

## A COMPARATIVE STUDY OF SCREEN TIME AND ITS EFFECTS IN PRE-COVID AND COVID-ERA IN CHILDREN OF 5 TO 15 YEARS

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### ABSTRACT

**Objective:** The objective of this study was to compare the screen time (ST) in pre-COVID and COVID era in children aged 5–15 years and to analyse the ST effect in pre-COVID and COVID era in the children.

**Methods:** The study was done at Vivekananda Polyclinic and Institute of Medical Sciences, Lucknow. Two hundred and seventy-six children aged between 5 and 15 years, attending outpatient department or inpatient department were enrolled in the study.

**Results:** It was observed that the ST was significantly increased in post-COVID as compared to pre-COVID time and the difference was statistically significant ( $p < 0.0001^*$ ). It was also observed that the screening time was significantly increased in post-COVID as compared to pre-COVID time and the difference was statistically significant ( $p < 0.0001^*$ ).

**Conclusion:** The present study found that when screening duration was analysed, the screening time during COVID-19 was significantly longer than the screening time before COVID-19 which may be associated with the various health problems reported among children during COVID-19 pandemic.

**Keywords:** COVID-19 and screen time, Children's health-related quality of life, Physical activity, Screen time.

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### INTRODUCTION

The amount of time spent on electronic/digital media such as television, smartphone, tablet, or computer is referred to as screen time (ST) ST which is an important part of modern life for our children, the so-called "digital natives" [1]. Over the past few decades, the increased use of screens by children has concerned parents, educators, and legislators alike. The proportion of children in the organization for economic cooperation and development who have access to the internet and other digital devices steadily increased. Across the country, younger children are increasingly interacting with digital technologies, and many pre-schoolers are more familiar with digital devices than they are with books. Children share personal information and user-generated material through Instagram, TikTok, and WhatsApp Snapchat. Children can express themselves, learn, and socialize with their friends in the digital world. Perhaps there are also cognitive benefits to watching TV, especially if it is of a high enough quality and is geared at the viewer's age group. Un-supervised use of digital tools jeopardizes children's health and well-being [2]. Restriction during the COVID-19 pandemic exposes children to digital technologies at a much faster rate than is typical. As the COVID-19 problem spreads around the world, it has an impact on children's lives.

Obesity has been linked to ST, either as a result of increased caloric intake, less time for physical activity, or a low metabolic rate. Excessive ST has been shown to have an adverse effect on social, mental, emotional development results in irritability, mood disorder, and poor academic performance [3]. Due to these concerns, experts recommend limiting children's ST. The American Academy of Pediatrics advised parents to limit screening time to 1 h/day for the children of age group 2–5 years and no ST for children aged 6 and older.

Excessive ST is linked to sedentary behavior in children and adolescents. Excess screening time may lead to various non-communicable diseases [4].

COVID-19 raises the risk of malnourishment, abuse, and domestic violence. Among these is the abrupt end of the school programme for children and adolescents in India, who were required to stay at home during the COVID lockdown to contain and reduce the disease's spread. As a result of widespread digitization, COVID-19 is in crisis. Digital tools also provide enjoyable activities as well as external psychological and social support. They improve children's social relationships as well as their overall digital literacy. Homeschooling and social interactions, on the other hand, may be worse than those obtained through school or in-person contact. Furthermore, increased digitization is likely to exacerbate child disparities because the poorest children lack quiet study spaces and/or the financial resources to access online schooling. This "education gap" could last a long time. If proper action is not taken, the COVID-19 legacy will be a growing disparity between rich and poor children [5]. In low- and middle-income countries, data on ST duration, associated factors, and interventions to reduce it are scarce, particularly during COVID-19. Thus, we want to compare ST in children aged 5–15 before and after COVID.

### Objective

The objectives of this study were as follows:

1. To compare the ST in pre-COVID and during COVID era in children aged 5–15 years
2. To analyse the ST effect in pre-COVID and during COVID era in the children.

### METHODS

#### Study area

This study was Department of Pediatrics, Vivekananda Polyclinic and Institute of Medical Sciences, Lucknow.

