



## Identifying Risk Factors of Speech and Language Delay on Children

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### Abstract

Speech and language delay are usually found in various disorders such as mental retardation, hearing impairment, psychosocial, autism, receptive aphasia and cerebral palsy and speech organ disorders. Retrospective research at Dr. Kariadi Hospital found that children aged 13 months to 60 months with complaints of speech problems that were subjected to an objective audiometric examination showed that 79.1% had hearing loss. This research aims to determine the relationship of risk factors with speech and language delays in children. This research was conducted in April 2020 using the cross-sectional with suspicion of late speaking who were examined by Brain evoked response audiometry (BERA) at Dr Kariadi Hospital Semarang. Researchers assessed the delay with the Language evaluation Scale Trivandum (LEST) questionnaire. Researchers analyzed the data with chi-square test, fisher's exact. The sample was 80 patients with the mean age was 22.35 months. Mostly in men (67.5%). The most common risk factor was hearing impairment. Hearing impairment was associated with speech and language delay. Economic status and bilingual were not associated with speech and language delay in children.

### Introduction

Language is a means of communication that symbolizes thoughts and feelings to convey meaning to others, and its development occurs in a very sequential manner. Language is divided into 2 components, the first is receptive language which means understanding and the second is expressive language which means speaking. There is a fundamental difference between speech and language. Speech is a pronunciation that shows a person's skill in pronouncing the sound in a word. Language means expressing and receiving information in a certain way. Speech delay is a complaint that is often encountered in daily practice. This disorder seems to be increasing day by day, (Ankale et al. 2018), (Singraiah et al. 2017).

Retrospective Research in 2006 at the Central General Hospital (RSUP) Dr. In the Ear Nose Throat polyclinic, Head and Neck Surgery (ENT-KL) found children aged 13 months to 60 months with complaints of speech disturbances

who underwent an objective audiometric examination and the results were 20.9% normal and 79.1% Hearing Loss (KP). Meanwhile, in a 2018 study at Dr Kariadi Hospital, Semarang, children with congenital deafness were detected at the ENT-KL clinic according to medical record data on average 10-20 patients per month. The prevalence of speech and language delays was high (27%) in children less than three years of age in a 2016 study at the Hospital of Jawarharlal Institute education research Puducherry India., (Hartanto et al. 2016), (Mondal et al. 2016), (Sidiarto 2002).

Delays in speech and language development sometimes accompany various disorders such as mental retardation, hearing loss, an expressive language disorder, psychosocial, autism, receptive aphasia and cerebral palsy, it can also be due to delays in maturation or bilingualism. Speech and language development is one indicator of the overall development of children's cognitive

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abilities, affecting personal social life, causing learning and working difficulties. Early identification and intervention can prevent these disturbances and barriers from occurring, (Nelson et al. 2006),(Sandler et al. 2001).

The identification of speech and language delay is using the Language evaluation Scale Trivandum (LEST) developed by the Child Development Center. LEST is a simple valid tool to identify children 0-3 years with speech and language delays in the community. LEST consists of thirty-three items, (Ganavi et al. 2015), (Mondal et al. 2016). The objective examination of hearing used the Brainstem Evoked Response Audiometry (BERA) examination which can estimate the hearing threshold in children and uncooperative patients and is able to detect neurological abnormalities from the brain nerves to the VIII cranial nerve (auditory nerve) and brain stem. (Sunderajan & Kanhere 2019),(Tegnoor & Naaz 2019). The purpose of this study was to determine the relationship between risk factors and speech and language delays in children.

## Method

This study used a cross-sectional method with a target sample of children who were suspected of being late in speech and a BERA examination was carried out at Dr. RSUP. Kariadi Semarang. The sample is determined by each group by calculating the formula based on previous studies, the proportion is 0.27 then with  $Z_{\alpha} = 1,96$  and the degree of deviation from the desired population is 10%, the result is 76 and rounded up to 80. The sampling technique in this study was carried out by consecutive sampling, in this method each subject that met the research criteria was used as a research subject until the number of samples was met. The inclusion criteria for children aged 6 months - 36 months and exclusion criteria were children with central disorders such as mental retardation, cerebral palsy, aphasia, microcephaly, hydrocephalus and abnormalities of speech and language organs. Researchers conducted alloan amnesis to the sample for filling in the basic data and the LEST questionnaire, this questionnaire has been validated. LEST assessment is in 4 ways, namely Normal: All can answer questions.

