

Amount of Screen Time and Occurrence of Autistic-Like Symptoms in Toddlers in a Tertiary Care Hospital

Vishnu Priya Dikkala, P. S. Murthy, Raja Vikram Prasad¹, Venugopal Sharma², Suprakash Chaudhury³

Departments of Psychiatry,
¹Community Medicine
 and ²Pediatrics, Santhiram
 Medical College and
 General Hospital, Nandyal,
 Andhra Pradesh, ³Department
 of Psychiatry, Dr. D Y
 Patil Medical College,
 Dr. D Y Patil Vidyapeeth,
 Pune, Maharashtra, India

ABSTRACT

Background: Currently due to the easy accessibility of virtual gadgets connected through the internet, there is a constant negative impact from on-screen media exposure, which is seen increasing among toddlers. **Aim:** This study aims to evaluate the impact of screen exposure on toddlers. **Materials and Methods:** A convenient sample of 80 toddlers aged between 9 and 36 months were enrolled for the study, conducted for 3 months after obtaining written informed assent from parent/primary caregiver. Prior I. E. C. clearance is obtained for the study. A sample of 80 toddlers who were exposed to screen and attended to constantly by a parent/primary caregiver were included in the study. All were assessed by a pretested questionnaire regarding screen media use and Modified Checklist for Autism in Toddlers Revised. **Results:** About 52.5% toddlers were male and 47.5% were female. Around 36.5% toddlers screen-viewed for only about 1–2 h/day. 53% of the toddlers with more than 4 h of screen time per day were at high risk for developing Autism. Thus, a statistically significant correlation ($P = 0.001$) was established between the duration of screen use and the score of the Modified Checklist for Autism in Toddlers-Revised scale, with increased screen time showing greater autistic-traits. **Conclusion:** Toddlers with high screen media use developed autistic-like traits that may even progress to Autism. Hence, it is advisable to educate the parents/primary caregiver regarding the hazardous effects of early exposure to screen use.

KEYWORDS: *Autistic-like symptoms, Modified Checklist for Autism in Toddlers-Revised scale, screen media use, screen time, toddlers*

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INTRODUCTION

One of the neurodevelopmental conditions that typically affect children is Autism Spectrum Disorder (A. S. D.).^[1] It was first described in 1943 by Leo Kanner, when he used the term “autistic loneliness” in children who were secluded and did not interact with others, despite their intelligence.^[2] In India, the estimated prevalence of A. S. D. extends from 0.155 to 1.01%.^[3] Even though genetics contribute to 50%–80% of the development of A. S. D., other risk factors are also present, including screen media viewing.^[4] The recent focus of many researchers, clinicians, have shifted to study the link between screen media use and the development of A. S. D. An increased amount of screen time by toddlers has been associated

with A. S. D. and harms the developmental outcomes.^[5] A milder form of symptoms that are similar to those experienced by the patients of A. S. D. is autistic-like traits/symptoms. A strong genetic association has been shown between autistic-like symptoms and A. S. D.^[6] The American Academy of Pediatrics recommended avoiding children <18 months of age to screen media use.^[7] When a toddler gets exposed to screen use before 3 years of age, along with developmental risks in the long term, there are also socioemotional, behavioral, and

Address for correspondence: Dr. Suprakash Chaudhury, Department of Psychiatry, Dr. D. Y. Patil Medical College, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune - 411 018, Maharashtra, India. E-mail: suprakashch@gmail.com

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cognitive problems.^[8] A causal developmental trajectory of A. S. D. was recently put forward by Heffler and Oestreicher, who concluded that audio-visual input due to screen viewing during infancy would affect the brain pathways specializing in audio and visual stimuli in a nonsocial manner.^[9] With digitalization, there was an increase in the screen media use by people from all generations. The emergent COVID-19 pandemic had caused the people to be quarantined, made them follow home isolation and reduced the social gatherings, causing us to be more addicted to the use of screens. This became even more of a curse for those parents with toddlers, who had to work from home. There is a gap in literature regarding the effects of screen viewing on toddlers as this is an emergent condition due to digitalization and increase in its impact because of social isolation resultant of COVID-19 pandemic. In the present study, we aimed to evaluate the impact of screen media use and its effects on toddlers by calculating the amount of screen time and the presence of autistic-like symptoms in them.

