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Original Research Article

Assessment of Pattern of Usage of Digital Screen and Associated Health Problems among Children ≤ 15 Years during COVID-19 Pandemic

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Abstract

Background: The covid-19 pandemic came with the lockdown which enforced people stay at home. During COVID-19, screen time increase significantly for the psychological needs and social requirements. Excessive ST is associated with sedentary behavior in children and teenagers and contribute to the development of non-communicable diseases.

Objectives: 1.To assess the pattern of digital screen time
2. To assess health problems associated with screen time.

Methodology: A cross-sectional study was conducted for one year among the children between age group 5-15 years in a tertiary level of health care centre. Sample size calculated was 278. Those attending OPD/IPD and gave consent were included in the study.

Results & Conclusion: Independent variables like gender, types of family, education of the parents, types of residence and family income is significantly associated with the screening time. Male and female distribution was 61.2% and 38.8%. Significant large difference for the screen time was observed between pre- covid-19 (mean= 13, SD= 5.7) and during covid-19(mean= 20.6, SD=7.5). Health problems were significantly increased during Covid-19 as compared to pre-covid era among children due to excessive screen time.

Keywords: Digital Screen, Screen Time, Health Problems, Children, COVID-19, Pandemic.

Introduction

The covid-19 pandemic came with the lockdown which enforced people stay at home. All routine activities like schooling, offline education, shopping, outdoor

working, meeting, leisure activities and social events suddenly restricted by governments. Work pattern shifted from offline to online mode during the pandemic. This shifts prolonged screen time among every age group of individuals and had affected physical and mental health. [1]

During COVID-19, screen time increases to a significant level for the psychological needs and social requirements.[2,3]

Screen time is defined as the amount of time spent using a device with a screen such as a smartphone, computer, television, or video game console.[4]

ST is a key component of contemporary life for our children, the so-called "digital natives." The increased use of screens by youngsters has concerned parents, educators, and legislators alike over the past few decades. The proportion of the organization for economic co-operation and development (OECD) children with access to the internet and various digital gadgets has steadily increased. Across-national trends show that younger children are increasingly interacting with digital technologies, and many preschoolers are familiar with digital devices before books. TikTok, Instagram, Snapchat, and WhatsApp are popular among kids who share personal information and user-generated content. The digital world allows children to express themselves, learn and socialize with their peers. Watching age-appropriate, high-quality TV may also have cognitive benefits. Unsupervised use of digital tools poses risks to children's health and well-being.[5]

ST has been linked to obesity, either due to increased caloric intake, reduced time for physical activity, or a decline in metabolic rate. Excessive screen use has been shown to negatively impact irritability, mood, cognitive, and socio-emotional development, leading to poor academic attainment.[6] Excessive ST is associated with sedentary behavior in children and teenagers. Excessive ST may contribute to the development of non-communicable diseases (NCDs).[7] And thus this study is conducted for the assessment of pattern and effect of digital screen time on the health of children during covid-19 pandemic.

Objectives:

1. To assess the pattern of digital screen time.
2. To assess health problems associated with screen time.

Material and Methods

Study Area: Department of Paediatrics, Vivekananda Polyclinic and Institute of Medical
Sciences, Lucknow

Study design: Cross-Sectional Comparative Study

Study duration: 12 months (November 2020 to October 2021)

Sample size: Minimum 276 sample size was calculated by applying the formula

$$N = Z^2_{(1-\alpha/2)}\, pq/d^2$$

Where: **N** = Sample size ; $Z_{1-\alpha/2}$ = two tailed alpha error (**$Z_{1-\alpha/2}$** = 1.96 at 5% alpha error); **P** = Population proportion; **d** = Precision; p = 23.5% (0.235)[population of children below < 15 years in Lucknow (U.P. India) -NFHS-5] [8]; q = 1-p; d= 5% (0.05).

$$N = (1.96)^2 * 0.235\,(1- 0.235)/(0.05)^2$$
$$N = 276.249 \approx 276$$

Inclusion criteria: Children of 5-15 years of age attending OPD/IPD in the paediatric of VPIMS Lucknow, whose parents gave consent.

