

Determining the Statistical Relationship between Hearing Loss and Language Outcomes for Deaf Iraqi Children through a Cross-Sectional Study

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Abstract: Background: This paper focus to know the relationship between hearing loss and language outcomes for deaf Iraqi children through a cross-sectional study conducted in different hospitals in Iraq, where information and demographic data were collected for 130 children whose ages ranged from 5 to 16 years and they were distributed according to gender: 100 boys and 30 females. In this study, results were evaluated according to several measures (Degree of Hearing Loss (4FAHL), PedsQL), and the data were analyzed statistically according to the IBM SOFT SPSS program To find mean value and standard regression in addition to the value of logistic regression to risk coefficient in this study. Results which found in this study according to Degree of Hearing Loss (4FAHL) classified to 4 types (Mild 23.6±5.9 dB, Moderate 49±6.6 for 55 patients with 42.3%, Severe 70.1±4.4 for 20 patients with 15.3%, Profound 90±4.3 for 10patients with 7.6% and were found low results according to compared with the control group, where Child Development was Inventory developmental quotient;(64 ±12), Preschool Language Scale(73±12) and we found A statistically significant relationship between quality of life with outcomes of the patient at p-value 0.01.

Keywords: Language, Deaf, PedsQL, Hearing, Loss, 4FAHL, Developmental.

INTRODUCTION

Hearing loss can happen at any age. However, hearing loss at birth, or what occurs in infants and children, causes additional anxiety and can lead to developmental problems if not recognized and treated early [O'Neill, C. *et al.*, 2004], as normal hearing is essential for understanding spoken language and speaking clearly in the future. [Umansky, A.M. *et al.*, 2011]

Language can be defined as communication between individuals of the same species by means of pre-agreed symbols in order to understand each other. [Hallberg, L.M. *et al.*, 2005]

Physiologically, symbols in humans consist of sounds emanating from the larynx and articulated by mouth. [Harper, A. *et al.*, 1988]

a child can communicate with others through speech depends on the degree of hearing loss, and most children with hearing loss can use spoken language and their hearing to communicate. [Palermo, T.M. *et al.*, 2008; Varni, J.W. *et al.*, 2011]

Although the audiometric threshold is an important factor influencing the language development of a deaf child, it is not the only factor; there are other variables to consider, such as gender, cognitive abilities, the presence of an additional disability, educational or socioeconomic level of their parents [Limbers, C.A. *et al.*, 2011; Davis, E. *et al.*, 2013],

According to Waltzman *et al.* (2000), 33 children were also diagnosed with a range of other problems, such as attention deficit disorder, motor and oral delays, cognitive delays, and learning disabilities. Before and after cochlear implantation, at intervals of 1 to 8 years, the children, whose persistence scores ranged from 1.9 to 12 years, had a variety of auditory and language assessments. The number of children who could finish the tests and the results they obtained increased progressively each year, but there was also notable diversity within the sample. Scores on all open-ended speech recognition tasks varied from less than 10% to more than 90% in the children's final assessments [Rachakonda, T. *et al.*, 2014; Reinjfjell, T. *et al.*, 2006].

The reason make children with hearing problems are more likely to be associated with other additional disabilities is risk factors for hearing loss overlap with risk factors for many other disabilities, such as having certain genetic syndromes, prematurity, congenital infections, and meningitis[Coll, K.M. *et al.*, 2009; Huttunen, K. *et al.*, 2009].

These factors can disturb various aspects of development as well as language acquisition. [Upton, P. *et al.*, 2008]

One of the challenges posed by the association of disability with hearing loss is its early detection.

Therefore, the evaluation every six months of speech and language development in all children with deafness is crucial because the identification of disability in addition to deafness allows for rapid and treatment. [Ching, T.Y. *et al.*, 2013]

In this study, we aim to know the relationship between hearing loss and language outcomes for deaf Iraqi children through a cross-sectional study.

MATERIAL AND METHOD

A cross-sectional study was conducted in different hospitals in Iraq, where information and demographic data were collected for 130 children, whose ages ranged from 5 to 16 years, and they were distributed according to gender: 100 boys and 30 females.

In this study, data were collected in cooperation with the agencies responsible for providing ethical approvals for a full year from 2020 to 2021, and illustrative tables were made for the demographic characteristics related to age and gender, Laterality of hearing loss, Laterality of hearing device, Degree of Hearing Loss (4FAHL) Where hearing loss is limited to one or both ears as shown below:

Bilateral or Unilateral

Bilateral refers to hearing loss in both ears, while unilateral refers to hearing loss in only one ear.

Symmetrical or Asymmetrical

It can be defined as the same degree and type of hearing loss in both ears. Asymmetry means that the ears have different types or degrees of hearing loss.

Gradual or Sudden Loss

Gradual hearing loss worsens over time, while sudden hearing loss occurs spontaneously, with a sudden hearing loss (sudden hearing).

Fluctuating Hearing Loss

The quality of life was also assessed according to PedsQL, which is a general tool for assessing the quality of life of children and also contains specific modules for various chronic diseases and clinical conditions.

PedsQL unit examines four domains or dimensions of a child's HRQoL: physical function, emotional well-being, social function, and school functioning.

