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Original Article

Effects of Increased Electronic Screen Exposure and Its Relation with Autistic Spectrum Symptoms (ASD) – A Cross Sectional Study in Peshawar

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Abstract

Background: Increased exposure to Light Emitting Diode (LED) screen or virtual media can affect the brain development process in children below 6 years of age. The symptoms after prolonged exposure are similar to Autism or Autism spectrum disorders (ASD).
Objective: To determine the effects of increased electronic screen usage on speech, behavioural and cognitive development in ASD children.
Study type, settings & duration: This cross-sectional study was conducted at Speech Therapy units of Rehman Medical Institute, Northwest Hospital & Combined Military Hospital and Autistic Jewel Centre in Peshawar from June to October 2020.
Methodology: A total of 100 children of age 1- 6 years were surveyed with the help of a questionnaire based on DSM-5 handbook and ASD assessment screening criteria through convenient sampling technique. Children who had speech delay, irritability and hyperactive behaviour were included in the study whereas children with diagnosed genetic developmental defects were excluded from the study. Data was analysed for descriptive analysis on SPSS version 24. The Chi square test was used to compare frequencies keeping $p \leq 0.05$ as significant.
Results: Children exposed to virtual media for more than 2 hours/day showed more significant issues with speech/communication (p=0.00018), social interaction (p =0.01), emotional responsiveness (p =0.01), behavioural pattern (p =0.0038), sensory (p =0.003) & motor aspects (p =0.01) and cognitive components (p =0.007) of child development as compared to children less than 2 hours/day of screen exposure.
Conclusion: The excessive electronic screen utilization relates to autistic symptoms. Longer screen time increases the chances of developmental delays and ASD like symptoms in children.
Key words: Electronic screen, virtual autism and autism spectrum disorders (ASD).

Introduction

The exposure to virtual screen time has risen so much among children in the last decade that it raises questions about how screen time can affect them.[1] Electronic screen time refers to the amount of time spent in front of any screen, including television, video games, smartphones, or computers.[2] According to the literature, increased screen time in young children is correlated to consequences such as reduced cognitive capacity, delayed language development, temperament issues and autistic-like behaviour such as irritability, reduced attention span, and behavioural problems.[3] Now-a-days, children in the world spend a lot more time with virtual media than children who were formerly socially interactive. Parents consciously encourage their children for using virtual digital media as a tool to engage and keep them busy, allowing the parent to function independently.[4]

The term Virtual Autism refers to overexposure to blue light in LED screens that can cause abnormal levels of neurotransmitters which results in erratic behaviour and decrease in intelligent and emotional quotient in children.

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Authors Contribution

AB conceptualized the project. SNK, HR, UK & MM did the data collection. SNK & HR also did the literature search. SA performed the statistical analysis. Drafting, revision & writing of manuscript were done by AB & SNK.

Increased early screen exposure below the age of 12 months can cause potential damage in developing brain and can show negative effect on child's psychological growth & symptoms of which are similar to that of ASD.[5] Children with virtual autism have shown a lack of communication and speech delay in early ages. Symptoms of virtual autism include nonexistence relationship with other children of same age, erratic behaviour and other cognitive impairments.[6]

Autism Spectrum disorders (ASD) are group of diseases, responsible for behavioural and emotional intelligence and attention deficit in children which becomes permanent with age.[7] Simply, ASD are neurodevelopmental disorders which include compromised social interactions, communication and imaginative skills.[8] The prevalence of ASD has increased in the 20th century but there is a difference in the prevalence of ASD in different regions of the world. ASD prevalence in the United Kingdom is 116.1per 10,000 children whereas 12 per 10,000 children in China and 2.64% in South Korea.[9,10] It has also been statistically observed that ASD is more common in male children as compared to females.[11] There is a subjective evidence that children with ASD have great interests in computers and technology as compared to their physical environment. This preoccupation with increased screen time practices can be problematic among ASD children, resulting in poor health outcomes and a barrier to physical activity.[12]

This study, conducted on urban and surrounding area of Peshawar, Pakistan, focused on children who are 1- 6 years of age coming to children Psychiatric/Speech Therapy clinics for Speech delay, short attention span and hyperactivity treatment. This research was focused to determine the effect of increased screen time on the social, behavioural and cognitive development of these children.