MATERIALS AND METHODS

This was a hospital-based cross-sectional study of toddlers attending the Vaccine Clinic at the Department of Pediatrics in a Tertiary care Hospital attached to a Medical College. Approval for this

study was obtained from the Institutional Ethics Committee (I. E. C./2020/009 dt January 2, 2020). A written informed consent form in the local language was signed by the parent/primary caregiver after explaining the nature of the study.

Study sample

Using a random sampling technique, a sample of 80 toddlers aged between 9 and 36 months were enrolled for the study, conducted from January 3, 2020, to March 28, 2020. Toddlers exposed to screens (television/smartphone/tablet/laptop) and were being attended to constantly by a parent/primary caregiver were included in the study. Toddlers with birth complications or with known genetic disorders or general medical disorders and those parents who are not willing to participate in the research were excluded from the study.

Methods

Toddler factors were assessed using a pre-tested questionnaire regarding the birth order, perinatal

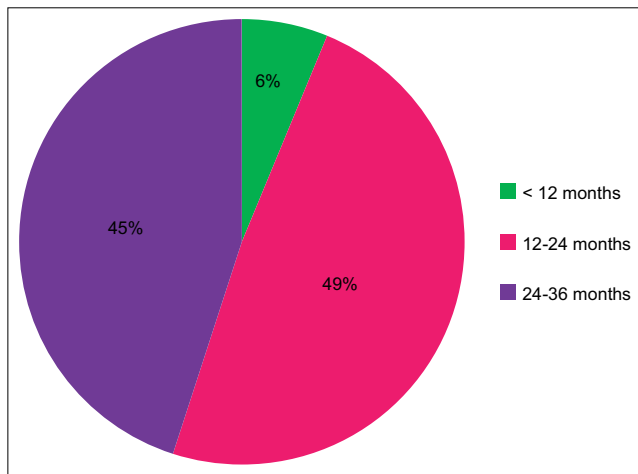


Figure 1: Toddler age

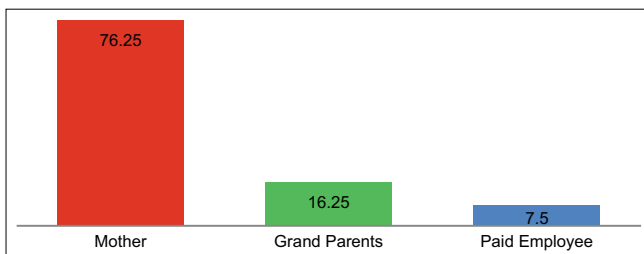


Figure 3: The primary caregiver of the toddler

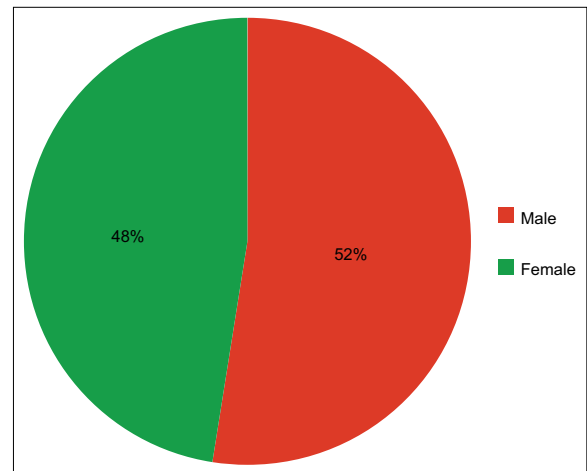


Figure 2: Gender distribution of toddlers

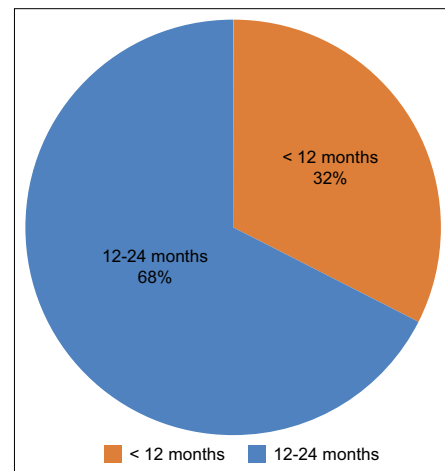


Figure 4: Age of first exposure of toddlers to screen media use

factors, and parent-child interactions, filled by the parent/caregiver. The caregiver was also interviewed about the screen time of toddlers when he views them and also whether it occurs in relation to other activities. Screen time is defined as time spent/occupied by a particular individual using a device such as mobile, computer, television, and game console.^[10] In the case of toddlers and children, the screen time may be active or passive. Active form in which the child is exposed to viewing the device by himself and without the presence of the primary caregiver. In passive exposure, the toddler sees the screen in the presence of another person (primary caregiver/family member/supervising adult) who themselves are using the electronic media.