Questionable : One point the question cannot be answered, Suspect: Two points cannot be answered, Delay: Three or more cannot answer the question. Based on the LEST score, the researchers concluded that speech and language delay if the LEST score is above 2 (Three points or more cannot answer), it is not too late to speak if the LEST score is less than 2 (One or two question points cannot be answered). Researchers analyzed several risk factors, namely hearing loss (result of ABR hearing threshold >40db in 1 or 2 ears), economic status and bilingualism. The ethical clearance was obtained from the Research Ethics Commission of RSUP Dr. Kariadi Semarang. Next, Researchers analyzed the data using the test Chi-square and fisher's exact, significant if  $p < 0,05$ .

## Results and Discussion

The research respondents were 80 people with an average age of 22-35 months.

Table 1. Sample Characteristics

Variable	F	%
Gender		
Male	54	67,5
Female	26	32,5
Father's education		
Junior high school	9	17,0
Senior high school	31	38,8
Diploma	7	8,8
Bachelor	33	41,3
Mother's education		
Elementary	1	1,3
Junior high school	9	11,3
Senior high school	39	48,8
Diploma	6	7,5
Bachelor	25	31,3
Economic status		
Less	9	11,3
Enough	71	88,8
Bilingual		
≥ 2 languages	59	73,8
1 language	21	26,3
Hearing Loss		
No	46	57,5
Yes	34	42,5
LEST		
speech delay	56	70
Un-speech delay	24	30

Source: primary data, 2021

Table 2. Relationship Between Hearing Loss, Economic Status And Bilingualism With Speech And Language Delays

Variable	LEST				p	PR	CI
	Speech and language delay		Un-speech and language delay				
	n	%	N	%			
<b>Hearing Loss</b>							
Yes	34	60,7	1	4,2	0,001 <sup>£</sup>	33,00	4,147-261,962
No	22	39,3	23	95,8			
<b>Status Economy</b>							
Enough	48	85,7	23	95,8	0,180 <sup>£</sup>	0,261	0,031 – 2,212
Less	8	14,3	1	4,2			
<b>Bilingual</b>							
≥ 2 languages	43	76,8	16	66,7	0,346 <sup>¥*</sup>	0,605	0,211-1,730
1 language	13	23,2	8	33,3			

Description : \* Significance ( $p < 0,05$ ); £ Fisher's exact, ¥ Pearson chi square;

Source: primary data, 2021

Characteristics (table 1) the education of the parents (father) with the highest number of bachelors is 33 (41.3%), the highest number of mothers is high school 39 (48.8%). Economic status is less 9 (11.3%) and enough 71 (88.8%). Bilingual criteria obtained 2 languages 59 (73.8%) and 1 language 21 (26.3%). The results of the study showed that there were no less hearing 46 (57.5%) and hearing loss 34 (42.5%). LEST criteria obtained un-speech delay 24 (30%) and speech delay 56 (70%).

Association of hearing loss with speech and language delay (table 2). Patients with speech and language delay 22 (39.3%) did not have hearing loss and 34 (60.7%) had hearing loss. This result is in accordance with the study which states that 100 children with suspected speech and language delays underwent ABR examination, it was found that 70% of children with hearing loss, (Shoukrya 2010). Patients with un-speech and language delay were 23 (95.8%) and 1 (4.2%) had hearing loss. Fisher's exact test showed that hearing loss was a significantly associated risk factor. Hearing loss had a 33 times greater risk (PR 33.00) than non-hearing lost.

