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Research Article

**SPEECH DEVELOPMENT IN HEARING-IMPAIRED
CHILDREN IN ARAR CITY, KSA**

Shouq Saud J Alanazi ¹, Reem Farhan Mater Alanazi ¹, Noof Saud J Alenezi ¹, Fatimah Yousef Abdulateef Albedaiwi ¹, Sarah Fereih M Alenezi ¹, Hajar Salah Khulaif Alenzi ¹, Danah Hamdan Hmoud Althomaly ², Athir Athallah Hlail Alruwaili ³

¹Northern border university, ²Imam Abdulrahman bin Faisal University, ³Aljouf University

Abstract:

Background: Hearing impairment is a factor that directly compromises the individual's language. This can vary according to the type and degree of hearing loss. **Objective:** to investigate the relation between Speech development in hearing-impaired children in Arar city, KSA. **Methods:** A cross-sectional study will be conducted in Arar, Northern Saudi Arabia. This study will include randomly selected participants aging between 0- 6 years old. A systematic random sampling technique was used from the children attending 5 randomly selected primary health care centers. We included every 2nd child. Collected data will be coded and analyzed using SPSS program (version 15) . P-value of less than 0.05 will be considered statistically significant. **Results:** Hearing disorders was 13.6% and speech delay was 23.1%. There were 52.8% with moderate hearing loss, 33.3% with severe hearing loss, and 13.9% with deafness. 66.7% of cases were visiting a doctor. Cases having hearing aids were 50%, Hearing improvement from using hearing aids were 33.3%, 66.7% show no improvement, cases with speech improvement from using hearing aids were 25%, 75% show no improvement. **Conclusion:** in children 1-6 years old , in Arar, Northern Saudi Arabia, hearing disorders affects the speech development to a varying and considerable degrees. There was speech improvement after using hearing aids in 25% of cases.

Key words: hearing disorders, speech development, children, Arar, Northern Saudi Arabia.

Corresponding author:

Shouq Saud J Alanazi,
Northern border university.

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INTRODUCTION:

The incidence of permanent bilateral hearing impairment with a hearing threshold above 40 dB is 1–2 out of 1,000 newborns. The rate rises up to the age of 5 years to 2.7 of 1,000 children and to 3.5 in adulthood. One third of the children with a hearing disability have additional comorbidities, regardless whether one or both ears are affected [1, 2]. Hearing impairment is a factor that directly compromises the individual's language. This can vary according to the type and degree of hearing loss. There are several ways in which hearing loss and subsequent cochlear implantation can negatively impact the development of language and literacy. The most obvious way is by diminishing the quantity and quality of the sensory input. It is known that sensorineural hearing loss is severe to profound that can cause more damage languages, making the acquisition and development of oral language, especially in people with pre-lingual hearing loss [3]. Accordingly, the dramatic improvements in language learning outcomes observed for severely to profoundly deaf children since cochlear implants became available are surely due to enhanced sensory inputs. The younger a child is exposed to auditory stimuli the more likely they appear to be able to understand spoken language and to use spoken language themselves [4]. Thusly, the utilization of minimal effort techniques, for example, screenings as well as surveys could encourage get to and early distinguishing proof among populaces in danger for these scatters, particularly in creating nations [5].

A previous study included 479 children with a mean age of three and one-half years reported that; 26.9% were identified as at risk for deficits in language production, 8.6% were at risk for deficits in language comprehension and 14% were at risk for hearing disorders. The children at risk for hearing disorders were twice as likely as those not at risk to exhibit language production and comprehension deficits [6].

This study is designed to investigate the relation between Speech development in hearing-impaired children in Arar city, KSA.

METHODS:

Study design: A cross-sectional study will be conducted in Arar, Northern Saudi Arabia.

Participants: This study will include randomly selected participants aging between 0- 6 years old (General female pediatric population of Arar, KSA). A systematic random sampling technique was used from the children attending 5 randomly selected primary health care centers. We included every 2nd child.

Data collection: by a pre-designed online questionnaire which distributed among population which will be filled by participants' mothers after a brief introduction or explanation of the idea of the research to the public. Sampled cases will fill out the predesigned questionnaire to collect demographic and socioeconomic data including:

- Socio-demographic characteristics of the participants including age and sex of child
- If the child has speech delay
- Questions to detect if there's a relation between speech delay and hearing disorders

Statistical analysis:

Collected data will be coded and analyzed using statistical package for the social sciences (SPSS, version 15). Descriptive statistics for the prevalence and quantitative variables will be used. Relation between speech delay and hearing disorders will be determined using chi-square test. P-value of less than 0.05 will be considered statistically significant.