^[11] All the subjects were screened for autistic-like symptoms using the Modified Checklist for Autism in Toddlers-Revised (M-CHAT-R), a validated two-stage parent-report screening tool to assess the risk of A. S. D. among toddlers. This scale consists of 20 items, which uses a two-point Likert scale of yes/no response. The total scoring ranges from 0 to 20 where increasing scores indicate more significant autistic-like symptoms. The score is divided into three groups, with 0–2 constituting low risk, 3–7 being a moderate risk, and 8–20 has high risk. If the child is <2 years of age and has a low risk on the scale, then assess the child again after 2 years. In case the child scores between 3 and 7, the second stage of the questionnaire is administered as a follow-up. When the score remains two and above, the child has screened positive and to be referred for diagnostic evaluation. When the child scores above 8, he/she immediately needs to be referred for diagnostic assessment and early intervention. The scale has a Cronbach's α of 0.79. A cut off score of 2 gave the scale a sensitivity of 94% and specificity of 83%.^[12]

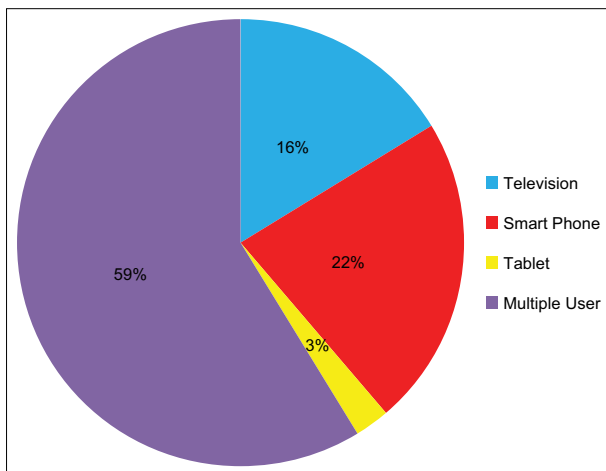


Figure 5: Screen used by toddlers

Statistical analysis

The characteristics of the study population were categorical and expressed as percentages. A Chi-square test was used to analyze the outcome measures. A multiple regression analysis was applied by stepwise methods to identify the predictors of MCHAT R scores. We analyzed the data using S. P. S. S., version 22.0 (I. B. M., Armonk, NY, USA). A $P < 0.05$ was considered to be statistically significant.

RESULTS

Table 1 describes the study characteristics. 52.5% of toddlers were male, and 47.5% were female. About 48.8% of the toddlers in the study were aged between 12 and 24 months, 45% were 24–36 months, and only 6.2% were <12 months of age. About 80% of the sample had parent-child interactions, while the other 20% had not. The age of first exposure of the toddler to screen media was assessed, where 67.5% of them were exposed

Table 1: Characteristics of the study population

Variable	n (%)
Gender of toddler	
Male	42 (52.5)
Female	38 (47.5)
Age of toddler (months)	
<12	5 (6.2)
12-24	39 (48.8)
24-36	36 (45)
Parent-child interaction	
Yes	64 (80)
No	16 (20)
Age of first exposure (months)	
<12	26 (32.5)
13-24	54 (67.5)
Primary caregiver	
Mother	61 (76.2)
Grandparents	13 (16.2)
Paid employee	6 (7.5)
Duration of screen use per day (h)	
<1	10 (12.5)
1-2	29 (36.2)
2-4	24 (30)
>4	17 (21.2)
Screen used by toddler	
Television	13 (16.2)
Smart phone	18 (22.5)
Tablet	2 (2.5)
Multiple user	47 (58.8)
M-CHAT-R score	
0-2	6 (7.5)
3-7	54 (67.5)
8-20	20 (25)

M-CHAT-R: Modified Checklist for Autism in Toddlers-Revised

between 13 and 24 months and 32.5% before 12 months of age [Figures 1 and 2].

