive research is required to determine other effects of children with increased screen usage.

Key word :Digital screen time, headache, Eye pain, Physical activity.

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I. Introduction

The widespread use of portable electronic devices and the normalization of screen media devices in the bedroom is accompanied by the high prevalence of insufficient sleep, affecting majority of children, and 30% of toddlers, preschoolers, and school-age children¹. Three-fourths of the children and adolescents report the presence of at least one screen-media device in their bedroom, with roughly 60% reporting regular use of these devices during the hour before bedtime. Parents, educators, and clinicians express concern about whether excessive use of screen media among young people affects sleep and wellbeing².

Children comprise one of the largest consumer groups of technology. A recent study by the Massachusetts Aggression Reduction Centre found that by fifth grade, 40% of children have cell phones³. Parents have reported that the purpose for a phone at this age is for security reasons or for keeping in touch with the family, but many parents gift their children a phone to keep in contact with friends from school⁴.

A series of surveys distributed from 2018 and 2021 demonstrated a dramatic 10-fold increase in children access to mobile devices. The past 2 decades have introduced portable, individualized technology (cell phones and computers) to our society, increasing our reliance on these products for day-to-day tasks⁵. It is difficult at the present time to predict whether this shift in technology use will have beneficial or harmful influences on human health.

The corona virus disease 2019 (COVID-19) pandemic occurred at a time of global digitalization, characterized by quick connection of people and information anywhere in the world⁶. Children and adolescents had lower incidence and mortality rates of COVID-19 than adults. However, they had relevant adverse psychological and behavioural effects, especially among school-age ones, due to home confinement and other

infection control measures, such as social distancing, and closure of schools and shared public spaces⁷. This led them, as well as adults, to spend more time at home and with major use of technological devices.

Headache represents the most common neurologic disorder in the general population including children and is increasingly being recognized as a major source of morbidity in youth related to missed school days and activities.

Evaluation and diagnosis of paediatric headache starts with a thorough headache and medical history, family and social history, and identification of risk factors⁸. A thorough physical and neurologic exam is important, with close attention to features that could suggest secondary headache pathology. While most headaches are due to primary headache disorders, in a small population, they can be an indication of a potentially life-threatening neurologic condition⁹.

Common thought is that increased frequency and severity of headache may reflect secondary pathology. Headache location, particularly occipital headache alone, does not necessarily signify secondary intracranial pathology. The correct advice and treatment require consideration of a wide differential diagnosis between primary and secondary headaches, and also of the different types of primary headache. It has been demonstrated that behavioural intervention is highly effective, especially in the treatment of paediatric headache, and can enhance or replace pharmacotherapy, with the advantage of eliminating dangerous side effects and or reducing costs¹⁰.

While a few previous studies have shown that sleep disorders are increasing in paediatric age group, there are very few studies explored the association of digital screen time with quality of sleep and headache in children. Hence the present study was planned, to determine the association of various symptoms in children with increased screen time.

II. Material And Methods

Materials and Methods

Methodology

Study design: cross sectional study

Study setting: AVMC pediatric department

Study participants

Inclusion criteria

Paediatric population of age group 3 - 12 years who are attending outpatient clinic during the study period were included in the study.

Exclusion criteria

- Patients whose age group are not within the inclusion range
- Children with visual impairment are excluded from the study
- Children attending online classes used to calculate the incidence of screen time. The data statistical analysis was made using the Statistical Package for Social Sciences software (SPSS), version 27.0. All variables were numeric or nominal and were represented
- Children with mental retardation

Study procedure

A cross sectional study was conducted for 3 months from IEC approval date in paediatrics outpatient department, AVMC by taking informed consent directly from patient representatives who attended the clinic regarding their screen viewing time with the prior approval from the Institutional Ethical Committee. Children presenting with eye related symptoms and CNS related symptoms was referred to particular department for further evaluation.

Statistical method

Descriptive statistics was used to calculate the incidence of screen view time. Categorical variables were summarized as frequency and percentages. Continuous variables were summarized as mean \pm S.D. Chi-Square test or Fisher's exact test was used to compare the categorical variables. Results with a *P* value of <0.05 were considered statistically significant. Statistical analysis was made using Statistical Package for Social Sciences software (SPSS), version 28.

