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Effect of screen time in the clinical outcome of therapy in children with Autism spectrum disorder and social communication disorder

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ABSTRACT

Children of present day are exposed to excessive screen time from a very young age itself. Among the factors which contribute to this is easy accessibility to gadgets, nuclear families with less support for childrearing due to parental preoccupation, etc. Though there are studies addressing the association between screen time and health effects, there isn't any study addressing the effect of screen time on progress of therapy session in children with special needs, especially Autism or social communication disorders. For the present study, we enrolled children between 2-5years with ASD / SCD and assessed their initial problems and improvement post interventions with ATEC scoring. They were questioned about the screen time their children were exposed initially as well as at the end of training duration and were grouped as <1 hour and >1 hour. Following complete assessment using all the required tools, the children were given all the required standardised therapies according to our unit protocol for ASD and SCD, respectively. This includes sessions of Occupational therapy, speech therapy, ABA, etc. for 6 months. The effect of the sessions in the form of improvement in ATEC scores- total and individual domain scores of both ASD and SCD children were correlated with the screen time exposure and assessed for significance. 70 % of the kids with special needs (ASD& SCD) had media exposure >1 hours in the first year itself and were continuing at >2 hour/day. The present study showed that screen time has significant negative influence affecting improvement following therapies in both ASD and SCD. But ASD children seem to be more affected than SCD. We caution the use of low quality Screen media intervention in therapy sessions or home for engaging these 2 groups of children.



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INTRODUCTION

Communication disorders in children could be due to language disorders, speech sound disorders, fluency disorders, socialisation/pragmatic disorders and unspecified disorders. Autism Spectrum Disorders (ASD) and Social Communication Disorder (SCD) are closely related entities falling under this category. SCD is characterized by a persistent difficulty in using verbal and nonverbal communication in a socially appropriate manner, which is not otherwise explained by other causes such as global developmental delay, autism spectrum disorders, intel-

lectual disability, or hearing impairment. DSM-5 defines this as a separate disorder. Initially, it was not thought to be a separate entity from ASD, while ASD does comprise of social communication issues, but it also includes restricted, repetitive stereotypical behavior. ASD must be ruled out for SCD to be diagnosed. So, a separate diagnosis of SCD had to be coined to warrant that the distinctive requirements of these children were fulfilled (Swineford *et al.*, 2014).

The increasing accessibility of smart phones, and other gadgets has increased their usage among the parents and in turn, the children are being exposed to media like mobile, T.V, computer direct and indirectly at a very early age, not only at home but at the daycare centres too, which is affecting the neuro-cognitive development, and social communication of these children among other ill effects (Christakis and Garrison, 2009). Even though the American Academy of Paediatrics (AAP) has laid down guidelines that children less than 2 years of age should not be exposed to any kind of media, in ages 2-4 years, it should be limited to less than 1 hour per day and beyond 5 years it can be up to a maximum of 2 hours, application of this rule is not applicable in social communication disorders (Bar-On *et al.*, 2001).

There are many recent studies which prove that children are spending more time than appropriate watching media (Tomopoulos *et al.*, 2010), and there are studies which have established that children who are exposed to media early in life there more chances of increased watching Digital media later on in life (Bar-On *et al.*, 2001). There are other problems identified like attention disorders at 7 years of age, which was linked with early exposure to television. (Christakis *et al.*, 2004) and even it effects the overall development as shown in study by tomopoulos *et al.* in their study they have done longitudinal analysis which included 259 mother-infant dyad over a period of 2 years 2 months in which they noted that 96.1% of children were exposed to media at 6 months of age and the duration of media exposure at 6 months of age was noted to be associated with lower cognitive and language development at 14 months of age (Tomopoulos *et al.*, 2010).

There are no studies which determine the effect of excessive screen time on the improvement following therapy in the symptoms in children with ASD and SCD hence our study is one of a kind which shows that the excessive screen time effects the amount of improvement following therapy in children who already have communication disorder such as ASD and SCD. Hence it becomes even more necessary to

create awareness regarding stopping the usage of screen time till 5 yrs of age.

MATERIALS AND METHODS

For the present study, ethical approval has been obtained, and informed consent was taken from the parents. All the children who were diagnosed with autism spectrum disorders and social communication disorder by using DSM-5 criteria at the Saveetha child development centre by a developmental pediatrician and clinical psychologist were enrolled.

They were assessed using Autism Treatment Evaluation Checklist (ATEC) prior to starting therapy. ATEC measures the condition on 4 domains – speech, socialization, sensory/cognitive awareness and Physical/ health/behavior. It gives a domain specific (speech-0-28; Socialisation-0-40; sensory/ Cognitive -0-36 and physical/health/Beh-0-75) and total score (0-180). The hours of screen time children enjoyed were assessed. They were divided into two groups of less than 1 hour and more than 1 hour in the age group of 2-5 years old children considering AAP recommendation.

