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ORIGINAL RESEARCH

Pattern of usage of smartphones in children and adolescents

[1]Dr. Pillamari Niharika, [2]Dr. Inderpreet Sohi, [3]Dr. Rajeev Vinayak

[1]Consultant Paediatrician, Neeharika Childrens Hospital, Bheemgal, Telangana, India
[2]HOD, [3]Professor, Department of Paediatrics, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, India

Corresponding Author
Dr. Pillamari Niharika
Consultant Paediatrician, Neeharika Childrens Hospital, Bheemgal, Telangana, India

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ABSTRACT

Background: With technological advancements, smartphone usage has increased significantly among children and adolescents. While these devices offer educational benefits, concerns exist regarding excessive use and its impact on health, behavior, and social interactions. The COVID-19 pandemic further accelerated smartphone dependency due to online education.

Objective: To assess the patterns of smartphone usage among children and adolescents and its impact on sleep, eating habits, academic performance, and behavioral outcomes.

Methods: This prospective cross-sectional study was conducted in the Department of Paediatrics, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, over 18 months. A total of 300 children aged ≤18 years attending the paediatric OPD or admitted to the paediatric ward were enrolled. Data were collected through parent/child interviews and analyzed using SPSS version 21.0, with a p-value <0.05 considered statistically significant.

Results: Smartphone usage was universal (100%), with a mean starting age of 1.81 ± 0.78 years. During the COVID-19 lockdown, daily screen time increased significantly (p = 0.0001). 45.6% of parents reported sleep disturbances, 80% noticed changes in eating habits, and 21.3% observed a preference for smartphones over outdoor play. 18% of children were perceived as addicted, while 14.7% experienced visual problems.

Conclusion: Smartphone usage is widespread among children, with increased screen time affecting sleep, diet, and physical activity. While educational use is beneficial, parental regulation is minimal, increasing risks of overuse. Strategies promoting balanced screen time and digital well-being are essential for mitigating adverse effects.

Keywords: Smartphone usage, children, adolescents, screen time, COVID-19, digital addiction, parental perception, behavioral impact, online learning, sleep disturbances.

INTRODUCTION

Technological advancements have significantly increased media consumption, particularly among children and adolescents. A U.S. survey of parents with children up to 8 years old found that mobile device availability rose from 52% in 2011 to 75% in 2013. Concurrently, daily television viewing decreased (69 min in 2011 to 57 min in 2013), while mobile device usage increased (5 min in 2011 to 15 min in 2013), reflecting a shift in screen habits (1).

Unlike television, smartphones offer interactive features such as video streaming, gaming, communication, and educational apps, making them more appealing to children. India ranks second globally in mobile phone usage (2). The COVID-19 pandemic further accelerated screen dependency due to online education. While smartphones provide educational benefits, concerns persist over excessive use and misuse.

Increased screen time has been linked to adverse health effects, including obesity, cognitive and language delays, and lower academic performance (3). Studies also associate it with hypercholesterolemia, insulin resistance, type II diabetes, and metabolic disorders (4). Although educational apps facilitate knowledge acquisition, crucial life skills—such as self-control, empathy, and creativity—develop through physical play and real-world interactions. Excessive screen use can reduce time for activities that enhance visual-motor skills, essential for academic and life success (5).

Among adolescents, smartphone overuse raises concerns about addiction, which may negatively impact emotional health, family relationships, academic performance, and cognitive abilities. It has also been linked to depression, ADHD, and risky behaviors (6). Parents increasingly use smartphones as a tool for distraction, especially during meals, work,

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or travel. Mothers often encourage their use for reading, educational games, and music, while their portability makes them convenient for keeping children occupied in public spaces (7).

The American Academy of Pediatrics recommends limiting screen time to under two hours per day for children above two years, while discouraging it entirely for those under two (8). Given the rapid rise in smartphone usage, further research is needed to understand its long-term effects on children's development.

MATERIALS AND METHODS

Study Design & Setting

This prospective cross-sectional study was conducted in the Department of Paediatrics, Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. The study was carried out over a period of 18 months after obtaining approval from the Institutional Ethical Committee.

Study Population & Sample Size

The study included children aged ≤18 years attending the paediatric OPD or admitted to the paediatric ward during the study period, along with their siblings. Based on a previous study indicating that 75% of children had access to mobile devices, the minimum required sample size was calculated to be 289, with a 5% margin of error and 5% level of significance. A final sample size of 300 was set to ensure adequate representation.