#### Study design

This study was cross-sectional comparative study.

**Study duration**

This study was 12 months (November 2020–October 2021).

**Sample size**

Minimum 276 sample size was calculated by applying the formula

$$N = Z^2 \frac{p(1-p)}{d^2}$$

Where

N=Sample size

$Z_{1-\alpha/2}$ =two-tailed alpha error

P=Population proportion

d=Precision

$Z_{1-\alpha/2}$ =1.96 at 5% alpha error

p = 23.5% (0.235) (population of children below <15 years in Lukhnow [U.P. India] -NFHS-5)

q=1-p

d=5% (0.05)

$$N = (1.96)^2 \frac{0.235(1-0.235)}{(0.05)^2}$$

$$N = 276.249 \approx 276$$

**Inclusion criteria**

The following criteria were included in the study:

- Children of 5–15 years of age come in outpatient department/ inpatient department in department of paediatric of VPIMS.

**Exclusion criteria**

The following criteria were excluded from the study:

- Not willing to participate.

**Validation of questionnaire (bilingual)**

Before the study, a pilot study was conducted on ten patients to validate the pre-designed questionnaire and made changes, if necessary.

These questions were asked in relation to pre-COVID and COVID era:

- Pre-COVID era: Duration before LOCKDOWN (i.e., before March 2020) in India
- COVID era: Duration after LOCKDOWN (i.e., after March 2020).

**Data collection procedure**

Pre-designed, semi-structured, questionnaires (bilingual) were used to collect the information. Pilot study was conducted to validate the questionnaire and made the changes, if necessary. These questions were asked to the parents of the children.

**Statistical analysis**

Statistical analysis was carried out using Microsoft Excel EpiInfo version 7.5.2.

**RESULTS**

Most of the children enrolled were male (61.15%), followed by females.

The majority of the enrolled children were of the primary class (66.55%), followed by secondary (22.66%) and lower primary (10.79%).

Above table depicted, the majority of the children have gained weight (55.40%). However, there was no increase in anger (78.06%), irritability, or anxiety (71.22%). The majority of children (83.79%) showed no increase in inattention, followed by children who showed an increase in inattention (14.03%). There was no increase in children's destructive behaviour (98.56%) or lack of concentration (81.65%). The majority of children (97.48%) have no lack of interaction, followed by children who lack of interaction (2.52%). Children have no increased mood swings (93.17%). Most children have nobody ache (84.17%), and no fatigue/weakness/lethargic symptoms (80.58%). The majority of children (73.02%) have no eye strain, but 93.52% have watering or dryness of the eyes. Most children have no difficulty focusing (97.22%) followed by children who have difficulty to focus (2.88%).

Above table depicted, duration of the ST on a weekday (5 days) observed as, the majority of children (25.90%) used screen media for 5 h (24.10%), followed by 4 h (24.10%), 6 h (18.35%), and so on. However, during COVID-19 pandemic, the majority of children used screen media for 8 h (17.99%), followed by 10 h (13.67%), 6 h (10.43%), and so on. The screening time during COVID-19 pandemic was significantly longer than the pre-COVID time ( $p < 0.0001^*$ ).

Above table depicted, duration of ST duration on a weekend day (2 days) as, the majority of children (34.89%) used screen media for 2 h (34.89%), followed by 3 h (87%), 4 h (18.71%), and so on. However, during COVID period, the majority of children used screen media for 3 h (26.62%), followed by 4 h (21.58%), 5 h (12.95%), and so on. Screening time during COVID-19 pandemic was significantly longer than the pre-COVID time ( $p < 0.0001^*$ ).

**DISCUSSION**

In our study, Fig.1 depicted that 278 children enrolled during 1 year of study period out of which 61% were female children and remaining were male children. Table 1 depicted, majority of children were studied in primary level classes (66.55%) Screening time among children plays an important role in behaviour change; thus, we studied changes in the screening time and its effects on children aged 5–15 years before and during COVID-19 pandemic.

