Original Research Article

Exposure to electronic gadgets and its impact on developmental milestones among preschool children

Roopadevi V., Shravanti B. S., Aravind Karinagannanavar*

Department of Community Medicine, Gadag Institute of Medical Sciences, Gadag, Karnataka, India

Received: 24 February 2020
Revised: 03 April 2020
Accepted: 04 April 2020

*Correspondence:
Dr. Aravind Karinagannanavar,
E-mail: draravindmbbs5@gmail.com

ABSTRACT

Background: The wellbeing of the children including their physical, mental, psychological growth and development and their opportunity to achieve full potential as adults is very important. But there are several factors which affect the normal development of the children. TV, mobiles, video gaming, DVD’s and other forms of electronic gadgets have become pastimes among preschool children. Thus, this study is planned to know the exposure of electronic gadgets and its impact on the developmental milestones among preschool children.

Methods: A cross sectional study was conducted at Gadag among 240 preschool children of age 2-5 years attending school. The data was collected from April 2018 to October 2018. Information was gathered from parents and teachers by using pretested semi-structured questionnaire. Frequencies, percentages and chi-square test were used in analysis.

Results: In this study children using most common electronic gadgets were mobile and television for less than one hour followed by 1-2 hours usage. On an average each family had 5 members possessing 6 electronic gadgets and 3 mobiles. Majority of the children started using electronic gadget for the first time at 13-24 months. Authors found that there was significant association between electronic gadget usage and personal and social development.

Conclusions: The most commonly used electronic gadgets were mobiles and television and, in this study, there is an association between total duration of electronic gadget usage and personal and social development.

Keywords: Developmental milestones, Electronic gadgets, Pre-school children

INTRODUCTION

Children are the world’s most important resources. The well-being of the children including their physical, mental, psychological growth and development and their opportunity to achieve full potential as adults is very important.1 As growth and development of children are continuous process, they attain certain milestones during their development. Children attain gross motor, fine motor, personal and social development, general understanding, vision and hearing. But there are several factors which affect the normal development of the children.2 TV, mobiles, video gaming, DVD’s and other forms of electronic gadgets have become pastimes among preschool children. Children especially toddlers are exposed to TV, videos in day-care and home based child care settings and even at home.3 The greatest exposure to media and are at increased risk in general for disparities in early development, school readiness, and educational achievement. Although younger children often experience difficulties in using apps on smart mobile devices still are motivated to continue to use the device.4 Thus this study is planned to know the exposure of electronic gadgets and its impact on the developmental milestones among preschool children.

Objectives

The objective of the study was to know the pattern of electronic gadgets usage among the pre-school children
and to assess the impact of electronic gadgets on developmental milestones among the pre-school children.

**METHODS**

A cross-sectional study was conducted from April 2018 to October 2018 at Gadag city after taking institutional ethical clearance. Bachpan play school, Gadag was selected randomly, study group included 240 preschool children of aged 2-5 years of Bachpan play school, Gadag, Karnataka, India.

Data was collected after taking consent of the parent. A pretested semi-structured questionnaire was used. This questionnaire includes socio-demographic profile of the parents, usage of electronic gadgets by children was collected from parents and assessment of developmental milestones and some information was gathered by teachers once they were trained to assess the milestones. Questionnaire was given to the child to home for completing it and next day collected from the children. Total 240 preschool children data were collected who were present on the date of data collection from April 2018 to October 2018. All the children were included in the study. The only exclusion criteria we had used was child absent at the time of visit to school for 3 visits.

**Statistical analysis**

The data was analysed by using Epi-info software and frequencies, percentages and chi-square/Fischer exact test were used.

**RESULTS**

In this study majority of the children were female children (59.2%). Most of the children belonged to the age group between 37-48 months (30%), followed by 49-60 months (27.9%), 61-72 months (20.4%), 24-36 months (11.7%). Most of the mothers belonged Hindu (87.5%) religion followed by Muslims (10.8%) and Christians (0.8%). Majority of mothers age was more than 30 years (51.3%) followed by 26-30 years (42.5%). Most of the mothers are married (98.2%). Majority of them are studied up to graduate (37.1%) followed by postgraduates (29.6%), post high school (22.5%), high school (9.2%) and primary school (1.7%) and majority of the mothers were homemakers (78.3%). Most of the fathers belonged to the age group between 31-35 years (47.5%) followed by 36-40 years (31.7%).

Majority of fathers belonged to 31-35 years (47.1%), followed by 36-40 years (32.1%). Majority of the fathers were graduates (43.3%) followed by postgraduates (27.5%) and post high school/diploma (23.3%). Majority of the fathers belonged to clerical, shop owner, farmer (48.3%) followed by semi-profession (21.3%) and later by profession (22.5%). Most of the children belonged to the nuclear family (50%) followed by joint family (39.2%). Majority of the children’s family belonged to class 1 of modified BG Prasad classification (75%), followed by class 2 (22.5%).