To include a balanced age distribution, at least 100 children were enrolled in each of the following categories: 0-6 years (preschoolers), 7-12 years (school-going children), and 13-18 years (adolescents). The sample size was determined using the formula:

ME=z×p(1−p)NME = z \times \sqrt{\frac{p(1 - p)}{N}}ME=z×Np(1−p)

where Z represents the value at a two-sided alpha error of 5%, ME is the margin of error, and p is the estimated mobile usage rate.

Inclusion Criteria

All children and their siblings aged ≤18 years attending the paediatric OPD or admitted to the paediatric ward during the study period.

Exclusion Criteria

Children with physical disabilities such as cerebral palsy or hemiparesis.

Children with developmental delays or mental retardation.

Cases where neither parent was available to provide information.

Methodology

A total of 300 children were enrolled in the study after obtaining informed consent from at least one parent.

For children ≤12 years, parents were interviewed, while children aged 13-18 years were directly interviewed using an investigator-administered questionnaire. Demographic data, including the child's age, gender, number of siblings, family type, urban/rural background, and socioeconomic status (based on the modified Kuppuswamy scale), were collected.

Information regarding smartphone usage patterns was gathered, covering aspects such as the number of smartphones at home, age at first use, daily/weekly duration of use, and reasons for use. Additional details included parental supervision, restrictions on duration, and preferences for screen devices over reading or outdoor play.

For school-going children (>6 years), data were also collected on smartphone usage before and after the onset of the COVID-19 pandemic (March 2020). The duration of smartphone use before the pandemic was analyzed concerning socio-demographic variables.

Statistical Analysis

Data analysis was performed using SPSS version 21.0. Continuous variables were reported as mean ± standard deviation (SD) and median, while categorical variables were presented as numbers and percentages.Chi-Square and Fisher's exact tests were used to examine associations between categorical variables. A p-value <0.05 was considered statistically significant.

Ethical Considerations

Informed written consent was obtained from each participant in their preferred language. Data confidentiality was strictly maintained, and participation was voluntary. The study was ethically approved, ensuring no undue burden on participants or the institution.

RESULTS

The mean age of the study population was 9.2 ± 4.44 years, with an equal distribution among the three age groups. The gender ratio was nearly equal (52% male, 48% female). Most children belonged to joint families (88.7%) and resided in urban areas (74.3%). Socioeconomic status was predominantly upper-middle (62.7%) and lower-middle class (36.3%).All children (100%) used smartphones, with a mean starting age of 1.81 ± 0.78 years. Most families (63%) had at least two smartphones at home, but only 6.7% of children owned their own device, typically acquired at 13.36 ± 1.16 years. Nearly all children (97%) used smartphones daily.

During the COVID-19 lockdown, smartphone usage significantly increased among children aged 6-18 years ($p = 0.0001$). The proportion of children using smartphones for <2 hours per day dropped from 19.5% (pre-COVID) to 9% (during COVID), while those using it for 2-4 hours rose from 9% to 21%. However, the percentage of children using smartphones for >4 hours per day remained high and nearly unchanged (71.5% vs. 70%).(table 1)

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Smartphone activities varied across age groups. YouTube watching was the most common activity across all groups, with 99% of 0-12-year-olds and 88% of 13-18-year-olds engaged. Gaming was popular, especially among 0-6 years (85%) and 13-18 years (66%). Educational usage increased with age, from 7% in 0-6 years to 98% in 13-18 years, reflecting greater engagement in online learning. Adolescents (13-18 years) were also more active on WhatsApp (48%) and Facebook (36%), while online classes (66%) and taking pictures (51%) were notable activities.(table 2)

A significant proportion of parents (45.6%) felt that smartphone usage impacted their child's sleep, with 68.6% reporting late sleeping habits and 29.2% facing difficulty falling asleep. Only a small percentage (2%) noted reduced sleep duration.Regarding eating habits, 80% of parents believed smartphone use influenced their child's eating behavior. The majority (78.8%) stated that their child used a smartphone while eating, while 19.6% noticed increased food consumption.On academic performance, only 16.7% of parents perceived a negative impact, suggesting that while smartphone usage is widespread, its academic repercussions may be less pronounced compared to effects on sleep and eating habits(table 3).21.3% of children preferred smartphones over outdoor play, while 18% were perceived as addicted. Parental regulation was minimal, with 0% setting time limits and only 1.3% supervising usage. 14.7% had visual issues, and 5% experienced weakened family bonding due to smartphone use.(Table 4)Table 5: Among children 0-6yrs, parents‘ reason for giving smartphone was primarily to calm the child (54%), to distract while feeding the child(48%) or as a baby sitter (25%) while they were busy with other work.