III. Result

Demographic characteristics

A total of 225 children participated in this survey with a response rate of 100 %. The mean age of the children was 5.85 ± 2.80 Standard deviation years, with a minimum age of 3 and a maximum age of 12 years. More than half (51.6%) were females, and male students (48.4%). The gender differences were highly significant with the *p* value of <0.001 . Socio-demographic characteristics are presented in Table 1

Table 1 - Socio-demographic characteristics associated with excess screen viewing time in 225 children included in the study

	No. of patients	Percentage
Gender distribution		
Male	109	48.4%
Female	116	51.6%
Educational Status		
Un educated	15	6.7%
Elementary level	34	15.1%
High School	61	27.1%
Higher Sec	32	14.2%
Degree	75	33.3%
Post Graduate	8	3.6%
Type of Family		
Nuclear	173	76.9%
Joint	52	23.1%
Father's Occupational Status		
Unemployed	1	0.4%
Self Employed	52	23.1%
Farm Worker	2	0.9%
Labour	89	39.6%
Others	81	36.0%
Place of Residence		
Urban	40	17.8%
Rural	185	82.2%

Screen time of the parents and children

Excessive use of electronic devices was noted in all parents in weekends than weekdays. Nearly 109 parents spend >2hr of time in television for entertainment purposes. The usage of computer is less compared to television and mobile phone. Most of the parents spend time on screen for entertainment purposes followed by keep them self-occupied.

Table 2 – Screen time of parents and children’s during week days and weekends

During week days (Parents)								
	TV			Mobile			Computer	
	<1hr	1hr -2 hr	>2hr	<1hr	1hr -2 hr	>2hr	1-2 hr	>2hr
1-for education	3	9	20	3	16	52	8	26
2-for entertainment	0	57	109	10	10	71	1	2
3-to keep yourself occupied	0	4	7	2	40	34	30	16
4-others	0	0	1	0	2	6	2	0
During weekends (Parents)								
	TV		Mobile			Computer		
	1 -2 hr	>2hr	<1hr	1-2 hr	>2hr	1 -2 hr	>2hr	
1-for education	6	4	4	1	18	0	21	
2-for entertainment	40	89	4	39	71	37	8	
3-to keep yourself occupied	0	6	0	0	37	0	0	
4-others	0	1	0	0	3	0	0	
During week days (Children)								
	TV			Mobile			Computer	
	<1hr	1hr -2 hr	>2hr	<1hr	1hr -2 hr	>2hr	1hr -2 hr	>2hr
1-for education	0	10	18		26	45	4	8
2-for entertainment	2	50	103	2	51	86	23	43

3-to keep yourself occupied	0	5	10	0	6	4	0	4
4-others	0	0	1	0	0	5	0	4
During weekends (Children)								
	TV		Mobile		Computer			
	1hr -2 hr	>2hr	1hr -2 hr	>2hr	1hr -2 hr	>2hr		
1-for education	6	14	10	11	2			
2-for entertainment	2	83	15	112	16	45		
3-to keep yourself occupied	1	6	0	10	0	1		
4-others	0	5	0	1	2	4		