In this study, the primary caregiver was the mother in 76.2% cases, followed by grandparents in 16.2% sample, and a paid employee was responsible for the well-being of the toddler in 7.5% of cases. The amount of time a toddler is exposed to screen media use per day, according to the primary caregiver, after taking into account both the active and passive exposure, has been calculated. The majority of the toddlers (36.2%) were screen viewing only for about 1–2 h/day; 30% of the study sample availed 2–4 h/day screen time, and more than 4 h/day of screen media exposure was seen in 21.2% of toddlers. However, there is a small study population of 12.5%, who watched the screens for <1-h duration in a day. Nowadays, every household has virtual gadgets for entertainment. In this study, we calculated the use of screen media by toddlers, where the majority of the toddlers, 58.8%, were multiple screen users. Multiple screen users are those who watch a screen actively but at the same time also watch another screen used by the primary caregiver/family member/another adult. In the current study, smartphones were most commonly used by toddlers to view screen media (22.5%) followed by televisions (16.2%) and tablets (2.5%). On the M-CHAT-R Scale in our study, 67.5% of the toddlers were at moderate risk of developing Autism by scoring between 3 and 7 on the scale. About 25% of the study population scored between 8 and 20 and were considered to have a high risk [Figures 3–5].

A significant statistical correlation was present for the duration of screen use by toddler per day with M-CHAT-R score ($P = 0.001$); screen used by a toddler with M-CHAT-R score ($P = 0.027$); screen used by a toddler with the duration of screen used per day ($P = 0.001$); and finally with the screen used by toddler versus the toddler's age ($P = 0.004$) [Table 2].

A multiple linear regression was calculated to predict MCHAT score in toddlers from age, sex, order of birth, domicile, consanguinity, antenatal complications, place and type of delivery, duration of pregnancy, birth weight, NICU admissions, developmental delay, parent child interaction, primary caregiver, age at first exposure to screen, who is present while watching, toddler in vicinity of caregiver, time of viewing, electronic media at home, duration of use per day, how many times a day, number of screens at a time, and screen use with other activities, using the stepwise method. A significant regression equation was found ($F_{3,75} = 23.375$, $P < 0.000$) with an R^2 of 0.483. Significant variables were how many times per day (Beta = 0.504; $P < 0.000$), duration of use per day (Beta = 0.229; $P < 0.000$), and toddler in vicinity of caregiver (Beta = 0.231; $P < 0.032$) [Table 3].

DISCUSSION

The key findings of the study showed that the majority of study toddlers were aged between 12–24 months (48.8%), and about 67.5% of the toddlers were first exposed to screen use when they were aged between 13–24 months. About 1–2 h/day of screen time was seen in the majority of the study sample. However, the autistic-like symptoms were more prominently noted in the toddlers who viewed the screen for 3–4 h/day. This increase in autistic-like symptoms with increased screen time might be due to reduced social interaction, reduced the duration of self-play using imagination in children due to the preoccupation of the toddlers for watching the screens. Furthermore, the use of screen limits the toddler from developing their sensory perception otherwise available through other avenues such as playing with toys, running about in the house touching things, playing with water/sand. We observed a slight male preponderance (52.5%) compared to the females (47.5%) in the enrolled study sample. Some other studies have reported a similar male dominance in their studies, which may indirectly reflect the prevalence of A. S. D., where the male to female ratio is 4.3: 1.^[13] The current study collected information regarding screen use in children aged 9–36 months. We found that the majority of participants were aged 12–24 months (48.8%). Among these toddlers, about 72.2% had smartphones as a source of screen media exposure, followed by 44.7% of multiple screens users. This finding is similar to an earlier study on children aged 0–6 years which reported that about 70% of 0–2 years old participants had screen media use.^[14] The reasons for early screen exposure to toddlers may be numerous depending on the familial situations such as need of parent for some personal time, need of parent to complete household chores without distraction while bringing up a toddler is a full-time job. In a young child, the development of social, cognitive, behavioral, and emotional responses depends on parent–child interactions. About 80% of the study population in our study had parent–child interaction, while 20% had no interaction with their parents. A cohort study in the U. S. reported that lesser parent–child interactions in the earlier stages of life, along with greater screen exposure, were associated with later autistic-like symptoms.^[9] The

Table 2: Correlation and P value for variables tested

Variable	Variable	χ^2 ($P=0.05$)
Duration of screen use	M-CHAT-R score	0.001
Screen used	M-CHAT-R score	0.027
Screen used	Duration of screen use	0.001
Screen used	Toddler age	0.004