Methodology

This cross-sectional study was carried in four Speech therapy centres in Peshawar, namely Speech Therapy unit of Rehman Medical Institute, Northwest Hospital & Combined Military Hospital and Autistic Jewel Centre from June to October 2020.

The sample size was determined with help of WHO sample size calculator (where z is 1.96 and p is 1%).[13,14] A sample of 100 children between 1-6 years of age, coming to these psychiatric/Speech clinics were selected through convenient sampling method. Children who had speech delay, irritability and hyperactive behaviour were included in the study whereas children with diagnosed genetic developmental defects were excluded. After literature review, a questionnaire was developed modified from DSM-5 handbook and ASD assessment screening criteria. The questionnaire was validated and pretested. Informed consent was taken from all the parents of under study children to ensure confidentiality. The data was collected by interviewing their parents based on the questionnaire. The questionnaire had seven domains namely demographics, screen time hours/day, social interaction & emotional responsiveness, language development, behavioural aspects, sensory & motor aspect and cognitive component of child development. Data were analysed for descriptive analysis on SPSS version 24. The Chi square test was used to compare frequencies keeping p≤0.05 as significant.

The Ethical approval was obtained from Institutional Research and Ethics Board of Postgraduate Medical Institute, Lady Reading Hospital, Peshawar.

Results

A total of 100 participants from four different children psychiatric clinics were enrolled in this study. Out of these, 73 were male children and 27 were female children. About 9% were between 1-2 years, 24% were between 2-3 years, 27% were between 3-4 years, 23% were between 4-5 years and 17% were between5-6 years (Table).

Table: Demographic distribution of study participants with respect to age and gender.

Age (Years)	*Male*		*Female*		*Total n (%)*
	f	*%*	*f*	*%*	
1-2	8	88.9	1	11.1	9 (9)
2-3	19	79.2	5	20.8	24 (24)
3-4	19	70.4	8	29.6	27 (27)
4-5	15	65.2	8	34.8	23 (23)
5-6	12	70.6	5	29.4	17 (17)
Total	73	73	27	27	100 (100)

It was found that 83% of the study participants had nuclear family whereas 17% had joint family system. During this survey, we found out that 85% of the study participants had more than 2 hour's media exposure.

It was also observed that study children with 2 hours or more screen exposure had issues with responding to normal situations. Approximately 48% children had slower response to react to normal situations whereas 19% of ASD children were non-responsive. The difference is significant with *p value <0.05* (Figure).

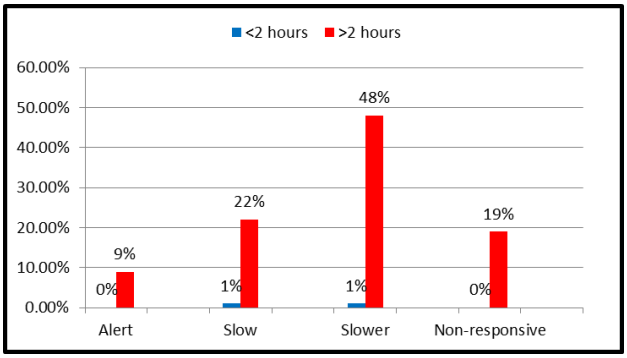

Figure: Relationship of children's response to normal situations with exposure to electronic screen media.