RESULTS

Table 1: Demographic results of Iraqi children (130 patients)

Age	
5-8	50
9-12	40
13-16	40
Sex	
Boys	100
Girls	30
Education level of the mother	
Primary	55
Secondary	40
College	33
Higher	7
Laterality of hearing loss	
Unilateral	80
Bilateral symmetrical	44
Bilateral asymmetrical	6
Age at Identification (in months) mean (sd)	12±2.1
Age at Amplification (in months) mean (sd)	5.5±1.1
Laterality of hearing device fitting	
Unilateral	20
Bilateral	66
Bimodal	44
Aetiology	
Congenital	35
Syndromic	60
Ototoxicity	35

Table 2: Distribution of patients according to Degree of Hearing Loss (4FAHL)

Degree	Mean±SD	N (%)
Mild	23.6±5.9 dB	15 (11.5)
Moderate	49±6.6	55 (42.3)
Severe	70.1±4.4	20 (15.3)
Profound	90±4.3	10 (7.6)

Table 3: Outcomes of patients according to Measure Receptive Language

Variable	Mean	Sd
Child Development Inventory developmental quotient;	64	21
Preschool Language Scale	73	22
Peabody Picture Vocabulary Test,	80	10

Table 4: Characteristics results related to Expressive Language

Variable	Mean	Sd
Child Development Inventory developmental quotient;	61	18
Preschool Language Scale	70	19

Table 5: Outcomes of the patient according to Speech and Cognition

Variable	Mean	Sd
Diagnostic Evaluation of Articulation and Phonology	4.2	1.4
Wechsler Non-Verbal	93.3	16.87

Table 6: Assessment quality of life according to PedsQL GCS compared with control

Variable	Patient (Mean±SD)	Child (Mean±SD)	P-value
Physical	70 (11)	77 (12)	0.03
Emotional	68 (6.9)	75 (8.8)	0.02
Social	71 (4.4)	83 (7.9)	0.77
School	72 (7.9)	82 (6.8)	0.01
Cognitive	55 (5.5)	78.8 (9.3)	0.005
activities	68 (6.1)	80 (7.5)	0.001

Table 7: Logistic regression to the analysis risk factor of study on patient

	OR (95% CI)	P-value
Age	3.3 (2.5-7.8)	0.001
Sex	1.2 (0.8-1.9)	0.06
Cognitive	2.8 (1.4-4.8)	0.002
activities	3.1 (1.7-7.7)	0.0001
Child Development Inventory developmental quotient;	4.4 (3.9-11-1)	0.0001
Preschool Language Scale	2.7 (1.7-4.1)	0.007

DISCUSSION

A cross-sectional study was conducted on Iraqi children who suffer from hearing loss, where 130 patients were collected from different hospitals in Iraq, with different ages ranging from 5 to 16 years, and the patients were distributed according to gender. One hundred boys, 30 girls.

Conducted research for the main objective of this bibliographic review, which consists of an analysis on hearing loss and language outcomes of deaf Iraqi children through a cross-sectional study.

Through this study, an opportunity was obtained to search from a linguistic point of view for a group

of 130 children with different degrees of hearing loss, who underwent a diagnosis, intervention, and follow-up protocol with standardized characteristics, although some exceptions were thought of that would allow us to perform comparative studies later.

We started implementing a comprehensive screening program in different hospitals in Iraq, where technological development made available digital hearing aids that made it possible to correct the hearing profile from mild to severe hearing loss, which also enriched the signal quality.

With the introduction of the cochlear implant (CI), a severely deaf child is finally provided with access to spoken language. All this time, improvements have been occurring, and the intervention has been increasingly early. [Edwards, L.C. et al., 2006]

This improvement is also noted in the level of quality of life.

Speech and language production is directly related to hearing, so analysing is one of the primary methods for measuring the development of children with congenital hearing loss, as we investigated through the interview. [Gallaudet Research Institute, 2008]

Realizing the importance of language assessment, we consider the tests that we should apply to conduct a systematic analysis and research on tools commonly used to study the language of children with hearing impairments. Students with hearing impairments have been found to have significant difficulties in language development and acquisition of reading and writing. [Warner-Czyz, A.D. et al., 2011]

In this study, realistic results were found for children who suffer from hearing loss, as the outcomes of patients were assessed according to the Measure of Receptive Language.

Were found low results according to compared with the control group, where Child Development was Inventory developmental quotient; (64 ± 12), Preschool Language Scale (73 ± 12).

As for results related to Speech and Cognition where a statistically significant relationship was found with hearing loss at a p-value of 0.05, and the mean value and the SD for Diagnostic Evaluation of Articulation and Phonology was 4.2 ± 1.4 , while for Wechsler Non-Verbal it was 93.3 ± 16.87

The quality of life of the pediatric patients was assessed in terms of Physical, Emotional, Social, School, Cognitive, and Activities.

A statistically significant relationship was found in most of the evaluation items of patients at a p-value of 0.01.

CONCLUSION

A set of tests was selected to find out hearing loss and language outcomes for deaf Iraqi children through a cross-sectional study, and we conclude from this study that there is a negative effect in relation to the factor of reading and speaking to

deaf children, and in this study, we conclude that there is a statistically significant relationship for the results of patients and their impact on the quality of life in all respects.

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