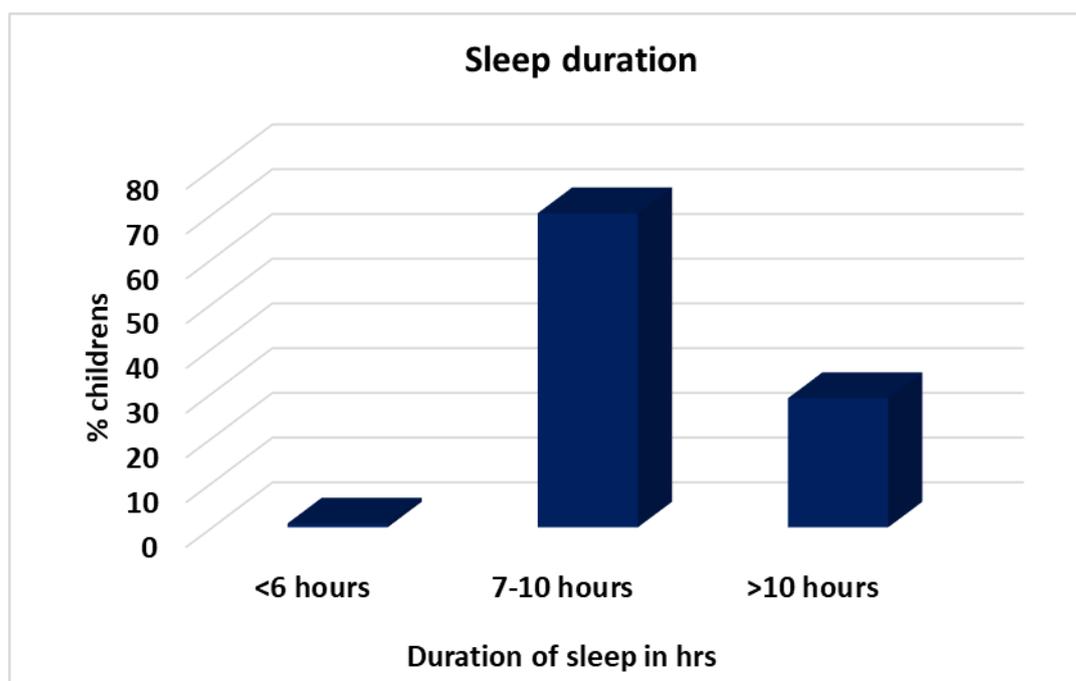


Figure 1 – Duration of sleep in hours

Table 4 – Association of parameters with screen time

		Screen time			Chi-square value	P value
		<1hr	1-2 hr	>2hr		
Gender	Male	59	35	15	13.535	<0.001*
	Female	35	53	28		
Age	<5 years	45	26	27	32.271	<0.001*
	5-10 years	56	27	19		
	>10 years	0	19	6		
Family	Nuclear	73	56	44	1.06	0.589
	Joint	25	13	14		
TV in bedroom	Yes	21	64	8	34.494	<0.001*
	No	25	49	58		
Mobile phone at bedtime	Yes	13	53	5	23.006	<0.001*
	No	38	66	50		

Head ache	Yes	10	28	5	24.006	<0.001*
	No	46	58	78		
Complained of eye pain	Yes	6	20	5	6.583	0.037*
	No	36	83	75		
Itching of eyes	Yes	5	10	3	1.514	0.469
	No	48	96	63		
Physical activity	Yes	52	57	59	7.154	0.028*
	No	17	10	30		

During week days 103 children spend more than 2 hrs for watching television. 50 children spend 1- 2 hrs in television for entertainment purpose. Very less number of children (n=14) use the screen time for education. The mobile usage seems to be high in children compared to television and computer. In our observation 54.7% parents have shown restrictions on the amount of time child can be in front of a screen. Moreover, only 43.6% of the parents have shown restrictions on the content of the screen time. 81.3% of the children do not interact with an electronic devices on after waking up. In our study, 40.9% have TV in their bedroom. 69.3% of the children use mobile phone at bedtime. In our study 19.1% of the children complained of headache. 13.8% of the children had the complaint of eye pain. In the case of sleep duration 158 students had 7 – 10 hrs of sleep. Only 2 children had less than 8 hrs of sleep. However, there is no significant correlation was observed between sleep duration and screen time with the p value of 0.215.

The association of evaluated parameters with the screen time recorded from the study population was given in table 4. The association was significant between the gender distribution and screen time with the p-value of <0.001 (chi square value 13.535). Similarly, significant association was found between age distribution and screen time of the study population with the p-value of <0.001 (chi square value of 32.271). The association of screen time was found to be non-significant with the parameters such as family types (chi-square value of 1.06) and itching of eyes (chi-square value of 1.514) with the p-value of 0.589 and 0.469, respectively. The other parameters such as usage of TV in bedroom (p-value <0.001), usage of mobile phone at bed time (p-value <0.001), headache (p-value <0.001), complaint of eye pain (p-value 0.037) was found to have significant association with the screen time recorded in the study population. The chi-square values were calculated as 34.494, 23.006, 24.006 and 6.583 for the parameters such as usage of TV in bedroom, usage of mobile phone at bed time, headache, and complaint of eye pain, respectively.