Most of the children exposed to virtual media for more than 2 hours/day had shown extreme level of ASD benchmarks as compared to less than 2 hours of screen exposure. The data analyzed on seven characteristic features of ASD were compared with length of screen time. The comparative relationship between social interaction and screen exposure length was found to be significant in more than 2 hours exposure (*p* 0.0169). The speech delay and communication component was highly significant in children having more than 2 hours of screen exposure (*p* 0.00018). Children with more than 2 hours of screen exposure also showed more issues on their emotional responsiveness than those with less than 2 hours of screen exposure. Similarly, significant difference was found in the behavioral pattern and sensory aspects of children having more than 2 hours screen exposure (*p* 0.0038 and 0.0126 respectively). Children with more than 2 hours screen exposure showed more issues with motor coordination (*p* 0.0322). Similar results were found in case of cognitive development of these children. The children with more than 2 hours of screen exposure displayed higher rate of cognitive problems (*p* 0.0074).

Discussion

The comparison between the exposure to virtual media and responsiveness to outer environment suggested that children with more than 2 hours of screen exposure had much slower responses than children with less screen exposure as the American Academy of Pediatrics recommended that children should not be exposed more than 2 hours to electronic screen.[15]

This delayed responsiveness of the children could be due to their overexposure to virtual media which was similar to research done by Twenge and Campbell in 2018.[16] As in current study, we didn't use a control to check the responsiveness of children so we could not suggest that the slow response to outer environment was only due to virtual media exposure. However, the difference in the responsiveness between exposure duration for less than 2 hours screen exposure and more than 2 hours screen exposure was quite significant to be ignored. Twenge, J and Hermavati. D had also established that with increased screen time, the responsiveness to the outer world could be slower and symptoms related to ASD could be increased[4,16] as consistent with our study results.

We also compared behavioral responses of children with less and more than 2 hours/day electronic screen time. The same results were described by a study conducted by Guerrero et.al, which showed that greater screen time exposure was associated with behavioral problems.[17] Social awareness of the children more than 2 hours was found deeply disturbed. They were anxious to make new friends and communicating with new people. They can neither easily imitate other people's action nor understand their emotions. These results were consistent with another study by Lissak G. who suggested that excessive screen time had adverse effects on physiological and psychological health of the children.[18] The difference between social behavior of children among children with less than and more than 2 hours of exposure was quite significant and could be directly attributed to the over exposure of electronic media.

The work conducted by Twenge and Campbell showed that more than 1 hour screen usage had less emotional stability and self-control.[19] The similar results were found in respect of emotional responsiveness of children during our study. They were found to throw tantrum very easily, get irritated quickly and did not show emotion or any kind of response when confronted after making mistakes. The difference between responses between more and less than 2 hours of exposure was quite significant. Gwynette MF suggested that children who were more inclined towards virtual media had emotional distress and depend on virtual media for their activities.[20] In our study, we found that these children were more possessive of inanimate objects and did not take well for any changes in their routines. Literature also showed that these children were mostly hyperactive and depend on virtual media for their daily chores and normal routines.[4,18] As consistent with our study results which also showed that children did not have any fear for physical danger and showed unusual responses towards unfamiliar people and objects.

In case of speech and communication, children with more than 2 hours daily exposure had issues with communication, and delayed speech. The similar results were observed by Chonchaiya and Pruksananonda study in 2010, which also confirmed that toddlers watching TV more than 3 hours had 3 times more risk of speech delay.[21] Another study by Duch et.al. conducted a survey to find the relationship between communication issues of children and TV exposure, showed that children watching more than 2 hours of TV per day had increased chances of low communication scores.[22] The study had certain limitations as only four speech therapy centres were selected for this survey from the Peshawar district. At the same time convenient sampling technique was used, so the results cannot be generalized. Further more elaborated work is required to produce conclusive results to establish the relationship between increased screen time and disturbed psychological, behavioral, communication & cognitive development in children.

Although the effects of virtual media exposure have been studied worldwide, there was no conclusive proof of its direct correlation with deteriorating mental health of children and other ASD aspects. This work managed to establish a relationship between hours of exposure to virtual media and the disturbed behavioral pattern which can be recognized as a part of Autism Spectrum Disorder.

However present work make it quite clear that children with more than 2 hours of virtual media exposure developed many developmental issues. This should be taken into consideration both by parents and family members.

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