Exclusion criteria: Those were not willing to participate.

Statistical Analysis: Data was analyzed by using Microsoft excel & Epi-info (7.5.2) and appropriate test of significance was applied where necessary.

Results

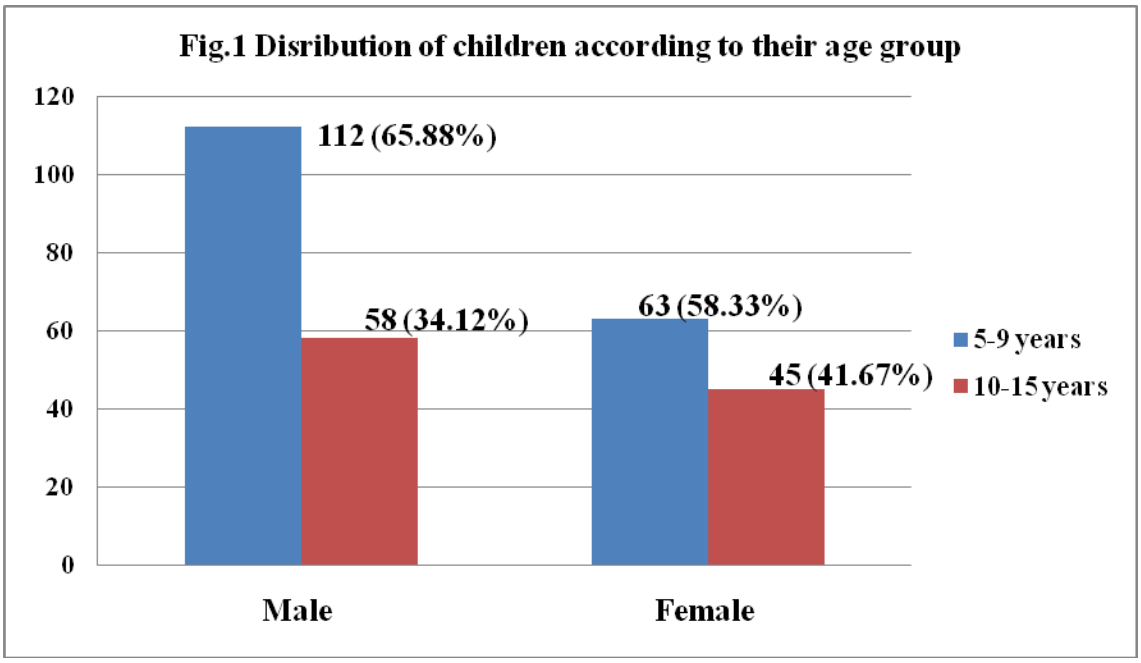

Figure 1: Distribution of children according to their age group

For the children of age group 5-9 years, Mean age = 6.92, SD =1.4119 and for the children of age group 10-15 years, Mean age 11.85, SD =1.504. Male and female contributes in this study was 61.2% and 38.8% respectively.

Table 1: Association of demographic profile of parents and screening time of their children

S. N.	Demographic profile		1-7 hrs	8-14 hrs	15-21 hrs	>21 hrs	Chi-square and P value
1.	**Age groups**	5-9 years(175)	7	29	84	55	$X^2 = 1.79$
		10-15 years(103)	5	19	41	38	P = 0.61
2.	**Sex**	Male(170)	18	26	70	56	$X^2 = 61.45$
		Female (108)	42	37	16	13	P < 0.00001* (<0.05)
3.	**Family**	Nuclear (94)	4	5	48	37	$X^2 = 14.398$
		Joint (184)	8	43	77	56	P = 0.0024* (<0.05)
4.	**Education of Father**	Illiterate (19)	9	6	3	1	$X^2 = 135.464$
		Up-to Senior secondary (138)	2	20	45	71	P < 0.00001* (<0.05)
		Graduate and above (121)	1	22	77	21	

