



ASSOCIATION OF DIGITAL MEDIA WITH DEVELOPMENT IN CHILDREN AGED 1-5 YEARS: A CROSS-SECTIONAL STUDY IN A TERTIARY CARE TEACHING HOSPITAL IN EASTERN INDIA

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ABSTRACT **Background:** Gone are the days of playing in the greens. Technology is playing a major part in children's brain development these days. Children abusing digital media have social, developmental and academic problems including attention deficit, lack of imagination, impaired memory, difficulty in planning and organisation. **Objective:** To study association between use of digital media with level of developmental milestones, physical and behavioural problems in children. **Methods:** A Cross-sectional study was conducted at Paediatrics OPD of CNMC&H among 288 children of 1-5 years of age over 6 months after getting approval from institutional ethics committee. For <2years, any use and for 2- 5 years, >1 hour use was considered to be overuse as per IAP screen time criteria. Denver Developmental Screening Test-II score was used to assess development at all spheres. Behavioural disturbance such as Hyperactivity, Temper tantrum, Sleep disturbances were sought. **Results:** 217 (75%) children was found to overuse digital media. Visual problems, neck strain and headache were found higher in overuse population. Language and speech delay was seen in 42% of children who overuse digital media. No difference was seen in other developmental milestones. Hyperactivity and Sleep disturbance was found to be more in population overusing digital media. **Conclusion:** Abuse of digital media has taken a toll on language and speech development. Others problems like emotional, sleep disturbances are also increasing. We must be alert about this grim reality and monitor digital media use.

KEYWORDS : Development, Digital media, Hyperactivity, Sleep disturbances, Speech and Language delay

INTRODUCTION

Childhood is a very important phase of one's life. The impact of anything in this time remains forever. The nurturing brain is hugely affected by the external forces. The warmth, care and interaction of family members help in shaping mental and physical health in a child.

20-30 years ago children used to roam outside, play in the greens. They used to have adequate physical activity, outdoor sports. But time has changed very rapidly over these years. Moreover, parents have self-interest in giving access to digital media to their little ones. [1]

Technology is playing a major part in the way children's brains are developing these days. Children abusing digital media have social, developmental and academic problems. The main areas affected by excessive use of technology are Attention deficit, lack of imagination, impaired memory, difficulty in planning and organisation. [2][3]

OBJECTIVES:

1. To find out pattern of use of digital media among children 1-5 years of age.
2. To study association between use of digital media with Physical problems and Level of development in children.
3. To study association between use of digital media with Behavioural disturbances in children.

METHODOLOGY:

A. Study Design: Cross sectional study

B. Place Of Study: Paediatrics out-patient Department of Calcutta National Medical College, Kolkata

C. Period Of Study: Six months from January 2022 to June 2022

D. Study Population: Children between 1 year to 5 years attending in the Paediatrics out-patient department of Calcutta National Medical College and Hospital, Kolkata

E. Selection Criteria:

- a) Inclusion criteria: Children 1-5 years whose parents gave informed consent for the study.
- b) Exclusion criteria: Children with
 1. Known case of Gross motor delay
 2. Head circumference <3rd percentile
 3. Known case of congenital hearing and vision abnormality
 4. Profound intellectual disability

F. Sampling and Sample Size: Simple random sampling method was used for selecting the sample size. Randomisation was done by taking

every 5th child between 1-5 years age group. Since the researchers have OPD twice a week and in each OPD day we could interview and examine 10 children, so we had 20 children per week. This took us around 15 weeks for data collection.

For calculation of sample size, the formula used is as follows-

$$N = \frac{(Z\alpha/2)^2 \times p \times q}{L^2}$$

Where N = Sample size

$Z\alpha/2$ = Standard Normal Deviate and its value would be 1.96 considering 95% Confidence Interval.

p = Expected prevalence obtained from similar studies

q = (100-p)

L = Precision in absolute terms and it will be taken as 5 percentage points

So, using this formula, our sample size is-

$$1.96 \times 1.96 \times 25 \times 75$$

$$= \frac{25}{25}$$

$$= 288$$

G. Study Variables:

1. Age of the child
2. Gender of the child
3. Mother's
 - a) Age
 - b) Education: illiterate/ primary/ secondary/ higher-secondary/ others
 - c) Working/ housewife
4. Duration of use of digital media: <2 years- No use/ any use
2-5 years- No use or <1 hr/>1 hr
5. Number of screen at home:
6. Family type: joint/ nuclear
7. Child quality time with family:
8. Physical health: a) Vision: visual acuity
b) Pure tone audiometry
c) Neck strain: yes/ no
d) Headache: yes/no
e) Weight
f) Height
g) Weight for Height
9. Mental & social health:
 - a) Denver Developmental Screening Test-II score

10. Emotional disturbance:

a) Hyperactivity: According to DSM-5 criteria

b) Temper tantrum: yes/no

11. Sleep disturbance: Delay in falling asleep &/or awakening up at night-yes/no

H. Data Collection And Interpretation:

After getting clearance from The Ethical Committee, the study was conducted in the out-patient department of Paediatric Medicine, Calcutta National Medical College and Hospital. Those children who meet the inclusion criteria and do not have exclusion criteria was taken for the study.