Among 6-12yrs and 13-18yrs age group, parents reason for giving smartphone was mainly for educational purposes (73% and 99% respectively).

Among study subjects of 13-18yrs age group, time spent on smartphones during covid lockdown for activities like chatting on Whatsapp, listening to music, educational purposes, playing games, Facebook usage and other social media, surfing the net, watching videos on Youtube and online shopping was statistically significantly higher compared to precovid times. None of the children used the smartphone for reading news or Skyping in both the time periods.(table 6)

Duration of smartphone usage in hours per day	Precovid times (n=200)	During covid Lockdown (n=200)	P Value
<2 hours	39 (19.5%)	18 (9.0%)	
2-4 hours	18 (9.0%)	42 (21.0%)	
>4 hours	143 (71.5%)	140 (70%)	0.0001***

Table1: Comparison of duration of Smartphone usage per day in precovid times and during covid lockdown among children 6-18 years

Type of activity	0-6 years N=100	7-12 years N=100	13-18 years N=100
Gaming	85	36	66
Watching Videos on YouTube	99	99	88
Education purpose	7	62	98
Listening to music	2	26	37
WhatsApp	0	4	48
Video calls	1	0	5
Facebook	0	0	36
Communications	0	1	15
Taking pictures	8	56	51
Online classes	1	36	66

Table 2: Type of activities the smartphones used for by study subjects

Variable	Response	N (%)
Affects Sleep Time	Yes	137 (45.6%)
Among those who responded Yes (n=137)	Sleeps Late	94 (68.6%)
	Difficulty Sleeping	40 (29.2%)
	Sleeps Less	3 (2.0%)
Affects Eating Habits	Yes	240 (80.0%)
Among those who responded Yes (n=240)	Uses Phone While Eating	189 (78.8%)
	Eats More	47 (19.6%)
	Other Effects	4 (1.7%)
Affects Academic Performance	Yes	50 (16.7%)

Table 3: Parental Perception of Smartphone Usage Impact on Sleep, Eating Habits, and Academic Performance

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Variable	Yes (%)
Prefers phone over outdoor play	64 (21.3%)
Uses phone under parental supervision	4 (1.3%)
Parents set fixed time limit	0 (0%)
Parents choose specific content	1 (0.3%)
Visual problems due to smartphone use	44 (14.7%)
Negative impact on family bonding	15 (5.0%)
Behavioral issues due to smartphone	11 (3.7%)
Feels uncomfortable without smartphone	21 (7.0%)
Considered addicted to smartphone	54 (18.0%)

Table 4: Parental Perception of Child's Smartphone Usage

Variables	0-6 years	6-12 years	13-18 years
To calm the child	54	27	1
For Educational purposes	41	73	99
As a Baby sitter	25	1	0
To distract while feeding the child	48	1	1

Table 5: Parents‟ reason for giving smartphone to the study subjects

Activity engaged on smartphone	Time spent on phone (in minutes)		P value
	Before Covid	During covid	
Talking on cell phone	48.75 ± 15.53	57.86 ± 21.90	0.3142
Text messaging/WhatsApp	55.71 ± 10.63	73.09 ± 28.73	0.0003***
Listening to music and other audio	44.06 ± 15.21	67.14 ± 22.77	0.0001***
Educational purpose/attending classes	55.71 ± 10.89	96.43 ± 47.28	0.0019**
Playing games	43.78 ± 15.16	65.40 ± 18.87	0.0001***
Facebook/other social media	54.32 ± 17.08	75.79 ± 26.78	0.0001***
Surfing the internet	56.00 ± 10.56	62.73 ± 12.79	0.1016
Emailing	60	58 ± 7.746	0.3815
Reading news	0	0	NA
Watching YouTube videos	55.76 ± 13.22	83.18 ± 29.38	0.0001***
For skyping	0	0	NA
Online shopping	60	70 ± 27.50	0.2197

Table 6: Comparison of time spent on using smartphones for various activities pre-covid and during covid among study subjects 13-18 years of age

DISCUSSION

The increasing reliance on smartphones among children and adolescents has raised concerns regarding their impact on health, behavior, and social interactions. This study revealed a 100% smartphone usage rate among children, with a mean starting age of 1.81 ± 0.78 years. The results indicate a significant shift towards early smartphone exposure, a pattern consistent with global trends. Comparative studies further emphasize the need to address the potential risks and benefits associated with prolonged smartphone usage among children.