5.	**Education of Mother**	Illiterate (12)	7	3	1	1	X^2 =110.223 P < 0.00001* (<0.05)
		Up-to Senior secondary (180)	4	18	89	69	
		Graduate and above (86)	1	27	35	23	
6.	**Residential area/locality**	Rural (99)	9	31	38	21	X^2 =34.057 P < 0.00001* (<0.05)
		Urban (179)	3	17	87	72	
7.	**Family Income (INR-monthly)**	<20000	9	8	3	2	X^2 = 107.707 P<0.00001* (<0.05)
		20000-50000	2	30	68	75	
		>50000	1	10	54	16	

Above table shows that variables like sex of the children, types of family to which children belongs, education of father and mother, their types of residence and their family income is significantly associated with the screening time i.e. time spent by the children on the device with screen.

Table 2: Pattern of Screen used by children of different age group

Pattern of screen uses by children	Responses from parents	5-9 years (No.175)	10-15 years (No. 103)	Chi-square & P- value
Any Family rule for screen media use	Yes	16 (9.14%)	12 (11.65%)	X^2= 0.45 P = 0.502
	No	159 (90.86%)	91 (88.35%)	
Does your child have his/her own: laptop, PC, tablet, smart-phone, TV, etc?	Yes	10 (5.71%)	31 (30.10%)	X^2= 29.94 P <0.00001*
	No	162 (84.29%)	72 (69.90%)	
While using screen media, how often does your child use more than one screen device?	Yes	16 (9.14%)	27 (26.21%)	X^2= 14.45 P =0.00014*
	No	159 (90.86%)	76 (73.79%)	
Is the child using screen media under the supervision of parents/elders family members?	Yes	24 (13.71%)	29 (28.16%)	X^2= 9.84 P = 0.0017*
	No	151 (86.29%)	70 (71.84%)	
Does your child use screen media before bed time?	Yes	47 (26.86%)	69 (66.99%)	X^2= 42.95 P <0.00001*
	No	128 (73.14%)	34 (33.01%)	
Parents give screen media device to calm their child	Yes	4 (2.29%)	0 (00.00%)	NA
	No	171 (97.71%)	103 (100%)	
How often does your child use screen media while eating?	Always	12 (6.86%)	42 (40.78%)	X^2= 54.47 P <0.00001*
	Often	95 (54.29%)	48 (46.60%)	
	Never	68 (38.85%)	13 (12.62%)	
Purpose of screen media use	Online classes/film/ serial/games	96 (54.86%)	62 (60.19%)	X^2= 1.24 P = 0.537
	Film/serial/ games	59 (33.71%)	33 (32.04%)	

	Online classes	20 (11.42%)	8 (7.77%)	

In above table, various variables for the pattern of the screening time were compared between two age groups of the children.

Table 3: Screen time among the children during pre-covid-19 era and during covid-19 pandemic

Screening time/week	Children groups (5-9 years = 175 and 10-15 years =103)	Pre-Covid-19 Era		During Covid-19 pandemic	
1- 7 hrs	5-9 years children	31(17.71%)	54 (19.42%)	7 (4%)	**12 (4.32%)**
	10-15 years of children	23 (22.33%)		5 (4.85%)	
8-14 hrs	5-9 years children	75(42.85%)	127 (45.68%)	29 (16.57%)	**48(17.27%)**
	10-15 years of children	52(50.49%)		19 (18.45%)	
15-21 hrs	5-9 years children	56 (32%)	78 (28.06%)	84 (48%)	**125(44.96%)**
	10-15 years of children	22 (21.36%)		41 (39.81%)	
>21 hrs	5-9 years children	13 (7.42%)	19 (6.84%)	55 (31.43%)	**93 (33.45%)**
	10-15 years of children	6 (5.82%)		38 (36.89%)	
Total		**278(100%)**			

t = 43.7, df = 277, p value < 0.001

Results of the paired t test indicated that there is a significant large difference for the screen time between pre- covid-19 (mean= 13, SD= 5.7) and during covid-19(mean= 20.6, SD=7.5).

