RESEARCH ARTICLE

Functional performance in profound hearing-impaired children

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Abstract

Background and Objective: The impacts of profound hearing loss during childhood on speech, language, and emotional development have been extensively investigated. However, little evidence exists on the adverse effects of the dysfunction on the functional abilities of the patients. This study aimed to comparatively evaluate the functional performance skills between children with profound hearing impairment and their counterparts.**Methods:** This was a randomized control trial conducted on children with bilateral profound sensorineural hearing impairment (n = 50) as treatment group and age-matched counterparts (n = 50) with normal hearing sensitivity as control group. Functional performance was measured using pediatric evaluation of disability inventory assessing the three functional domains of self-care, mobility, and social function. **Results:** The "social functioning" performance of the treatment group was significantly lower than the control group ($P < 0.0001$). No significant differences in the "self-care" and "mobility" domains were observed between the two groups ($P > 0.05$). **Conclusion: N**ormal hearing children have better functional social functioning activities than hearing-impaired children. These results could help design strategic interdisciplinary programs with a focus on improvement of social skills to prevent further communication and behavioral problems and to facilitate their performances at home or community.

Key words: Functional performance, hearing-impaired children, pediatric evaluation of disability inventory, social functioning

INTRODUCTION

Hearing loss is one of the most common developmental disorders among childhood. The prevalence of hearing loss is estimated 1–3 children per 1000 live births, of which, 10% have hearing levels that fall in the profound range.[1,2] Approximately 40% of children with clinically significant permanent hearing loss also suffer developmental disabilities that lead to serious risks of life-long communication impairment.[3] Hearing loss affects the development of social skills and attitudes such as self-esteem and inability in the education of children, which will lead to lower job performance of hearing-impaired children.[4,5]

Functional performance is defined as the child's ability to perform daily tasks such as self-care (eating, clothing, and bathing), mobility (change of position at home and communication), and social functions (basic communication needs, problem-solving, and social interventions). The children with hearing loss are under greater risk of impairing the functional performance. Therefore, clinicians try to support children in their daily tasks through performance assessment, which focuses on their coping skills and identification of their needs. This assessment is necessary for clinical specialists who are involved with children suffering from hearing loss.[6,7]

Awareness of functional capabilities in preschool years may help prioritization in early, secondary, and tertiary

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intervention, which over time will enhance the independent. Then, enhancement of functional independence acts as a stimulus for comprehensible language and a foundation of communication.[1] Therefore, by evaluating their functional performance, a holistic view of the child (a whole child approach) is adopted to understand the daily needs of the children so that he/she can be effectively integrated in the communication.

Pediatric evaluation of disability inventory (PEDI) is a standard questionnaire capable of assessing all areas of functional performance in preschool children. The basic concepts of PEDI are in accordance with a wide range of activities, participation, and environmental factors of the International Classification of Functioning, Disability, and Health (ICF) model. The ICF model was presented by the World Health Organization with the aim of a common language on disability.[8,9]

Significant body of literature shows the influences of profound hearing loss on speech, language, and emotional development in children; however, few studies have been conducted on the impacts of profound hearing loss in children on the functional aspects. In Iran, the prevalence of hearing loss is significant which necessitates the early age monitoring and evaluation of audiological and functional performance of these children to reduce the associated burdens. However, few studies have been conducted on the association between the profound hearing loss and the functional performance among Iranian children. Therefore, the present study aims to evaluate the impacts of profound hearing loss in Iranian children on their functional performance of children using the PEDI assessment.

MATERIALS AND METHODS

Participants

A total of 50 children with bilateral profound sensorineural hearing impairment, age 2–6 years, and 50 age-matched children with normal hearing sensitivity (control group) were enrolled in this study. The children with developmental disorders such as cerebral palsy, Down syndrome, and autism were excluded from the study. The hearing-impaired participants were recruited from Khuzestan Cochlear Implant Center, Ahvaz, Iran.

The experimental procedures of the present study including interventions, data collections, and clinical assessments were performed in the Khuzestan Cochlear Implant Center, which is affiliated to Ahvaz Jundishapur University of Medical Sciences (AJUMS), Ahvaz, Iran. The protocols and all experimental procedures of the study were approved by the local ethics committee of AJUMS, Ahvaz, Iran (registration code: IR.Ajums.REC.1395.686), which were in complete agreement with the ethical regulations of human studies set by the Helsinki declaration (2013). After the enrolment of all subjects and before the start of the study, researchers completely and clearly explained all objectives and protocols of the study and possible benefits and side effects of the treatments to all participants, and then, all of the patients filled and signed a written consent form on their participation in the study.

