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The relationship between screen time and speech delay in 1-2-year-old children

Putu Dianisa Rosari Dewi *, Soetjningsih, Ida Bagus Subanada, I Made Gede Dwi Lingga Utama, I Wayan Dharma Artana, I Made Arimbawa and Ni Nyoman Metriani Nesa

Department of Child Health, Medical Faculty of Udayana University, Sanglah Hospital, Denpasar, Bali, Indonesia.

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Abstract

Background: Speech delay was one among the most prevalent and most often developmental disorders found in children. The use of screen media was suspected to be associated with speech delay, especially related to screen time. Urgent study related with identifying the association between speech delay and screen time was needed especially among younger children.

Objective: This study aimed to prove the association between speech delay and screen time in 1-2-year-old children.

Methods: This is a cross-sectional study, subjected at children aged 1-2-year-old in Denpasar, Bali, Indonesia Primary Health Care working area. Outcome was speech delay which diagnosed using Capute scales.

Results: This study included 167 subjects with average age introduced to screen media was $9,84 \pm 4,04$ months. This study subjects were mostly male (55%) with average age was 19.2 ± 3.5 months. Children with screen time more than 2 hours per day were associated with speech delay [OR 6.15 (CI95% 2.84-13.30; $p < 0.001$)]. Male gender and low social economy were also associated with speech delay [adjusted OR 2.67 and 5.49 (CI95% 1.72-5.60; $p = 0.009$ and 2.04-13.93; $p = 0.001$)].

Conclusion: Screen time more than two hours daily increase the risk of speech delay 6.2 times in children aged 1-2-year old. Male and low parental education also acted as risk factors for speech delay. Keywords: critical congenital heart disease, early screening

Keywords: Screen Time; Speech Delay; Children; Developmental disorder

1. Introduction

Speech delay was the most common developmental disorders in children. It is important to identify speech problems early because it is essential part of any child's development and impact children's social interactions, behavior and academic skills [1]. The incidence of speech delay varied from time to time, in 2009 it was reported in Indonesia the prevalence was 0,9% in children below five years [2]. Concern is often expressed about modern lifestyle issues (e.g. the effect of watching television and using computers). Some studies have found that children who are heavy gadget users have lower language scores while others show that television can be a positive factor and provide important opportunities for children to verbally engage with other family members [3].

Identification for high risk children for speech delay has been known. Several risk factors have been identified and among them family history with speech delay, male, and perinatal factors such as low birth weight and prematurity were consistent risks for speech delay. Other inconsistent factors such as parents education, history of illness at young

* Corresponding author: Putu Dianisa Rosari Dewi

age, other toddlers in family, big family, asphyxia neonatorum, bilingual, primary caregiver, stimulation, and screen time were being extensively studied [4].

Screen time was defined as time spent in front of screen media (include television, handphone, computer, tablet, and video games. The relationship between screen time and speech delay has been studied for decades. In one side, there were studied claimed that there were positive impacts of education derived from television with cognitive, language and behavior development in children [5]. Watching television was related with concentration problems and language development. Inconsistent results between screen time and speech delay [6]. Several studies limitation had been identified such as data collection by using phone call or hospital medical records and confounding variables were not analyzed [7].

Digital media and screens are a ubiquitous part of our daily lives and children in today's world are digital natives. American Academy of Pediatrics recommended no screen time at all for children until 18 to 24 months, except for video chatting, and said kid ages 2 to 5 should get an hour or less of screen time per day [8]. Study in 3895 children in US found that 87% of the children had screen time exceeding these recommendations [9].

Parents are the teachers, facilitators, and gate-keepers of a young child's media consumption. Screen media parenting practices refer to goal-directed parental interactions with the child, to influence the child's screen media use [10]. There were four types of parental monitoring help in healthy screen habits in children – co-viewing with the child, restricting time spent on media, restricting content viewed on-screen, and active mediation- offering opinions on media content, educating the child about the purpose of various media such as advertising and encouraging them to apply practical aspects of the contents viewed to daily life [11].

Based on this, researchers were interested in conducting a study regarding the relationship between screen time and speech delay in children aged 1-2-year-old, so that these data are expected to be used to give counseling, education and information to caregiver about the negative impact of screen time so that speech delay can be prevented in children aged 1-2 year.