Table 2 showed various health-related issues observed by their parents during COVID-19 majority (55.40%) of parents of the children reported that weight of their their children have been increased during COVID-19. About 21.22% parents reported that their children became short-tempered, 28.78% reported that their child become more irritable, 26.98% reported that their children had eye stain/pain in their eyes

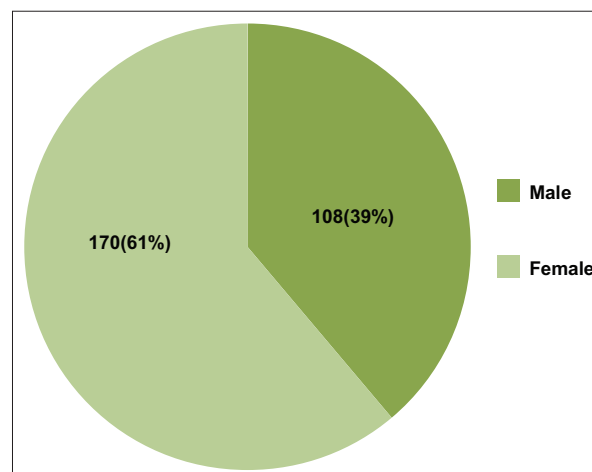


Fig. 1: Sex distribution of enrolled children

Table 1: Class-wise distribution of the enrolled children

Class	n (%)	Educational level	n (%)
UKG	12 (4.32)	Lower primary	30 (10.79)
KG	18 (6.47)		
1 <sup>st</sup>	43 (15.47)	Primary	185 (66.55)
2 <sup>nd</sup>	35 (12.59)		
3 <sup>rd</sup>	39 (14.03)		
4 <sup>th</sup>	39 (14.03)		
5 <sup>th</sup>	29 (10.43)		
6 <sup>th</sup>	19 (6.83)	Secondary	63 (22.66)
7 <sup>th</sup>	20 (7.19)		
8 <sup>th</sup>	13 (4.68)		
9 <sup>th</sup>	8 (2.88)		
10 <sup>th</sup>	3 (1.08)		
Grand total	278 (100.00)		

**Table 2: Distribution of changes observed in children during COVID-19 pandemic**

Observed changes	n (%)
Do you find any change in the weight of your child	
Decrease	44 (15.83)
Increase	154 (55.40)
Not sure	80 (28.78)
Increased anger (short-tempered)	
No	217 (78.06)
Not sure	2 (0.72)
Yes	59 (21.22)
Increased irritability/anxiety	
No	198 (71.22)
Yes	80 (28.78)
Increased inattention	
No	233 (83.79)
Not sure	6 (2.16)
Yes	39 (14.03)
Increased destructive behavior	
No	274 (98.56)
Yes	4 (1.44)
Lack of concentration	
No	227 (81.65)
Not sure	2 (0.72)
Yes	49 (17.63)
Lack of interaction	
No	271 (97.48)
Yes	7 (2.52)
Increased mood swings	
No	259 (93.17)
Not sure	2 (0.72)
Yes	17 (6.12)
Body ache	
No	234 (84.17)
Yes	44 (15.83)
Fatigue/weakness/lethargic	
No	224 (80.58)
Yes	54 (19.42)
Eye strain	
No	203 (73.02)
Yes	75 (26.98)
Watering/dryness of the eye	
No	260 (93.52)
Not sure	2 (0.72)
Yes	16 (5.76)
Trouble in focusing	
No	270 (97.22)
Yes	8 (2.88)

few of them reported watering/dryness in the eyes and some parents reported various others health issues such as lack of concentration, weakness/fatigueness, and back ache in their children during COVID-19 pandemic, may be due to increase in the screening time for various purpose (gaming/movies/serials/online classes) due to COVID-19 restriction that limits the outdoor activities such as playing and walking in neighbourhood. Tables 3 and 4 showed screening time significantly increased during COVID-19 pandemic as compared to before COVID-19. A prospective study conducted reported that there is no association of physical activity with ST and also pointed out before COVID-19, higher PA levels did not prevent screening time [6]. Changes in the quality of life before COVID-19 and during COVID-19 pandemic influenced level of physical activity among children and women [6-8]. Nigg *et al.* concluded that psychosocial health of children decides the level of physical activity from early to late stage of childhood found that psychological and psychosocial health variables predicted PA from early to late childhood [6]. Children who remain active during lockdown may be due availability of various supporting factors such as equipments for sports, supports of parents, and various other motivation resources. A study reported that there were positive relation between level of physical activity and good mental health that is disturbances in mental health adversely effect the