**Table 1: Socio-demographic profile of the study subject.**

| Variable                     | Categories          | Frequency (198) | %    |
|------------------------------|---------------------|-----------------|------|
| Age of infant/child (in months) | 24-36              | 28              | 11.7 |
|                              | 37-48              | 72              | 30   |
|                              | 49-60              | 67              | 27.9 |
|                              | 61-72              | 49              | 20.4 |
|                              | >72                | 24              | 10   |
| Gender of the child          | Female             | 142             | 59.2 |
|                              | Male               | 98              | 40.8 |
| Place                        | Urban              | 224             | 93.3 |
|                              | Rural              | 16              | 6.7  |
| Religion                     | Hindu              | 210             | 87.5 |
|                              | Muslim             | 26              | 10.8 |
|                              | Christian          | 03              | 1.3  |
|                              | Others             | 01              | 0.4  |
| Mother age (years)           | 20-25              | 15              | 6.3  |
|                              | 26-30              | 102             | 42.5 |
|                              | >30                | 123             | 51.3 |
| Mother education             | Post-graduate      | 71              | 29.6 |
|                              | Graduate           | 89              | 37.1 |
|                              | Post high school/diploma | 54       | 22.5 |
|                              | High school        | 22              | 9.2  |
|                              | Primary school     | 04              | 1.7  |
| Father age (years)           | 26-30              | 10              | 4.2  |
|                              | 31-35              | 113             | 47.1 |
|                              | 36-40              | 77              | 32.1 |
| Father education             | Post-graduate      | 66              | 27.5 |
|                              | Graduate           | 104             | 43.3 |
|                              | Post high school/diploma | 56       | 23.3 |
|                              | High school        | 12              | 5    |
|                              | Primary school     | 02              | 0.8  |
| Mother occupation            | Working            | 52              | 21.7 |
|                              | Homemaker          | 188             | 78.3 |
| Father occupation            | Semi-skilled workers | 05         | 2.1  |
|                              | Skilled workers    | 14              | 5.8  |
|                              | Clerical, shop owner, farmer | 116   | 48.3 |
|                              | Semi-profession    | 51              | 21.3 |
|                              | Profession         | 54              | 22.5 |
| Type of family               | Nuclear            | 120             | 50   |
|                              | Joint              | 94              | 39.2 |
| Modified BG Prasad classification | Class 1        | 180             | 75   |
|                              | Class 2            | 54              | 22.5 |
|                              | Class 3            | 05              | 2.1  |
|                              | Class 4            | 01              | 0.4  |
Most of the children do not use electronic gadgets during charging (89.6%) as well as while eating (60.8%).

Table 2: Distribution of age of first usage of electronic usage.

| Age of 1st usage of EG (in months) | Frequency | %  |
|------------------------------------|-----------|----|
| 8-12                               | 28        | 11.7|
| 13-24                              | 81        | 33.8|
| 25-36                              | 79        | 32.9|
| 37-48                              | 32        | 13.3|
| 49-60                              | 7         | 2.9 |
| 61-72                              | 5         | 2.1 |
| Do not know                        | 8         | 3.3 |

Figure 1: Duration of usage of electronic gadgets among preschool children.

The first age started using electronic gadgets for the first time was as early as 8-12 months, followed by 13-24 months and 25-36 months, and later by 37-48 months. Only few children started the usage at more than 49 months. As the age progressed the number of the users for 1st time electronic gadgets increased.

Children used different electronic gadgets like mobiles, computers, tablets, television etc. So, majority of them used mobiles <1 hour (55.8%) followed by 1-2 hours (22.5%). Computer and tablet were used by few children i.e., 20.8% and 9.8% respectively. 11.7% and 6.7% children used computer and tablet less than one hour. 38.3% of the children watched television for less than one hour followed by 1-2 hours usage among 24.2%.

On an average each family had 6 electronic gadgets in which each family had average 3 mobiles. On an average child used mobile for the 1st time at 30.8 months

Most of children were not using electronic gadgets after getting up from sleep (84.6%) and before going to sleep (63.3%). It was found in this study that majority of the children do not have delay in initiation of sleep (71.7%), do not feel sleepy in the day-time (72.5%), do not wake in the night (55.8%). Majority of the children take day time naps >60 min (50%). Most of the children do not use gadgets before going to sleep (40.8%).

Table 3: Distribution of pattern of usage among preschool children.

| Variables | Yes (%) | No (%) |
|-----------|---------|--------|
| Use of EG immediately after getting up in the morning | 37 (15.4) | 203 (84.6) |
| Use EG before going to sleep | 88 (36.7) | 152 (63.3) |
| Delay in initiation of sleep | 68 (28.3) | 172 (71.7) |
| Child feel sleepy during daytime | 66 (27.5) | 174 (72.5) |
| Child wakes up in night | 106 (44.2) | 134 (55.8) |
| Use of EG while charging | 25 (10.4) | 215 (89.6) |
| Use EG while eating | 94 (39.2) | 146 (60.8) |

Most of them do not use electronic gadgets during charging (89.6%) as well as while eating (60.8%).