2. Material and methods

The is a cross-sectional study to determine the relationship between screen time and speech delay in children aged 1-2-year-old. Children aged 1-2-year-old in Denpasar Public Health Center working area from March 2019 to December 2020. Approximately 167 children aged 1 to 2-year-old were evaluated for speech delay. Subjects who were previously diagnosed with family history having speech delay, physical impairment that affected oromotor organs, children with neurological disturbance, history of prematurity, history of low birth weight, history of neonatal asphyxia, children with hearing disturbance, children with malnutrition, and history of hospitalized in intensive care unit were excluded.

Variables with numerical data scale will be displayed in the form of mean (SD) or median with minimum and maximum values. Variables with categorical data scale will be displayed in the form of relative frequency (amount and percent).

Chi-square test was used to analyze the relationship of screen time and speech delay. Multivariate analysis using logistic regression was performed to control for confounding variables. The significance level of this study is determined by a probability value (p) less than 0.005.

Data analysis was done with Statistical Package for Social Sciences (SPSS) software version 23. The discrete variables are expressed as counts (percentage) and continuous variables as mean or median.

3. Results

During the research period from March 2019 to December 2020, there were 197 subjects who fulfill the inclusion criteria, 30 subjects was excluded (20 subjects had malnutrition, 6 subjects with neurological disturbance, 2 subjects with history of low birth weight), A total of 167 subjects were obtained. All subjects follow the research protocol such as filling the questionnaire form, physical examinations and Capute scales examination.

This study subjects were mostly male (55%) with average age was 19.2 ± 3.5 months. Average children age at the first time introduced with media was 9.9 ± 4.0 months. Characteristic of research subjects were stated in **Table 1**.

Table 1 Demographic characteristics of the study

Demographic characteristic	Screen time >2 hours per day	Screen time ≤2 hours per day
	(n = 92)	(n=75)
Gender, n (%)		
Male	54 (58.7)	38 (41.3)
Female	38 (50.6)	37 (49.4)
Presence of other toddler in family, n (%)		
Yes	27 (56.3)	21 (43.7)
No	65 (54.6)	54 (45.3)
Parents educational level, n (%)		
Yes	25 (65.8)	13 (34.2)
No	67 (51.9)	62 (48.1)
Bilingualism		
Yes	18 (56.3)	14 (43.7)
No	74 (54.8)	61 (45.2)
Stimulation		
Yes	30 (71.4)	12 (28.6)
No	62 (49.6)	63 (51.4)
Primary caregiver		
Not parents	14 (58.3)	10 (41.7)
Parents	78 (54.3)	65 (45.5)
Socioeconomic status		
Low	16 (62.1)	11 (37.9)
High	76 (54.3)	64 (45.7)
Parental monitored		
Fully monitored	60 (54.5)	50 (45.5)
Limited assisted	22 (57.9)	16 (42.1)
Coviewing	8 (72.3)	3 (27.7)
No monitoring	2 (25.0)	6 (75.0)
Gender, n (%)		
Male	54 (58.7)	38 (41.3)
Female	38 (50.6)	37 (49.4)
Presence of other toddler in family, n (%)		
Yes	27 (56.3)	21 (43.7)
No	65 (54.6)	54 (45.3)

The relationship between screen time and speech delay in children 1-2-year-old was tested using chi-square and shown in Table 2.

Table 2 Bivariate analysis between screen time and speech delay

	Speech delay	Normal speech development	PR	CI95%	p value
Screen time					
>2 hours	62	30	5.68	2.90-11.13	<0.001
<2 hours	20	55			

Multivariate analysis was conducted to determine the association between factors that affect speech delay in children aged 1-2-year-old. The variables controlled by multivariate analysis were all variables considered important, includes gender, primary caregiver. Table 3 shows multivariate analysis related to speech delay.