I. Outcome Measures And Parameters:

Delay in developmental milestones identified by DDST-II and Hyperactivity by DSM-5 criteria for ADHD.

J. Study Tools And Techniques:

A. Study Tools:

1. Proforma for Data collection

2. Denver Developmental Screening Test-II

3. DSM-5

4. Measuring tape

5. Weighing scale

B. Study Techniques:

1. Individual (one to one) Interview of parents based on Predesigned and Pretested Proforma

2. Clinical Examinations

K. Data Analysis:

The collected data were entered into Microsoft Excel Sheet. Statistical analysis of data were performed by applying standard and appropriate statistical tests. P value <0.05 was considered as statistically significant. The data obtained will be kept confidential and preserved for three years.

M. Ethical Considerations:

Ethical approval for the study was taken from Institutional Ethical Committee. Informed written consent was taken from parents to participate in the study.

RESULTS:

288 children were enrolled for the study. 47 children were aged between 1-2 years (16.3%) and 241 children were in the age group 2-5 years (83.7%). The demographic data of the study population is summarised in Table-1.

Table-1: Demographics Of The Study Population

	Frequency	Percentage
GENDER		
Male	174	60.4%
Female	114	39.6%
MATERNAL AGE GROUP		
<20 years	27	9.4%
21-30 years	146	50.7%
31-40 years	104	36.1%
>40	11	3.8%
MOTHERS EDUCATION		
Illiterate	4	1.4%
Primary	88	30.6%
Secondary	92	31.9%
Higher-secondary	65	22.6%
Graduate	39	13.5%
EMPLOYMENT OF MOTHERS		
Housewife	216	75%
Working	72	25%
TYPE OF FAMILY		
Nuclear	176	61%
Joint	112	39%
SOCIO-ECONOMIC STATUS#		
Upper	26	9%
Upper-middle	82	29%
Lower-middle	151	52%
Upper-lower	23	8%
Lower	6	2%

#according to Modified Kuppaswamy scale

Among the children aged 1-2 years, 7 children did not use digital media (17%), which is recommended for this age group; whereas 34 children used digital media (83%), which is considered overuse. Among the children aged 2-5 years, 64 children used digital media up to 1 hour (26%), which is recommended for this age group; whereas 183 children used them more than 1 hour (74%), which is considered overuse. [Figure 1]

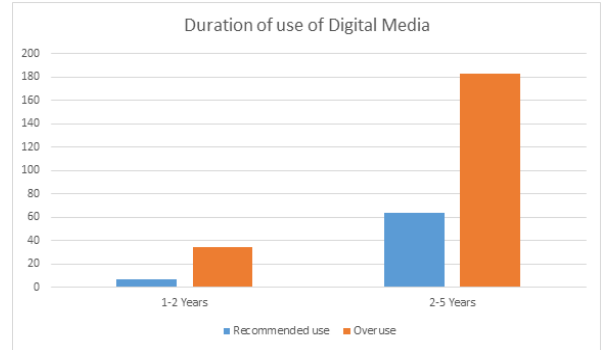


Figure 1: Duration of use of Digital media

Among children with recommended use of digital media, 14 children had visual problems (20%); whereas among children with overuse of digital media, 72 had visual problems (33%). P-value is 0.0314, which is statistically significant. Among children with recommended use, Neck strain was found in 1% and among children with overuse, 11% had this problem. P-value is 0.015, i.e. statistically significant. Headache was seen in 3% children with recommended use, whereas it was present in 19% children with overuse. P-value is 0.001, making it statistically significant. Hearing problem was not found to be statistically significant. Obesity was found in 1% of children with recommended use, but 6% children with overuse. P-value was 0.299, which was not statistically significant. [Table-2]

Table-2: Physical Problems

	Recommended Use	Overuse	P-value
Visual Problems	14(20%)	72(33%)	0.0314
Hearing Problems	2(3%)	9(4%)	0.61
Neck strain	1(1%)	23(11%)	0.015
Headache	2(3%)	41(19%)	0.001
Obesity	3(1%)	17(6%)	0.299

Out of 71 children with recommended use of digital media, 11 had Speech and Language delay (15%), whereas out of 217 children with overuse of digital media, 91 had speech and language delay (42%). P-value was 0.0001 i.e. statistically significant. Gross motor, Fine motor and social & cognitive delay was not found to be statistically significant. [Table-3]