Experimental Procedures

The Persian version of PEDI[10]was used to measure daily functional performance. The PEDI is a quantitative assessment instrument which is responsive to change over time and can be utilized for children ages 6 months–7.5 years.[6] This scale containing 197 discrete functional skill items concerning three domains: Self-care, mobility, and social functioning. Each item is rated as either incapable (score 0) or capable (score 1). A "score 1" was given when a child had mastered the particular skill.

Data Analysis

The collected data were analyzed with a statistical package of SPSS (Windows, version 21). For the comparison of normally distributed variables, independent samples t-test was used, while Mann–Whitney *U*-test was applied for variables which were not normally distributed. The significance level was set at 0.05.

RESULTS

The demographic information and clinical characteristics of the participants are presented in Table 1. The mean age of the children in the hearing-impaired group and control group was 39.84 ± 16.16 and 37.90 ± 16.54 months, respectively. The independent sample t-test showed that the mean age was not significantly different in both groups ($P > 0.05$). The Chi-square test showed that the distribution of children in both groups in terms of gender was not significantly different as well ($P > 0.05$). The Chi-square test also showed that a number of children in family and birth rank were not significantly different between groups ($P > 0.05$).

Table 2 summarizes the comparison of the mean of PEDI scores between the hearing-impaired and control groups. Our data showed that social functioning performance of children with hearing impaired was significantly lower than the control group ($P < 0.0001$). No significant differences in self-care and mobility domains between the hearing-impaired and control group were observed ($P > 0.05$).

DISCUSSION

The aim of the present study was to compare the functional performance in profoundly hearing-impaired

Table 1: Demographic information and clinical variables of the participants

Variables	Hearing-impaired	Control	Total
Age (mean±SD)	39.84±16.16	37.90±16.54	38.87±16.30
Gender (boys/girls)	24/26	22/28	46/54
Age level			
2–3 years	19	18	37
3–4 years	11	13	24
4–5 years	11	12	23
5–6 years	9	7	16
Number of children in family			
1	20	25	45
2	16	16	32
3	9	8	17
4	4	1	5
5	1	0	1
Birth rank			
1st	27	35	62
2nd	13	11	24
3rd	6	4	10
4th	3	0	3
5th	1	0	1

SD: Standard deviation

Table 2: Comparison of functional performance scores in hearing-impaired and control groups

PEDI domain	Mean±SD		
	Hearing-impaired	Control	*P* value
Self-care	3.23±1.17	3.26±1.21	0.908
Mobility	3.69±1.03	3.87±0.71	0.320
Social functioning	2.65±1.22	3.84±1.08	<0.0001

SD: Standard deviation

and normal children. Our results showed that hearing-impaired children obtained lower significant scores in PEDI social functioning compared to normal children. Wiefferink *et al*.[11] showed that children with hearing loss who were the candidate of cochlear implantation obtained lower scores in emotional control and social skills in comparison with normal children. However, these children after implantation revealed similar skills compared to their normal counterparts. Similar to our findings, Stevenson *et al*.[12] also reported that children with hearing loss had lower scores in social functioning than normal hearing children.

The absence of verbal communication and social functioning in hearing-impaired children leads to their failure to express their needs and requests. As a result, these children feel frustrated, depressed, and reclusive due to lack of constructive social interaction; in addition, they show aggressive behaviors. Furthermore, language skills are greatly associated with a high level of functional ability, especially social performance.[13]

The ability to hear and understand speech can have a profound influence on all aspects of children communication development and daily functioning.[3] Therefore, it seems that overcoming the barriers against children social functioning leads to the improvement of everyday activities and results in their extensive participation and cooperation at home or in the school environment. It is also recommended that cochlear implants may be effective in improving hearing-impaired children communication and social functioning.[14]

Our findings indicated no significant difference in self-care or mobility between normal children and profound hearing-impaired counterpart. These results are in line with Meinzen-Derr *et al*.[15] findings. It seems that the auditory system affects one's social functioning, while it has no major impacts on daily activities and self-care. The present results reveal the functional independence of hearing-impaired children regarding self-care and mobility. The results of Sewpersad[5] study showed that hearing-impaired children compared to normal children have difficulty in fine motor skills. As many self-care skills depend on fine motor skills, it is expected that hearing-impaired children may manifest difficulty in the self-care skills.

CONCLUSION

The present findings can help us to identify the needs of hearing-impaired children in daily activities and social functioning. In addition, such studies can help design strategic interdisciplinary programs with a focus on independence in hearing-impaired children, and thereby reduce their future problems and prevent from the progress of their problems using programs such as cochlear implant.

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