After six months of needed modalities of therapies comprising of ABA, occupational and speech therapy, etc., the children were reassessed using ATEC and the percentage of improvement was noted down compared to prior to therapy. These scores were compared in both groups of children with lesser screen time and prolonged screen time and the data was analysed using SPSS -20.

RESULTS AND DISCUSSION

Screen media is being widely used by parents to keep the children occupied or to distract them. In spite of the AAP recommendations which clearly state that children below the age of 2 years should not have any exposure and 2-5 years old should have lesser than 1 hour, the usage is starting early, as is shown by many studies (Tomopoulos *et al.*, 2010; Christakis and Garrison, 2009). There are many ill effects of excessive media exposure, such as delay in language development. This has led AAP to come out with these recommendations. This early exposure and continuing exposure will not only result in speech & language disorders but also retard the progress of already established disorders. We had 4 girls and 10 boy children with SCD and 6 girls and 10 boys with ASD in the study sample. In a study done in Thailand it was shown that children who started viewing TV at less than 1 year of age and who watched for more than 2 hours per day had a six fold more chance of developing language delay (Chon-

Table 1: Comparison of Pre and Post ATEC scores with respect to the screen times

Screen time	N	Mean	Std.Deviation	Sig. (2-Tailed)
ATEC score-Pre <1 hour	9	98.44	37.918	0.663 (NS)
>1 hour	21	91.38	41.196	
ATEC score- Post <1 hour	9	70.00	26.258	0.386 (NS)
>1 hour	21	82.48	38.675	

NS-Not significant

Table 2: Correlation of pre and post ATEC scores with age

Age	Mean	Std.Deviation	Sig.
Pre 2-3 years	102.00	41.398	0.355 (NS)
3-4 years	80.50	33.630	
4-5 years	102.60	48.402	
Total	93.50	39.723	
Post 2-3 years	87.62	37.156	0.348 (NS)
3-4 years	67.17	32.716	
4-5 years	83.40	36.508	
Total	78.73	35.434	

NS-Not significant

Table 3: Correlation of pre and post ATEC scores with sex

Sex	Mean	Std. Deviation	Sig.
Pre Male	90.95	39.233	0.627 (NS)
Female	98.60	42.327	
Post Male	74.40	32.608	0.352 (NS)
Female	87.40	40.937	

NS-Not significant

Table 4: Correlation of pre and post ATEC scores with the diagnosis

Diagnosis	Mean	Std. Deviation	Sig.
ATEC score- Pre ASD	126.94	19.875	0.000***
SCD	55.29	10.745	
ATEC score -Post ASD	107.31	21.666	0.000***
SCD	46.07	10.254	

*** P value: <0.001

Table 5: Screen time in conditions Vs Improvement

Condition/ Hour of exposure	Percentage improvement
ASD<1 hr	38.2/127.60 x100 29.93%
ASD>1 hr	11.182 x100/126.64 8.8%
SCD<1 hr	16.25x 100/62 26.2%
SCD >1 hr	6.40x100/52.6 12.16%

Table 6: ASD ATEC score vs screen time<1 hour

ASD with screen time <1hour	Mean	Std.Deviation	Sig.
ATEC score Pre-	127.60	15.241	0.000***
ATEC score Post	89.40	10.359	

*** P<0.001

Table 7: ASD ATEC score vs. Screen time>1 hour

ASD with screen time >1hour	Mean	Std.Deviation	Sig.
ATEC score Pre-	126.64	22.344	0.000***
ATEC score Post	115.45	20.685	

***P<0.001

Table 8: SCD ATEC score vs.<1 hr screen time

SCD with screen time <1hour	Mean	Std.Deviation	Sig.
ATEC score Pre-	62.00	18.348	0.001**
ATEC score Post	45.75	16.860	

**P<0.05

Table 9: SCD ATEC score vs.>1 hr screen time

SCD with screen time <1hour	Mean	Std.Deviation	Sig.
ATEC score Pre-	56.20	5.147	0.008**
ATEC score Post	46.20	7.554	

**P<0.05

Table 10: Comparison of pre and post ATEC scores in each of the domains

	Mean	Std. Deviation	Sig.
ATEC Score -Pre	93.50	39.723	0.000***
Post	78.73	35.434	
ATEC Score domains			
d 1-Pre	24.53	2.991	0.000***
D 1- Post	20.27	3.600	
d 2-Pre	21.70	13.086	0.000***
D 2- Post	18.27	10.907	
d 3 -Pre	25.73	8.346	0.000***
D 3- Post	21.03	8.311	
d 4-Pre	21.43	17.262	0.000***
D 4- Post	19.17	15.494	

*** P<0.001

Table 11: Wilcoxon signed Ranks test on total and all 4 domains Teststatistics^b

	ATEC score-Post-ATEC Score-Pre	D1-Post -D1-Pre	D2-Post -D2-Pre	D3-Post -D3-Pre	D4-Post -D4-Pre
Z	-4.785a	-4.795a	-4.317a	-4.801a	-4.035a
Asymp.Sig(2tailed)	.000	.000	.000	.000	.000

a- Based on positiveranks b- Wilcoxon Signed Ranks test

chaiya and Pruksananonda, 2008).