**Table 3: Duration of children using screen media devices on a weekday during pre-COVID and COVID time**

Duration on a weekday (total duration in 5 days)	Pre-COVID time, n (%)	COVID time, n (%)
4 h	67 (24.10)	9 (3.24)
5 h	72 (25.90)	18 (6.47)
6 h	51 (18.35)	29 (10.43)
7 h	23 (8.27)	14 (5.04)
8 h	27 (9.71)	50 (17.99)
9 h	12 (4.32)	20 (7.19)
10 h	11 (3.96)	38 (13.67)
11 h	1 (0.36)	13 (4.68)
12 h	6 (2.16)	25 (8.99)
13 h	4 (1.44)	10 (3.60)
14 h	2 (0.72)	4 (1.44)
15 h	2 (0.72)	36 (12.95)
16 h	0	7 (2.52)
17 h	0	1 (0.36)
18 h	0	3 (1.08)
20 h	0	1 (0.36)
Grand total	278 (100.00)	278 (100.00)
$\chi^2, P$	176.2, <0.0001*	

**Table 4: Duration of screen-time on weekend days among children before COVID-19 and during COVID-19 pandemic**

Duration of screen-time on weekend (last 2 days)	Pre-COVID time, n (%)	COVID time, n (%)
2 h	97 (34.89)	23 (8.27)
3 h	87 (31.29)	74 (26.62)
4 h	52 (18.71)	60 (21.58)
5 h	21 (7.55)	36 (12.95)
6 h	10 (3.60)	51 (18.35)
7 h	6 (2.16)	14 (5.04)
8 h	5 (1.80)	16 (5.76)
9 h	0	1 (0.36)
10 h	0	3 (1.08)
Grand total	278 (100.00)	278 (100.00)
$\chi^2, P$	91.72, <0.0001*	

physical activity level [9]. That is, before the COVID-19 pandemic, other factors or potentially traumatic childhood events (such as experiencing violence, abuse, or neglect) may play a critical role in maintaining good mental health in children [10]. During the lockdown, children's physical activities decreased significantly, according to the current study.

Using a nationally representative sample of German children and adolescents, Wunsch *et al.*, in 2021, examined the direct impact of lockdown during COVID-19 on PA, ST, and the cross-behavioral HRQoL associations [11]. We accounted for country differences and compared results with (European) norms using a full, validated HRQoL measure. The lagged analysis in this study examined prospective correlations between all variables.

Informations about children were provided by their parents. In analysing the data, it is important to consider the factors related to age, sociocultural environment that influences the children and adolescents. Shortcomings of the study include a sample collected from a single health institute. Thus further multi-center research is needed to support the study's findings.

## CONCLUSION

The present study found that when screening duration was analysed, the screening time during COVID-19 was significantly longer than the screening time before COVID-19 which may be associated with the various health problems reported among children during COVID-19

pandemic. Future research should use experimental designs to find out the association between screen time and their effect on physical activity and health-related quality of life.

#### ETHICAL APPROVAL

Taken from the Institutional Ethical Committee.

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#### AUTHORS CONTRIBUTIONS

Dr. Atul Rajpoot, Dr. Anurag Jain: Literature search, design, data acquisition, statistical analysis, manuscript preparation, and editing. Dr. Peeti Gupta, Dr. Neeta Bhargava: Collection of data, Writing – original draft. Dr. Taruna Vijaywargiya, Dr. Mahesh Gupta: Conceptualization, methodology, formal analysis, writing original draft, supervision, writing-review, and editing.

#### CONFLICTS OF INTEREST

No conflicts of interest.

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None.

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