The results obtained from 80 samples, with 54 men and 26 women, are in accordance with a 2016 study on 100 children who visited the Jawarhal Nehru Hospital India, the ENT-KL section and the Children's section with suspected speech and language delays is 58% in boys and

48% in girls, (Mondal et al. 2016). Meanwhile, in a previous study on 702 children with speech and language delays, 425 (60.5%) boys were less hearing and 277 (39.5%) girls lacked hearing, (Lange et al. 2016). The functional connectivity of the neural network of the male brain tends to have a reduced capacity for processing social stimuli, and therefore males are more prone to impaired communication, (Adani & Cepanec 2019). One of the causes of speech and language delays is hearing loss. In this study, hearing loss was found to be more common in men than women. The same condition was also found in other studies which showed that hearing loss was more common in boys than girls, (Singraiah et al. 2017). This is probably due to anatomical differences in the peripheral auditory pathways, the volume of the ear canal in males is relatively wider when compared to females, in addition, the cochlea in females is shorter than the cochlea in males. This causes the stimulus in women to arrive more quickly, (Shuster et al. 2019).

The effects of hearing loss depend on the nature and extent of the hearing loss and the individual characteristics of the child. Hearing loss can be unilateral or bilateral, conductive, sensory-neural, mixed, mild, moderate, severe, profound, sudden or gradual onset. This hearing loss can lead to speech and language delays. Hearing loss that happens very early in life can affect speech and language development,

social and emotional development, behavior, attention, and academic achievement (Ganavi et al. 2015).

The quality of speech and language reflects the ability to hear and perceive sounds. Usually there is a direct relationship between speech/language ability and the amount of hearing residue. Mild or severe hearing loss has a negative effect on speech and language development. The effects of severe deafness tend to be real. Vocabulary, word order and use of grammar become messy. Voice distortion, speech errors and rhythm deviations are typical, so speech is difficult to understand. The use of hearing aids and amplification devices is important to reduce hearing loss, so that children can hear other people's voices as well as their own voices. Hearing aids are one aspect of the habilitation process. (Osama et al. 2010). Hearing loss repair that is done early at the age of 2 to 3 years will result in better speech and language development. This may be due to the existence of a sensitive period that is important for language development by assessing the effect of age at implantation on cognitive and linguistic skills, (Houston & Miyamoto 2010)

Babies generally quickly learn from the home environment and its surroundings. Between the ages of 6 – 12 months, children's ability to process speech develops rapidly, and this ability can predict language development in later life. The basic idea is that hearing loss limits access to auditory learning so that children do not get auditory experience, so immediate intervention is needed to facilitate this access, (Tager-Flusberg 2015), (Zhao & PKuhl 2016).

The results of this study showed that there were 9 people with poor economic status (11.3%) and sufficient economic status as many as 71 people (88.8%). In 24 children with no delay in speech and language, 23 children (95.8%) were found with sufficient economic status and 1 child (4.2%) with less economic status. Of the children who experienced speech and language delays as many as 56 samples obtained 8 patients (14.3%) with less economic status while as many as 48 patients (85.7%) with sufficient economic status. Fisher's exact test showed that economic status was a risk factor that was not associated with speech or

language delay. This can be caused by speech and language delays that can be experienced by those with economic status, either with less or sufficient income. The most relevant factor for children's language development is probably the education of parents, not household income itself, (Hoff 2013), (Hurt & Betancourt 2016), (Schwab & Lew-williams 2016).

In this study, the sample obtained with 80 research samples obtained 2 languages as many as 59 people (73.8%) and 1 language as many as 21 people (26.3%). Of the 24 samples of patients who were not late in speech and language, 16 patients (66.7%) spoke 2 languages, while 8 patients (33.3%) spoke 1 language. Then from patients with delays in speech and language as many as 56 samples obtained 43 patients (76.8%) with 2 languages while 13 patients (23.2%) with 1 language. The chi-square test showed that bilingualism was a risk factor that was not associated with speech and language delays in children ( $p = 0.346$ ;  $RP 0.605$ ; 95%  $CI 0.211-1.730$ ). This is different from previous studies that bilingual language affects speech and language delays in children, (Hoff & Ribot 2017). This difference may be due to the technique of collecting data using telephones which can lead to misunderstandings between respondents and researchers.

## Conclusion

This study showed that the risk factors for hearing loss were significantly associated with speech and language delays in children. There is no significant relationship between economic status factors and bilingual use on speech and language delays in children. Further research is needed to include behavioral disorders as another risk factor. The limitation of this study is that behavior disorders are not included as a risk factor for speech delay because it is difficult to identify.

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