M-CHAT-R: Modified Checklist for Autism in Toddlers-Revised

Table 3: Multiple regression analysis for predictors of MCHAT-R score: Coefficients^a

Term	Coefficient	Standard error of coefficient	95% CI	T	P
Constant	0.652	0.197	0.260-1.045	3.313	0.001
How many times per day	0.504	0.107	0.291-0.718	4.703	0.000
Duration of use per day	0.229	0.049	0.132-0.326	4.702	0.000
Toddler in vicinity of caregiver	0.231	0.106	0.020-0.442	2.181	0.032

^aDependent Variable: MCHAT-R, CI: Confidence interval, M-CHAT-R: Modified Checklist for Autism in Toddlers-Revised

toddlers learn to model their parental behavior while growing up and decreased interaction with parents can restrict their developmental outcome and lead to autistic-like behavior in them.

The age of first exposure to screens also has a vital role to play in the developmental outcome in toddlers. In our study, 32.5% of participants belong to the <1-year age group, and 67.5% were aged 13–24 months. High risk for Autism and more significant autistic-like symptoms were seen in 30% of infants below 1 year of age. A comparative retrospective study regarding television viewing was done between children with A. S. D. and controls. In that study, the authors concluded that children with A. S. D. were exposed to screen viewing before 12 months of age. Nevertheless, both control and A. S. D. groups were screen viewing before 24 months of age, against the A. A. P. recommendations.^[15] This observation questions the cause and effect of the autism disorder as to whether increased screen time leads to autistic-like symptoms and then to autism or whether the toddlers with preexisting vulnerability to develop autism employ more time in screen viewing as a preference of solitary activity. Another longitudinal study performed on toddlers aged <2 years of age with exposure to television had reported that there is no improvement in the cognitive development of those 2-year-old when compared to their nonviewing peers by the age of 3 years.^[16]

The present study focused on the relationship between the amount of screen time in toddlers and the occurrence of autistic-like symptoms in them. Accordingly, our results showed that as the duration of screen time increases, the risk of scoring high on the M-CHAT-R scale also increases. 53% of toddlers in our study had more than 4 h of screen time per day, scored between 8 and 20, and were considered to be at high risk for A. S. D. Several studies have observed the impact of increased duration of screen time on the outcome variables in toddlers. An increase of A. S. D.-like symptoms was notable in a survey done by Heffler and Oestreicher at 12 months of age when exposed to screen viewing.^[9] Limited screen information regarding the factors such as duration of viewing per day, exposure to all screen types were shortcomings. Hermawati *et al.* conducted a study

on “Early exposure to screen media and autistic-like symptoms” in nine children. They stated that all their study participants were exposed to screen before 2 years of age, and in those infants with <3 h of screen use, they noted language delay and short attention span. In the case of toddlers with more than 3 h of screen viewing, they observed language delay, short attention span, and also hyperactivity.^[17] The present study due to its cross-sectional nature was unable to observe the detailed developmental shortcomings in the toddlers.

Limitations

One of the limitations of the study is that samples taken from a single institute cannot be attributed to the general population. Another limitation is the recall bias of the primary caregiver, which we tried to minimize as much as possible. The lack of reassessment, follow-up plan for toddlers in the study and the lack of comprehensive clinical evaluation of the screen positive toddlers by psychiatrist were other short-comings in this study. Furthermore, the plan for the management in cases of screen positive toddlers was not elaborated in this study. These should be addressed in future studies.

CONCLUSION

With increased the duration of screen time in toddlers, the risk of autistic-like symptoms also increases. Screen media use by toddlers negatively impacts their developmental outcome by causing them to develop autistic-like symptoms. Regardless of the viewing screen, the duration of screen time has a greater impact on the toddler. With the COVID-19 pandemic and strict social norms, more and more people belonging to different age groups were addicted to their screens and also exposing their off-springs to screen media use to divert some of their attention and energy. Therefore, it is of great importance to educate the parents about the effect of screen media use on the developing brains of toddlers. It is also essential to increase their awareness about the positive outcomes the parent–child interactions bring in their children. More research is needed in this area in the future due to digitalization and progress into online educational teachings, the danger of being further addicted to screens increases.

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Conflicts of interest

There are no conflicts of interest.

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