The study population had a mean age of 9.2 ± 4.44 years, with equal distribution across three age groups (0-6 years, 7-12 years, and 13-18 years). The gender ratio was nearly balanced (52% male, 48% female), and most children belonged to joint families (88.7%) and urban areas (74.3%). Socioeconomic status predominantly fell into the upper-middle (62.7%) and lower-middle (36.3%) classes.

A major finding was the universal access to smartphones within the study group. Kabali et al.(1) reported that 96.6% of children used mobile devices, with many starting before their first birthday, reinforcing the trend of early exposure to screens. Additionally, this study found that only 6.7% of children owned a smartphone, usually acquired at 13.36 ± 1.16 years, while the majority used their parents' devices.

A significant increase in smartphone usage was observed during the COVID-19 lockdown, particularly among children aged 6-18 years. The proportion of children using smartphones for less than 2 hours per day dropped from 19.5% (pre-COVID) to 9% (during COVID), while those using it for 2-4 hours rose from 9% to 21% (p=0.0001). However, the percentage using smartphones for more than 4 hours per day remained consistently high (71.5% pre-COVID vs. 70% during COVID).

A study by Gregorio Serra et al(9). in Italy similarly found that screen time significantly increased due to school closures, as children turned to smartphones for education, entertainment, and social interaction. These findings suggest that the pandemic exacerbated existing smartphone dependency, further highlighting

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the need for regulated screen time and structured digital engagement.

Patterns of Smartphone Usage Across Age Groups

Smartphone activities varied based on age. YouTube was the most commonly used feature, with 99% of children under 12 and 88% of adolescents engaging with it. Gaming was highly prevalent among younger children (85% of 0-6 years) and adolescents (66% of 13-18 years). Educational use increased with age, from 7% among 0-6 years to 98% among 13-18 years, reflecting a shift towards online learning and school-related activities.

These findings align with Jung Lee et al.,(10) who reported that adolescents prioritized social networking and gaming over other smartphone activities, contributing to higher addiction risks. Moreover, WhatsApp usage (48%) and Facebook engagement (36%) were significantly higher among adolescents, mirroring trends seen in studies on teenage digital communication habits.

Parental concerns revolved around sleep, eating habits, academic performance, and behavioral changes.Sleep Disturbances: 45.6% of parents felt that smartphone usage negatively impacted their child's sleep patterns, with 68.6% reporting late bedtime habits. These findings are consistent with Twenge et al.,(11) who linked excessive screen exposure to delayed sleep onset and poor sleep quality.

Eating Habits: 80% of parents reported that smartphone use disrupted their child's eating behavior, with 78.8% of children using smartphones while eating. Kim et al(12). found a similar pattern, where 80% of children were distracted by screens during meals, leading to disrupted family interactions .Academic Performance: Despite concerns about screen addiction, only 16.7% of parents believed that smartphone use negatively impacted academics. However, Young et al(13). found that 58% of students showed declining study habits and grades due to excessive internet use, indicating a more severe academic impact than perceived in this study.

Outdoor Play and Physical Activity: 21.3% of parents reported that their child preferred smartphone use over outdoor play. Bentley et al(14). highlighted similar struggles, where parents found it difficult to limit mobile usage among preschoolers, leading to reduced outdoor activity.Smartphone Addiction: 18% of children were perceived as addicted, aligning with findings from Moon et al.,(15) who linked excessive screen time to attention deficits and emotional instability.Visual Problems: 14.7% of children experienced visual strain due to prolonged smartphone exposure, consistent with research by Moon et al.,(15) which associated excessive smartphone use with pediatric dry eye disease.

Among younger children (0-6 years), parents primarily used smartphones to calm them (54%), distract them during feeding (48%), or as a babysitter (25%). For older children (6-18 years), education was the primary reason (73-99%).A similar study by Hernández et al.(16) found that parents used smartphones to regulate their child's behavior, particularly in public settings. This suggests that parental reliance on smartphones as a coping mechanism may contribute to early screen dependency.

CONCLUSION

This study underscores the growing dependence on smartphones among children, with early exposure, increased screen time during COVID-19, and a shift towards online learning and entertainment. Parental concerns highlight the negative effects on sleep, eating habits, and outdoor activity, yet smartphone use for educational purposes is widely accepted.

Comparative studies reinforce the need for responsible smartphone usage, digital literacy, and parental intervention. Strategies such as screen time limits, content monitoring, and encouraging offline activities are essential to balance the benefits and risks of smartphone exposure in children. Future research should explore long-term cognitive and behavioral effects, as well as effective interventions for promoting healthy digital habits.

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