For the age group of 5-9 years, mean and SD before covid-19 calculated as 13.4 & 5.5 and during covid-19 calculated values are 20.4 & 7.2 (t =33.9, df = 174, p value < 0.001), whereas for the age group 10-15 years, mean and SD before covid-19 calculated as 12.4 & 6.1 and during covid-19 calculated values are 20.9 & 7.9 (t = 29.7, df = 102, p value < 0.001).

Discussion

In our study total 278 children were enrolled, the 175 children belonged to age group 5-9 years (Mean age = 6.92, SD =1.4119) and 103 children were of age group 10-15 years (Mean age 11.85, SD =1.504). Male and female distribution in this study was 61.2% and 38.8% respectively. Most of the children (66.19%) belonged to joint family. About 6.83% father's of children were illiterate and education of most of father's of children were above secondary education. In our study only 4.32% mothers were illiterate, most of the mothers having education above secondary education. Most of the children (64.4%) were from urban area and rest from rural area (35.6%). In our study, a significant association was observed with the age of the children , mother and father education , monthly income etc. for the screen time during covid-19 pandemic, Similarly Bergmann C *et al*. founds positive association between children's screen time and age and negative association between children's screen time and SES as indexed by maternal education.[9]

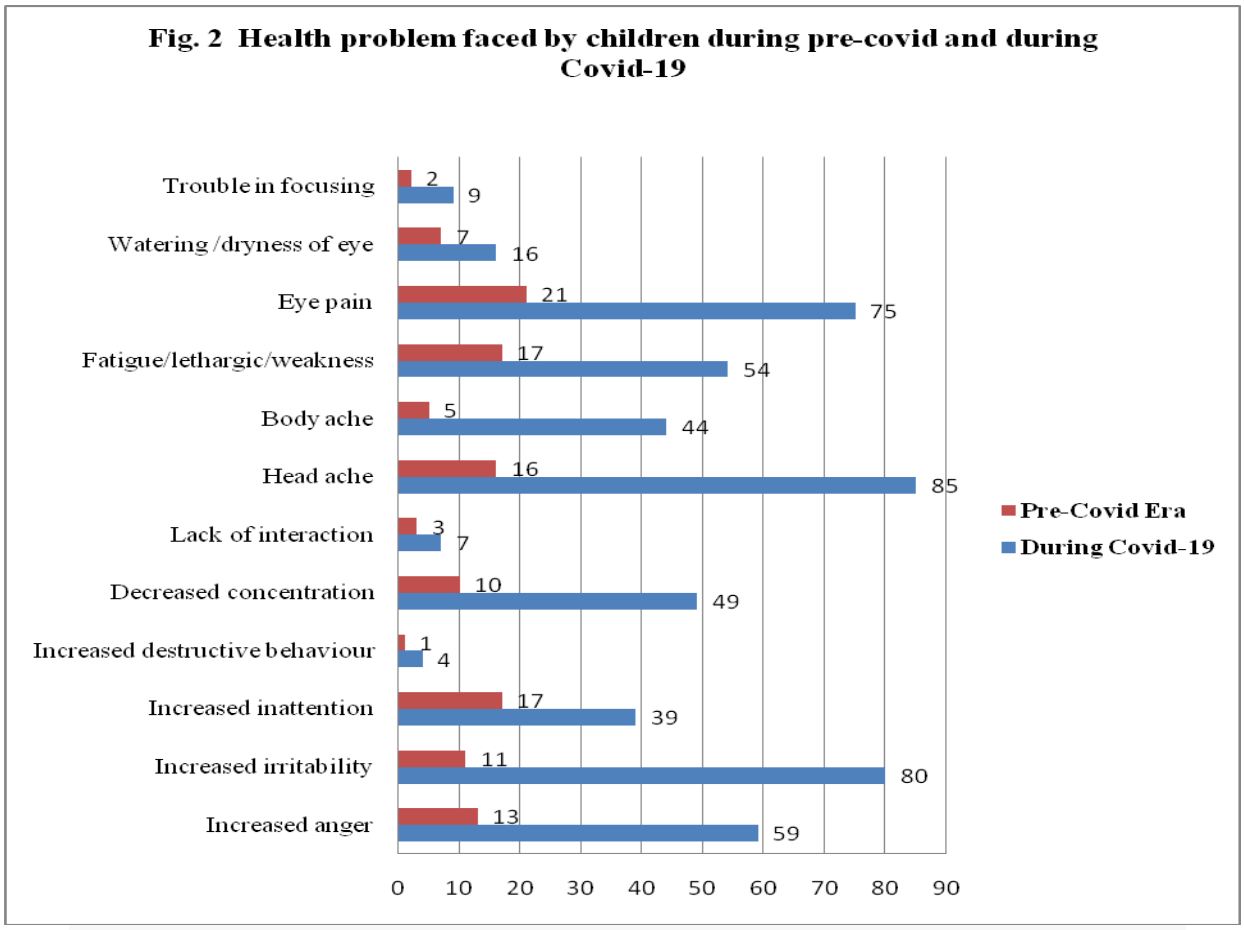

Figure 2: Health problem faced by children during pre-covid and during covid-19

The two-tailed P value = 0.0006, t = 4.7618, df = 11, standard error of difference = 6.965

Above figure describes that various health problems mentioned above are significantly increased during Covid-19 as compared to pre-covid era among children due to excessive screen time during covid-19 lockdown.

Table no. 2 showed only little no. of families of children were have any rule for use of screen media. About 30% Children of old age group (10-15 year) have their own screen devices. Majority (66.99%) of children of older age group (10-15 year) used screen devices before bed time. Most the children of older group (40.78%) of used screen devices during eating. During covid-19 children were exposed to use screen devices for the purpose of online classes due to closure of schools. Table no. 3 showed there were significant increase in screening time as during covid-19 pandemic as compared to the pre-covid era.

The association between the same factors pre- and post-COVID-19 is consistent with the present literature, despite the fact that only a few studies have been conducted to date examining changes in variables as a result of pandemic limitations.[10-12] Similarly studies conducted in Poland & nine European countries found that there is increased screen time among the participants during this pandemic.[13,14]