Table 4: Distribution of social participation of the children.

| Variables | Frequency | %  |
|-----------|-----------|----|
| Participation in class | Good | 212 | 88.3 |
| | Bad | 28 | 11.7 |
| Mingles with Friends | Yes | 231 | 96.3 |
| | No | 09 | 3.8 |
| Play outdoor games | Always | 96 | 40 |
| | Sometimes | 75 | 31.3 |
| | Occasionally | 51 | 21.3 |
| | Never | 18 | 7.5 |
| Play indoor games | Always | 125 | 52.1 |
| | Sometimes | 85 | 35.4 |
| | Occasionally | 21 | 8.8 |
| | Never | 09 | 3.8 |

Table 5: Distribution of health problems related to electronic gadget usage.

| Variables | Frequency | %  |
|-----------|-----------|----|
| Eye problems | Yes | 13 | 5.4 |
| | No | 227 | 94.6 |
| Use of specs | Yes | 08 | 3.3 |
| | No | 232 | 96.7 |
| Headaches | Yes | 18 | 7.5 |
| | No | 222 | 92.5 |
| Overall sleep | Good | 235 | 97.9 |
| | Bad | 05 | 2.1 |
| Binge eating while using EG | Yes | 26 | 10.8 |
| | No | 214 | 89.2 |

Most of the children play outdoor games at least 5 days in a week (40%) as well as outdoor games (52.1%) and few
never play (7.5%). Majority of them have good participation in the class (88.3%) as well as mingle with their friends (96.3%).

Only 5.4% of mothers complained of eyestrain and watering from eyes of their children and 3.3% children had usage of specs in day to day life. 7.5% had complain of headache. 97.9% children had good sleep. Few of them have habit of eating more (10.8%) while using gadgets and others were not (89.2%).

**Table 6: Distribution of development among preschool children.**

| Developmental milestones | Normal (%) | Delayed (%) |
|--------------------------|------------|-------------|
| Gross motor              | 234 (97.5) | 6 (2.5)     |
| Fine motor               | 240 (100)  | 0 (0)       |
| Personal and social development | 212 (88.3) | 28 (11.7)  |
| Language                 | 230 (95.8) | 10 (4.2)    |

In this study authors found gross motor development was normal among majority (97.5%) children and only 2.5% had delayed development. Fine motor development was normal among all the children (100%). Personal and social developmental delay was noticed among 11.7% children and language delay was among 4.2%. In this study authors found that there is no association between electronic gadget usage and gross motor (p=0.084) and language development (p=0.13). Authors found that there is significant association between electronic gadget usage and personal and social development.

**DISCUSSION**

In this study children using most common electronic gadgets were mobile and television for less than one hour followed by 1-2 hours usage. On an average each family had 5 members processing 6 electronic gadgets and 3 mobiles. Majority of the children started using electronic gadget for the first time at 13-24 months.

Most of children were not using electronic gadgets after getting up from sleep (84.2%) and before going to sleep (63.3%). It was found in this study that majority of the children do not have delay in initiation of sleep (71.6%), do not feel sleepy in the daytimes (72.5%), do not wake in the night (55.8%). Majority of the children take day time naps >60 min (50%). Most of the children do not use gadgets before going to sleep (40.8%). Almost all children had good sleep (98.3%). Most of the children play outdoor and indoor games regularly. Majority of the children had good participation and mingling with friends. Very few children had complaints about headache, binge eating, sleep problems, eye problems and use of specs.

In a study conducted by Mendelsohn AL et al, found daily media exposure, with a median exposure of 120 minutes, which was more compared to this study. In another study conducted by Byeon H, found the average daily television watching time was <1 hour (23.3%), 1-2 hour (44.1%), 2-3 hours (24%) and >3 hours (8.6%).

In one of the studies conducted by Schmidt ME et al mean daily television viewing in infancy (birth to 2 years) was 1.2 (SD: 0.9) hours. On average, children watched 0.9 (SD: 1.2) hours of TV per day at 6 months of age, 1.2 (SD: 1.5) hours/day at 1 year of age, and 1.4 (SD: 1.1) hours/day at 2 years of age. This study done among preschool children showed mobile and television usage was for less than 1 hour.

In one of the studies conducted by Peter Nikken Marjon Schools according to the reports of their parents, TV sets are most often used by children. They watch on average about 52 min per day, whereas the other three media types each are used for about 11-12 min on average per day. The use of game devices and computers significantly increases gradually with age, which was similar to this study. These devices are used the least per day by 0-1-year old, somewhat longer by 2-3 years old, then even significantly longer per day by 4-5 years old children, and finally the longest by 6-7 years old children.