Ethical considerations:

This study was reviewed and approved by the Research Ethics Committee of Faculty of Medicine, Arar University. Participants will be informed that participation is completely voluntary and data collectors will introduce and explain the research to participants. No names will be recorded on the questionnaires. All questionnaires will be kept safe.

RESULTS:

Table (1) shows the Gender, age group, hearing disorders and speech delay in the studied population. We found that 26.9% of cases aged 2-4 years old, 19.7% aged >8 years old, 18.6% aged 4-6 years old. 57.6% were male, 42.4% were female. Cases have no hearing disorders were 86.4% and no speech delay were 76.9%.

Table (2) illustrates hearing problem, visiting a doctor, hearing aids, hearing improvement from using hearing aids in the studied cases. There were 52.8% with moderate hearing loss, 33.3% with severe hearing loss, and 13.9% with deafness. 66.7% of cases were visiting a doctor. Cases having hearing aids were 50%, Hearing improvement from using hearing aids were 33.3%, 66.7% show no improvement, Speech improvement from using hearing aids were 25%, 75% show no improvement.

Table (3) there was insignificant association of age group and gender with hearing disorders ($p > 0.05$).

Table (4) there was insignificant association of gender and age group with speech delay ($p>0.05$).

Table (1): Gender, age group, hearing disorders and speech delay in the studied population (N=264)

	Frequency	Percent
Age Group		
< 2 years	56	21.2
2-4 years	71	26.9
4-6 years	49	18.6
6-8 years	36	13.6
>8 years	52	19.7
Gender		
Female	112	42.4
Male	152	57.6
Hearing Disorders		
Yes	36	13.6
No	228	86.4
Speech delay		
Yes	61	23.1
No	203	76.9

Table (2): Hearing problem, visiting a doctor, hearing aids, hearing improvement from using hearing aids and speech improvement from using hearing aids in the studied cases. (N=36)

	Frequency	Percent
Hearing problem		
severe hearing loss	12	33.3
moderate hearing loss	19	52.8
deafness	5	13.9
Visiting a doctor		
Yes	24	66.7
No	12	33.3
Hearing aids		
Yes	18	50.0
No	18	50.0
Hearing improvement from using hearing aids		
Yes	12	33.3
No	24	66.7
Speech improvement from using hearing aids		
Yes	9	25.0
No	27	75.0

Table (3): Association of age group and gender with hearing disorders

		Hearing disorders		Total (N=299)	P value
		Yes (N=36)	No (N=228)		
Gender	Female	12	100	112	0.157
		33.3%	43.9%	42.4%	
	Male	24	128	152	
		66.7%	56.1%	57.6%	
Age Group	<2 years	5	51	56	0.112
		13.9%	22.4%	21.2%	
	2-4 years	9	62	71	
		25.0%	27.2%	26.9%	
	4-6 years	5	44	49	
		13.9%	19.3%	18.6%	
	6-8 years	4	32	36	
		11.1%	14.0%	13.6%	
	>8 years	13	39	52	
		36.1%	17.1%	19.7%	

Table (4): Association of gender and age group with speech delay

		Speech delay		Total (N=299)	P value
		Yes (N=61)	No (N=203)		
Gender	Female	22	90	112	0.159
		36.1%	44.3%	42.4%	
	Male	39	113	152	
		63.9%	55.7%	57.6%	
Age Group	<2 years	14	42	56	0.625
		23.0%	20.7%	21.2%	
	2-4 years	17	54	71	
		27.9%	26.6%	26.9%	
	4-6 years	9	40	49	
		14.8%	19.7%	18.6%	
	6-8 years	6	30	36	
		9.8%	14.8%	13.6%	
	>8 years	15	37	52	
		24.6%	18.2%	19.7%	

DISCUSSION:

Impaired hearing is prevalent in the world population. Intervening before the age of 6 months allows for

normal development of language regardless of the degree of hearing loss [7]. Hearing impairment occurs when there is reduction in hearing acuity. Its

symptoms and causes must be found and treated. Hearing impairment is a neglected chronic otological disorder with varying etiology. It is one of the commonest sensory disabilities worldwide. In 2014, WHO estimated that over 360 million people worldwide had different form of hearing impairment. It was found that 328 million were adults while 32 million were children [8]. Speech and language development problems are the most common problems observed in preschool children, which means that early detection of those children with speech and language abnormalities at an early age is critical. It is well known that hearing and speech language development is a useful indicator of a child's overall development and cognitive ability [9, 10]. This is across sectional study conducted among 264 children in Arar city, KSA. The study is designed to investigate the relation between Speech development in hearing-impaired children.