Table 3 Multivariate analysis regarding factors affecting speech delay

Variable	Adjusted RO (IK 95%)	P value
Screen time >2 hours	6.15 (2.84-13.30)	<0.001
Primary caregiver	1.29 (0.45-3.91)	0.641
Male gender	2.67 (1.72-5.00)	0.009
Low parents educational status	5.49 (2.04-13.93)	0.001
Low socioeconomic status	0.83 (0.30-2.31)	0.586
Low stimulation	1.99 (0.75-5.24)	0.166

4. Discussion

Language impairment is thought to be multifactorial and affected by both genetic and environmental factors. Gender is one factors affecting language development [12]. Potential risk factors which might affect language development were evaluated in the current study. Presence of other toddlers in family, parental education, bilingualism, stimulation, primary caregiver, socioeconomic status, and parental assistance are known to be related with language skills of the child [13]. In this study only 75 subjects (45%) were female. Male predominance of the group is consistent with the literature. In the current study, all children had exposed to screen time which inappropriate according to AAP recommendations.

Screen time for >2 hours daily was significantly associated with speech delay (OR 6.15; 95%CI 2.84-13.30; $p < 0.001$). This result was consistent with a study by Duch et al. who found that exposure to gadgets and television of >2 hours daily was significantly associated with lower communication scores. Hypotheses on the mechanism of how media may affect speech development have been proposed. Evidence suggests that young children are not proficient in learning words from media. Thus, exposing them to gadgets and television worsens their language acquisition by decreasing the quantity and quality time of the parent-child relationship and children's play activities [14]. Other mechanism which might affect speech development was lower integrity of microscopic white matter structure in children who had screen time more than recommendation. This was thought related to language, executive and literacy development of children [15].

The presence of background television plays a large role in distracting a child and potentially being detrimental to their learning process from real life experiences. Background television typically included programs that are not intended for children, and are therefore incomprehensible while distracting children from focusing on exploration and play. Barr and Lerner reported that children younger than the age of 3 were exposed to 5 hours and 30 minutes of background television each day. This same study demonstrated that children younger than 2 years of age are most likely to watch inappropriate background television, which is likely due to parents' belief that their child is not paying attention to the television program. This study also found that children spent much less time exploring a toy when the television was on because the sudden noises, loud voices, and flashes of light distracted them from their play. Quantity and quality of parent-child interactions were compromised because of background television [16].

We also studied the four types of parental supervision, since supervised viewing and covieing has also been recommended by AAP, including active supervision, co-viewing, restricting time spent on screen, and restricting the content [10]. In our study, while 65.9% of the parents employed fully monitored supervision for their child regarding using screen media, only about 6.5% of parents co-viewed media content with their child. The numbers of children who had speech delay was significantly lower in children who had parental monitoring during screen media use.

Mondal et al. in assessed 200 children aged 13 to 24 months and found a prevalence of speech delay was 14.5%, which was lower than the results in this study (51%) [17]. Gender was significantly associated with speech delay (OR 2.67; 95%CI 1.72-5.60; $p=0.009$). Study from Lindsay and Strand also found that male gender had more tendency on having speech delay compare to female which might caused because physiology development of male gender was prone to have more neurological disturbance [13]. Other study suspected that testosterone level during prenatal stage were slowing neuron growth in left hemisphere of the brain which caused language development in male were slower than female [18].

The research result shows that there was a significant relationship between parental education and speech delay ($p=0.001$), in which the higher parents' level of education makes the better children's language development would be. The result was supported by the other study that language development of a child is related with social economy status which is measured by education. Education is any efforts taken by adult (parents) in their relationship with children to lead their physical and psychological development into adulthood [19]. Education plays important role in the society. By having sufficient education someone will understand which one is good and able to make them beneficial for themselves as well as for others who need them. Educated parents usually have very high aspiration and expectation toward their children. Parents will give direct support such as helping children with their vocabulary learning so that they can achieve better than children whose parents' level of education are low [20].

Primary caregiver were not parents, low social economical status, and the lack of stimulations were not significant in the final model for multivariate logistic regression. Further investigations are needed to confirm the relationship between social interaction and speech delay.

5. Conclusion

This study concluded that screen time more than two hours daily increase the risk of speech delay 6.2 times in children aged 1-2-year old. Male and low parental education also acted as risk factors for speech delay.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interests. The author reports no conflicts of interest in this work. By this statement, all authors who consist of Putu Dianisa Rosari Dewi, Soetjningsih, Ida Bagus Subanada, I Made Gede Dwi Lingga Utama, I Wayan Dharma Artana, I Made Arimbawa, and Ni Nyoman Metriani Nesa have no conflict of interest regarding this manuscript publication.