In the present study almost 100% of these children with special needs were exposed to TV / mobile before 2 years of age. It is being used even to make children occupied or happy and in spite of parental counselling by their primary pediatricians, 95% of parents continue to give gadgets as they feel it is easy to make the child comfortable and manageable with

it. Probably, such a scenario might have prompted AAP to come out with a media management tool for parents and they have even recently release a "Family Media Plan tool" to educate parents and plan a media exposure for their kids by the active involvement of parents.

In the present study, 70 % (n=21) of the kids with special needs (ASD& SCD) had media exposure >1

hours in the first year itself and were continuing at >2 hour at the time of the study. Only 9 of them had media time <1 hour/day, as in Table 1.

We found that there was no relation between job opportunities for parents, as 80% of the parents were not having outside jobs and were looking after the kids at home. However, this may need a larger study to be statistically significant. It is proven that good communication skills, including both receptive and language skills at an early stage is important for good adult mental health later on and psychosocial adjustment; hence, children should be protected from exposure to media at early age to prevent this from happening (Schoon *et al.*, 2010).

We had a 2:1 male to female ratio, but our study sample is small to conclude the sex ratio from it. Further, as purposive sampling method to recruit children with these disorders was chosen and there is a proven increase in the incidence of ASD among boys, this ratio is expected. However, the study doesn't give a 4:1 M: F ratio, as is seen in the study (Idring *et al.*, 2015). It goes more in favour of more recent studies, which give a lesser figure in this aspect (Loomes *et al.*, 2017). Further, we did not get any significant male: female difference in outcome following interventions in both the SCD and ASD group when assessed with t-test. One-way ANOVA done to assess the association between effect of interventions among the age groups (2-3; 3-4 and 4-5 year group) also did not give any significant difference among the means of change scores following interventions $P > 0.05$ as in Table 2.

Though there are studies to prove that female sex is protected from genetic and hormonal factors in aggravating manifestation of ASD, the present study does not show any significance in the response to treatment in these two disorders (Werling and Geschwind, 2013). T-test analysis done to understand the significance of sex on the response to treatment options did not show any statistical significance at $P > 0.05$ as shown in Table 3.

The pre-intervention and post intervention scores of both ASD and SCD group were assessed by t-test for equality of means at $P < 0.001$ Table 4.

In both ASD and SCD groups, screen time was found to be affecting the scores for assessing improvement. However, the improvements in SCD group was found to be less affected with >1 hour screen time (12.16%) when compared with ASD (8.8%) as in Table 5.

This point to the fact that screen-time impairs the improvement in children even when effective interventions were going on in both ASD and SCD. How-

ever its negative implications in SCD were lesser than in ASD and hence parents have to be more cautious with use of media especially in ASD children even with therapy. However even in SCD children, the screen time should be selected, monitored and quality of program should be checked by parents to enable children get quality program at optimal time and not over exposure.

Screen time was found to be important influence in ATEC scoring in both <1 hour group and >1 hour group for ASD (p -value<0.001) and SCD (p -value<0.05).as seen in Tables 6, 7, 8 and 9.

The performance of ASD and SCD children before and after completing the therapy program were noted and analyzed the differences using a paired sample *t*-test and improvement in different domains was analysed by Wilcoxon signed ranks test. We found significant improvement (p -value <0.001) in all 4 domains as well as total score of Autism treatment evaluation checklist (ATEC) when used to find the improvement Table 5. Of particular importance was the 3rd domain, which measures sensory/cognitive domain, which showed a significant difference in pre and post test. This may be due to the higher cognition and no/lesser degree of sensory issues in SCD when compared with ASD. We used this to find if the same ATEC, which was used for evaluation before, has the same role in assessing improvement after the SCD had been separated from ASD and put as a separate entity since 2013 in the last version of DSM-5. ATEC was found to be useful in both ASD and SCD groups in follow-up monitoring for improvement/ deterioration.

T-test was performed to assess the significance of improvement in pre and post total and domain specific ATEC scoring before and after interventions with values returning as <0.0001 in total and domain specific scores as in Table 10.

In order to understand the effect of intervention on, pre and post intervention values of each child along total score and the 4 domains- speech, sociability, sensory/cognitive awareness and physical/health/behaviour domains Wilcoxon signed rank test, which is a non-parametric test, was used and all domains and total returned as significant p value<0.001 as seen in Table 11.

CONCLUSION

Though ASD and SCD have been separated as 2 different entities, the use of ATEC in monitoring the effects of therapy/ treatment in both was found to be useful. Analysis of screen time on these two disorders had been found to be significant with respect to

interference in improvement even if proper therapy sessions and supportive managements were going on. In this context, longer use of low quality AAC's and language programs available has to be used with caution in both disorders. However, this has to be studied on a larger sample.

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