Table-3: Delay In Developmental Milestones

	Recommended use	Overuse	P-value
Gross motor	2(3%)	9(4%)	0.61
Fine Motor	3(4%)	11(5%)	0.77
Language and speech	11(15%)	91(42%)	0.0001
Social and cognitive	4(5%)	20(9%)	0.34

Among 71 children with recommended use, 8 had hyperactivity (11%); whereas among 217 children with overuse, 57 children had hyperactivity (26%). P-value was 0.0087, i.e. statistically significant. Among children with recommended use, 15 had sleep disturbances (21%); whereas among children with overuse, 74 had sleep disturbances (34%). P-value was 0.04, i.e. statistically significant. Temper tantrums was not statistically significant among both the groups. [Table-4]

Table-4: Behavioural Disturbances

	Recommended use	Overuse	P-value
Hyperactivity	8(11%)	57(26%)	0.0087
Temper tantrums	9(12%)	46(21%)	0.11
Sleep disturbances	15(21%)	74(34%)	0.04

DISCUSSION:

1. Out of 71 children aged 1-2 years in our study, 17% did not use any forms of electronic media, which is recommended by IAP [4] and 83%

used media. Out of 217 children in the age group 2-5 years, 26% used digital media less than 1 hour, which is recommended, while 74% used it more than 1 hour, which is considered as overuse. The total prevalence of overuse was 75.34%, which was consistent with a study conducted in rural Western India by Rutvi R Shah et al, which showed that 80% Preschool children exceeded advised screen time usage. [5]

2. In our study, 33% children with digital media overuse had visual problems. In a study conducted by Fatima Shirly Anitha et al showed visual problems among 18.6% children with excess use of digital media. [6]. A study by Gui-You Yang et al suggested the hypothesis that screen exposure in early life could be significantly and positively associated with preschool myopia, and in agreement with this hypothesis was the association being strengthened with the increasing daily exposure duration and total years of exposure. [7]

3. Our study showed that among children with recommended use, Neck strain was found in 1% and among children with overuse, 11% had this problem. Headache was seen in 3% children with recommended use, whereas it was present in 19% children with overuse. A study conducted by Shailly Gupta et al found statistically significant positive correlation between screen usage time during COVID-19 pandemic with backache, neck pain, headache, and weight gain. [8]. But study in pre-schooler age group was not found.

4. In our study, out of 71 children with recommended use of digital media, 11 had Speech and Language delay (15%), whereas out of 217 children with overuse of digital media, 91 had speech and language delay (42%).

In a study conducted by Annette Sundqvist et al concluded that there is significant association between digital media overuse and delay in speech and language development. [9] Another study by Marja Asikainen concluded that longer child and parental exposure to electronic media was negatively associated with the size of the child's expressive vocabulary. [10] In another study by Shradha Salunkhe et al showed that Speech and language delay was seen among 28.4% of children who used media for more than 3 hours. [11]. All the findings were similar to our study.

5. In our study, prevalence of hyperactivity in recommended use group was 11%, whereas in overuse group it was 26%. In a study by Carlin J Miller et al found that there is positive correlation between television exposure and ADHD associated behaviours [12]. Another study by Guodong Xie from China showed that exposing pre-schoolers to screen time of >1 hour is associated with higher risk of negative effects on temper, character, and vulnerability to inattention and ADHD symptoms [13]. According to a study conducted by Shradha Salunkhe et al showed that ADHD was seen in 9.4% of 348 children using media and 5.1% of 77 children who were not using media [11].

6. Our study found that sleep disturbances among children with recommended use was 21%, whereas among children with overuse was 34%. In a study by Michelle M Garrison et al found that 18% of parents reported at least 1 sleep problem and violent content and evening media use were associated with increased sleep problems [14]. In another study by Ine Beyens et al, results showed that heavier television use and tablet use, both overall and in the evening, were associated with later bedtimes and later wake times, but not with fewer hours of sleep [15].

CONCLUSION:

Electronic media has become a part of our daily life now-a-days. It has both positive and negative effects, especially on growing minds. It can be used to learn new things with parental supervision above 2 years of age; but if parents has no control over children's media use, it can lead to several physical, language, cognitive and behavioural disturbances and can affect normal development. Hence, Paediatricians should counsel parents about proper use of digital media in their children.

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KEY MESSAGES

WHAT IS ALREADY KNOWN: Digital media use has significantly

increased among children in last few years, especially during COVID era.

WHAT THIS STUDY ADD: Excessive use of electronic media not only affects children's speech and language development, but also affects their physical health and causes significant behavioural disturbances.

CONTRIBUTORS:

Dr. Madhurima Das conceived and designed the study and revised the manuscript for important intellectual content. She will act as guarantor of the study. Dr. Kaushambi Basu and Dr. Soumyadip Paria collected data and drafted the paper. Dr. Madhurima analysed the data and others helped in manuscript writing. The final manuscript was approved by all the authors. All authors have agreed to the order of the listing of the names of the authors.

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