During covid-19, screening time increased more among older children (10-15 years) as compared to younger age group children (5-9 years). Mean screen time and SD was

calculated as 20.6 and 7.5 per week in this study. Smith *et al*. in their study found the average of 7.2 hours of screen time, which was higher in aged below 34 years compared to those aged 65 years or above.

In our study, there was significant large difference for the screen time between pre-covid-19 (mean= 13, SD= 5.7) and during covid-19 (mean= 20.6, SD=7.5). Similarly, Bergmann C *et al*. in their study revealed that children had more access to screen time during lockdown relative to before the lockdown across several countries.

During covid-19 children faced various health problems due over-use of screen and faulty position during use of screen devices. Most prevalent problem among children were head ache followed by increased irritability, eye pain, increased anger, body ache and other health problems such as lack of concentration, dryness/watering of eyes reported more during covid-19 pandemic as compared to pre-covid-era. In systemic review and meta-analysis conducted by Janssen *et al*. reported that screen time was associated with poorer sleep outcomes in infants, toddlers, and pre-schoolers. [15] Study conducted by Suchert et.al. also supported that screen use may affect the mental health.[16] Various studies indicate excessive screen time has adverse health effects such as eye strain, sleep disturbance, carpal tunnel syndrome, neck pain as well as mental health such as anxiety, depression and attention-deficit hyperactivity disorder. [17-20]

Conclusion

Our study concluded that during covid-19, screening time increases as compare to the pre-covid era among both the age group of the children significantly. There is significant association between screen time among children and independent variables like gender of the children, types of family to which child belongs, education of father and mother, their types of residence and their family income. Excessive time on the screen devices imparted various adverse effect such as head ache, increased irritability, eye pain, increased anger, body ache, lack of concentration, dryness/watering of eyes etc. among children.

Ethical Approval: Ethical permission obtained from the IEC with the letter no IEC/VPIMS/21/0A4.

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Authors contribution: All authors listed had substantial, direct, and intellectual contribution to this hard work research project and approved it for publication.

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