Statement of ethical approval

This research has received ethical approval for the research ethics committee of Sanglah Hospital, Denpasar number 2019.02.1.1004.

Statement of informed consent

Informed consent was obtained from the patient whose data mentioned in the study.

References

- [1] Leung, AKC, Kao, CP. 1999. Evaluation and management of the child with speech delay. *Am Fam Physician*, 59(11):3–9.

- [2] Soetjiningsih. 2013. Speech delayed. In: Soetjiningsih, Ranuh, I.G.N, editor. *Children Growth and Development*. Second edition. Jakarta: Penerbit Buku Kedokteran EGC. p. 237-48.
- [3] McLaughlin, M.R. 2011. Speech and language delay in children. *Am Fam Physician*, 83(10):1183-1188.
- [4] U.S. Preventive Services Task Force. 2016. Speech and language delay and disorders in children age 5 and younger: screening. [Accessed on 4 December 2017]. (Downloaded from <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/speech-and-language-delay-and-disorders-in-children-age-5-and-younger-screening>).
- [5] Guram, S. Heinz, P. 2017. Media use in children. *American Academy of Pediatrics*, 3:129-169.
- [6] Mares, ML, Pan, Z. 2013. Effects of sesame street: a meta-analysis of children’s learning in 15 countries. *J App Dev Psychol*, 1(1):1-12.
- [7] Kostyrka-Allchorne, K, Cooper, NS, Gossman, AN, Barber, KJ, Simpson, A. 2017. Differential effects of film on preschool children’s behaviour dependent on editing pace. *Acta Paediatr*, 106(5):831-836.
- [8] American Academy of Pediatrics. 2006. Identifying infants and young children with developmental disorders in the medical home: an algorithm for developmental surveillance and screening. *Pediatrics*, 118(1):405-420.
- [9] Zimmerman, FJ, Christakis, DA. 2005. Children’s television viewing and cognitive outcomes: a longitudinal analysis of national data. *Arch Pediatr Adolesc Med*, 159(7):619-625.
- [10] Sims, CE, Colunga, E. 2013. Parents-child screen media co-viewing: influences on toddlers’ word learning and retention. *Proceedings of the Annual Meeting of the Cognitive Science Society*, 35(35):1324-1329.
- [11] Tomopoulos, S, Dreyer, BP, Berkule, S, Fierman AH, Brockmeyer, C, Mendelsohn, AL. 2010. Infant media exposure and toddler development. *Arch Pediatr Adolesc Med*, 164(12):1105-1111.
- [12] Ko, CH, Yen JY, Chen CC, Chen SH, Yen CF, Gender differences and related factors affecting online gaming addiction among Taiwanese adolescents. *J Nerv Ment Dis*, 2005;193: 273-277.
- [13] Lindsay, G., Strand, S. 2016. Children with language impairment: prevalence, associated difficulties, and ethnic disproportionality in an English population. *Frontiers in Education*, 1(2):1-14.
- [14] Chonchaiya, W., Pruksananonda, C. 2008. Television viewing associates with delayed language development. *Acta Paediatrica*, 97(7):977-982.
- [15] Deki, P. Factors affecting early childhood growth and development: Golden 1000 days. *Journal of Advanced Practices in Nursing*, 2015;01(01):1-7.
- [16] Barr, R, Lauricella, A, Zack, E, Calvert, SL. 2009. Infant and early childhood exposure to adult-directed and child-directed television programming. *Merrill-Palmer Quarterly*, 56:21–48.
- [17] Mondal N, Bhat, B, Plakkal, N, Thulasingham, M, Ajayan, P, Poorna, DR. Prevalence and risk factors of speech and language delay in children less than three years of age. *J Compr Ped*, 7(2):1-7.
- [18] Hidajati, Z. 2009. “Risk factors for dysphasia in children development” (thesis). Semarang: Diponegoro University.
- [19] Dollaghan, C.A., Campbell, T.F. 1998. Nonword repetition and child language impairment. *Journal of Speech Language and Hearing Research*. 41:1136-1146.
- [20] Hartanto, F., Selina, H., Zuhriah, H., Fitrah S. 2011. The influence of language development towards cognitive development in 1-3-year old children. *Sari Pediatri*, 12(6):386-390.