Our study found that 13.6% of studied sample had hearing disorders. A national survey was carried out among Saudi children, 13% of children were found to have hearing disorders [11]. Jacob et al. [12] reported that hearing impairment was seen in 11.9% of studied children. In a study conducted in south Sinai, Egypt, 19.3% of the participants had hearing impairment [30]. Another study reported hearing disorders in 16% of children [31]. In India another study conducted among 700 children reported high prevalence of hearing disorders by 30.9% [26]. However, in 2002 another study conducted in South India 855 children of them (11.9%) had hearing disorders [35]. Another study reported the prevalence of hearing disorders was 20.9% [38].

As regards association of age group and gender with hearing disorders this study reported, hearing disorders was found in males (66.7%) more than females but without significant correlations ($p=0.157$). Another study reported that hearing disorders was not statistically different by gender [31]. Another study reported, hearing impairment in male and female school children was 46.5% and 50% respectively [32]. Large studies in general suggest hearing impairment to be more prevalent among male than female children with an average male to female ratio of 1.24:1 [33, 34].

Our results showed that hearing disorders was more prevalent at age more than 8 years by 36.1% (no significant correlation). Another study reported that hearing disorder was more in the age group of 10 years 41.2% followed by the age group of 11 years 35.6% [32].

According to hearing problem our study reported that the majority of cases 52.8% had moderate hearing loss followed by 33.3% had severe hearing loss and 13.9 had deafness. Another study reported mild hearing loss by 84.8%, 14.3% were moderate and only 0.7% severe [11]. In Assir region, Saudi Arabia another study reported that hearing loss was found to be moderate to severe in 64% of children and mild in 10% of them [13]. Another study found that the prevalence of slight to mild hearing loss was 15.5% whereas the prevalence of moderate-to-severe hearing loss was 0.5% [31]. Another study reported mild, moderate hearing loss by 25.8%, moderate to severe 19.4% and 16.1% for complete deafness [36]. In Egypt another study reported, 50.1% had mild, (24.9%) had moderate, (16.1%) had moderately severe, (7.6%) had severe, and (1.3%) had profound degree (deafness) of hearing loss [37].

Our study found that there were 50% of children using hearing aids. This was higher than another study which reported 21% of participants were using hearing aids [13]. However, another study reported, hearing aids were chosen for 5.83% of the children with impaired hearing [8].

Delay in speech and language development is the most common developmental disorder in children aged three to six years. There is a wide variation in the prevalence of speech and language delay, as reported by different authors [15, 16]. The wide range is due to differences in the age groups studied, different screening/diagnostic tools used and variations in terminologies. Our study reported that speech delay was found in 23.1% of children. In the Eastern Province of Saudi Arabia, another study revealed that the prevalence of speech delay among preschool-aged children was 24.5 % [17]. A similar cross-sectional study done in Egypt published in 2012 showed less prevalence, at 9.4 % [18]. However, another study from Egypt in 2012 found that 19.7 % of children had speech delay [17]. Higher prevalence was found in another study in the UAE, in 2017, there were 46% of children had speech delay [20]. On the other hand, Somefun et al. reported that 70% of preschool Nigerian children who referred to Lagos University Teaching Hospital had delayed speech disorder [21]. In India, a descriptive cross sectional study was conducted among 200 children, 27% of children had speech delay [22]. In a study by Tomblin et al. on kindergarten children, 26.2% had speech delay [23]. Regarding association of gender and age group with speech delay our study found that there was no association between speech delay and gender and age $p = 0.159$, $p = 0.625$ respectively. Another study found that higher prevalence speech

delay found for girls than for boys, although the difference was not statistically significant and there was no difference in the prevalence of language delay by age [24]. In contrast to our results another study found that there were significant associations between speech delay in preschool children and child age and sex ($p < 0.001$) [11]. These results are similar to other Middle Eastern and international studies [25-28]. However, another study found that association of speech delay with gender was significant ($p = 0.037$), male was risk factor of delay but no significant association between speech delay and age of children ($p = 0.58$) [29].

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