IV. Discussion

Over recent years, screen time have become a more complicated concept, with an ever-expanding variety of electronic media devices available throughout the world. Television remains the predominant type of screen-based activity among children. However, computer use, video games and ownership of devices, such as tablets and smart phones, are occurred to be increasingly seen in young age.

Screen time, in particular, television viewing, have been negatively associated with the development of physical and cognitive abilities, and positively associated with obesity, sleep problems, depression and anxiety^{7,8}. The physiological mechanisms that underlie the adverse health outcomes related to screen time and the relative contributions of different types of screen and media content to specific health outcomes are unclear. Increased digital device use for professional and social causes is considered as normal these days. Studies have documented that odds of an unhealthy lifestyle and subjective complaints increase with the use of electronic media beyond 1 h. Moreover, the presence of TV in the bedroom highly influenced by the screen time. The screen time was higher in the children who have TV in their bedroom. The observations were statistically significant with the p value of <0.001.

Recent studies have explored that sedentary behaviors among 10–12-year-old children was nearly 8 h per day and they spent more than 2 h per day in front of computer or TV screens. Hoffmann et al. , In our study we found highly significant association between physical activity and screen viewing time with the p value of 0.028.

Much like other habits, screen viewing habits that begin in infancy persist into childhood. Paediatric societies all over the world recommend limiting screen use among preschool children and emphasize on consistent parental mediation to offset the harmful effects of screen. However, adherence to these guidelines is poor and shows a diminishing trend. This study builds on previous research, evaluating the determinants of excess screen use and inconsistent parental supervision of screen viewing and its association with headache among young children in the Indian context. In the present study, results showed that girls had higher screen time than boys. However, the differences were not found to be statistically significant. The results of the present study differ from those of a study conducted in New Delhi, India, which found that boys have longer SVT than

girls, with boys having 1.36 times greater odds than girls¹¹. According to a study from Democratic Republic of China, the prevalence of excessive screen time was 14.7% in boys and 8.9% in girls¹².

We found children who used mobile other than a computer were more likely to have excess screen time. Also, children who do not have a structured screen use plan and a set time limit were three to four times more likely to have excess screen time. The mean age of the children was 5.85 ± 2.80 standard deviation years, with a minimum age of 3 and a maximum age of 12 years. A recently published study from Lithuania also found a similar significant association between mealtime screen use and excess screen use among children aged 3–5 years¹³.

Some individuals reported that they suffered a variety of complaints, including headaches and migraines, fatigue, skin itches, and sensations of warmth. In our study 19.1% of the children complained of headache. 13.8% of the children had the complaint of eye pain.

For example, Oftedal et al sent a questionnaire to 12,000 Swedes and 5000 Norwegians children and found that longer calls and a higher number of calls were associated with a higher prevalence of warmth behind, around, or on the ear and with headaches and fatigue¹⁴.

However, in provocation studies, a causal relation between radiation frequency exposure and the above symptoms have not been convincingly demonstrated, suggesting that psychological factors, such as the conscious expectation of effect, may play a role in the relationship between mobile usage and health symptoms.

In addition, some studies also argued that a higher prevalence of health symptoms observed in mobile users could be due to an increasing number of people with these symptoms considering themselves “electromagnetically hypersensitive”.

According to Harvard Health, screens and bright lights can trigger migraines in children who are susceptible. However, too much time staring at a phone, iPad, or computer can trigger tension headaches or headaches caused by eye fatigue, as well.

Too much screen time may result in what’s known as digital eye strain, causing symptoms like tired, itching, or burning eyes. Eye strain has the potential to result in headaches centred around the eyes and temporal region. Without good lighting, kids may look at screens while squinting, and prolonged squinting may tire the muscles and lead to a tension headache. Improper posture while viewing screens may also put a strain on the neck and back, resulting in headaches.

V. Conclusion

Children with increased screen time develop complaints like headache, eye irritation that may progress to migraine disorder and refractive error. Sleep duration in children with increased screen time had no significance. Hence larger study have to be conducted to identify other impacts in children with increased screen time.

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