In a study conducted by Garrison MM et al, 18% of them had sleep problems. But in this study, authors found there 30% had delay in initiation and feel sleepy in the daytimes.

Most of them do not use electronic gadgets while eating (60.8%). Few of them have habit of eating more (10.8%).
while using gadgets. A study reported that each additional hour of TV viewing per week increased the risk of obesity by 2%. The experimental study by Robinson found strong evidence of a causal link between TV viewing and children being overweight. In India, this association has also been emphasized. In this study few have reported binge eating while using electronic gadget. Stettler et al. showed a significant association between electronic game use and obesity, with nearly a 2-fold increased risk of obesity for every hour spent playing electronic games daily. An inverse relationship between time spent using video games and daily physical activity has also been observed. In this study majority of the children were using electronic gadgets for less than one hour and they were paying outdoor and indoor games regularly.

In a study conducted by Mendelsohn et al., study analyses were first performed to determine whether media verbal interactions had a direct positive impact on language development. Media verbal interactions considered separately were associated with enhanced total language in both unadjusted analysis (model 1: β=0.15, p<0.05) and after adjustment for all potential confounders except for cognitive stimulation (model 2; β=0.16, p<0.05). In this study majority of the children had personal and social development delay (11.7%). Authors have found that there is an association between electronic gadget usage and personal and social development (p=0.022).

CONCLUSION

In this study authors have found most commonly used electronic gadgets were mobiles and television. The 1st time electronic gadget usage was as early as 8-12 months and majority started at 13-24 months. Majority of the children were not having health problems related to electronic gadgets and their social participation was good. Authors found in this study there is an association between total duration of electronic gadget usage and personal and social development.

ACKNOWLEDGEMENTS

The authors thank the professor and head department of community medicine and school authority for their kind support. The authors are also grateful to authors/editors/publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed. The authors are also thanking all the study subjects for their kind support.

Funding: This study funded by ICMR-STS
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kliegman R, Stanton B, St. Geme J, Schor N, and Behrman R. (n.d.). Nelson text book of pediatrics. 19th ed. Published by Philadelphia, PA: Elsevier/Saunders; 2011.
2. Ghai O, Gupta P, and Paul V. Ghai. Essential pediatrics. 8th ed. New Delhi: CBS Publishers and Distributers; 2008.
3. Duch H, Fisher E, Ensari I, Harrington A. Screen time use in children under 3 years old: a systemic review of correlates. Int J Behav Nutr Phy. 2013;10(1):102.
4. Nikken P, Schols M. How and why parents guide the media use of young children. J Child Family Stud. 2015;24(11):3423-35.
5. Mendelsohn A, Berkule S, Tomopoulos S, Tamis-LeMonda C, Huberman H, Alvij J, et al. Infant television and video exposure associated with limited parent-child verbal interactions in low socioeconomic status households. Arch Pediatr Adoles Med. 2008;162(5):411.
6. Byeon H, Hong S. Relationship between television viewing and language delay in toddlers: evidence from a Korea National cross-sectional survey. Plos One. 2015;10(3):e0120663.
7. Canadian Paediatric Society Statement. Children and the media. 1999;4(5):350-4.
8. Schmidt M, Rich M, Rifas-Shiman S, Oken E, Taveras E. Television viewing in infancy and child cognition at 3 years of age in a US cohort. Pediatr. 2009;123(3):370-5.
9. Kozeis N. Impact of computer use on children’s vision. Hippokrat. 2009;13(4):230-1.
10. Garrison M, Liekgwe K, Christakis D. Media use and child sleep- the impact of content, timing, and environment. Pediatr. 2011;128(1):29-35.
11. Robinson TN. Television viewing and childhood obesity. Pediatr Clin North Am. 2001;48:1017-25.
12. Kuriyan R, Bhat S, Thomas T, Vaz M, Kurpad A. Television viewing and sleep are associated with overweight among urban and semi-urban South Indian children. Nutitr J. 2007;6(1):25.
13. Stettler N, Signer T, Suter P. Electronic games and environmental factors associated with childhood obesity in Switzerland. Obes Res. 2004;12(6):896-903.
14. Mendelsohn A, Brockmeyer C, Dreyer B, Fierman A, Berkule-Silberman S, Tomopoulos S. Do verbal interactions with infants during electronic media exposure mitigate adverse impacts on their language development as toddlers?. Infant Child Develop. 2010;19(6):577-93.

Cite this article as: Roopadevi V, Shravanti BS, Karinagannanavar A. Exposure to electronic gadgets and its impact on developmental milestones among preschool children. Int J Community Med Public Health 2020;7:1884-8.