

## RESEARCH ARTICLE

# A comparative study on the general health of the mothers of children with cochlear implant, hearing aid, and normal hearing

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## Abstract

**Background and Aim:** The general health of the mothers of children using hearing aids is highly important, and can affect their children's progress in hearing rehabilitation programs. This study aimed to compare the general health of the mothers of children using cochlear implants (CIs), mothers of children using hearing aids (HAs), and mothers with normal hearing (NH) children.

**Methods:** In this descriptive-comparative study conducted on the mothers of children using CIs (n = 19), HAs (n = 19), and NH (n = 15). Their general health was measured by the 28-item general health questionnaire (GHQ-28) in four areas of physical symptoms, anxiety symptom, social dysfunction symptom, and depression symptom.

**Results:** The general health of the mothers of children using CIs was significantly higher than that of the mothers with children using HAs (p = 0.02), while it was lower than that of the mothers with NH children, but it was not statistically significant (p = 0.5).

**Conclusion:** Mothers of children using CI children have higher general health than the mothers with children using HA, and its level was close

to that of the mothers with NH children. Cochlear implantation and consequently improved communication is effective in improving the general health of the hearing-impaired children's mothers.

**Keywords:** Hearing aid; cochlear implant; general health questionnaire; mothers

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## Introduction

Hearing loss is the second most common health disorder affecting more than 1.26 billion people worldwide [1]. According to the World Health Organization estimation in 2012, about 12–26 million children aged 5–14 years worldwide had a hearing impairment more than 35 dB, with a prevalence rate of 1.4% (95% uncertainty interval 1–2%) [2]. The highest prevalence was reported among children in South Asia, Sub-Saharan Africa and Asia Pacific [3]. Its prevalence among kindergarten children (< 6 years) in Tehran, Iran was reported 0.6% [4,5], and according to a cross-sectional study during 2005-2012 in Iran, congenital hearing loss was 3 per 1000 live births [6]. Nowadays, advances in cochlear implantation and surgical procedures have been

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accompanied with advances in hearing aids (HAs) technologies, and many families still prefer HAs for children with severe and profound hearing loss; however, children with severe and profound hearing loss who use cochlear Implants (CIs) have better development of speech and language compared to their peers using HAs [7]. Furthermore, it has been found that individuals with CIs have higher comprehension scores than those with severe hearing loss [8].

About 90% of hearing-impaired children have parents with normal hearing (NH), and in most cases, there is no family history of hearing loss and their families are not familiar with such situation where they need to get enough and useful information, make a quick decision, and provide the best solution and support for their children. Coping with all of these challenges endangers their mental health, especially mothers' [9]. Hearing-impaired-children are more likely to have psychosocial mental retardation than hearing children [10]. Adult deaf people have been shown to have more mental problems than their peers, and people who use spoken language have better mental performance than those who use sign language. Deaf adults and children are at greater risk of socio-psychological problems than NH peers [11]. Clinical evidences have indicated that hearing loss in children cause psychosocial stress in their parents, and their family members are exposed to feelings of guilt, hopelessness, helplessness, and violence [12]. A study on the mothers of mentally-retarded, hearing-impaired, and visually-impaired children showed that they experience stress more than the mothers of normal children [13]. Using the symptom checklist-90-R (SCL-90-R) questionnaire, a study found out that the mental health of mothers with exceptional children are less than that of the mothers with normal children [14]. In the study by Sarant and Garrard, they showed that the parents of children using CIs had higher stress than the parents with NH children, and parents of children using unilateral CIs had higher stress than parents of children using bilateral CIs [15]. In another study, using SCL-90-R questionnaire, it was reported that the mothers of children using CIs had more depression than the mothers of NH

children [16]. Movallali et al. in a study on the general health of mothers with hearing-impaired children in Tehran, Iran, reported less mean level of general health in these mothers than mothers with NH children [17]. In a study on the quality of life of hearing-impaired adults, it was shown that cochlear implantation is useful in cases of profound hearing loss, while the use of HAs is useful in cases of severe or mild hearing loss [18]. Maternal general health is very important and has been shown to affect the behavior of hearing-impaired children and their adaptation and progress in all rehabilitation programs [17]. It is suggested that by reducing the hearing loss consequences, communication and speech disorders in children using CIs can improve the general health of their mothers. In this study, we compared the general health of the mothers of children using CIs, HAs and mothers with NH children.

### Methods

This is a descriptive-comparative study. The study population consists of the mothers of hearing-impaired children using CIs and HAs referred to the Rehabilitation Centers in Hamadan, Western of Iran as well as the mothers with NH children selected from the kindergartens in this city. Samples were selected using a convenience sampling method. The inclusion criteria for all mothers were: age < 40 years, educational level less than diploma, being housewife, having children aged < 6 years with severe to profound and profound hearing loss and use of CIs or HAs, and with duration of use of 18–24 months, and having no other disabilities. They were divided into three groups of CIs (n = 19), HAs (n = 19), and NH (n = 15).

In this study, the general health questionnaire-28 (GHQ-28) was used to measure the general health of mothers. It has 28 questions rated on 4-point Likert scale and four subscales including physical symptoms, anxiety symptom, social dysfunction symptom and depression symptom. The total score is obtained by summing up of the scores of these subscales; score 0–27 indicates favorable health, score 28–55 to some extent favorable health, and score > 56 shows poor

**Table 1. Comparison of the mean general health scores between mothers of children using cochlear implants, mothers of children using hearing aids and mothers with normal hearing children**

Health factor	Mean $\pm$ SD score			F	p
	Mothers of children using CIs	Mothers with NH children	Mothers of children using HAs		
General health	6.32 $\pm$ 2.15	5.45 $\pm$ 1.24	8.90 $\pm$ 1.03	5.224	0.009
Physical symptom	6.03 $\pm$ 2.18	5.89 $\pm$ 1.46	8.85 $\pm$ 1.87	2.655	0.047
Anxiety symptom	6.65 $\pm$ 2.43	5.36 $\pm$ 2.01	8.79 $\pm$ 1.43	2.620	0.045
Social dysfunction symptom	8.26 $\pm$ 2.89	5.33 $\pm$ 1.15	9.05 $\pm$ 2.01	6.000	0.005
Depression symptom	7.85 $\pm$ 2.98	5.02 $\pm$ 1.83	9.04 $\pm$ 2.39	3.137	0.026

CIs; cochlear implants, NH; normal hearing, HAs; hearing aids

health. For this questionnaire, a Cronbach  $\alpha$ , split half coefficients, test-retest reliability, sensitivity and specificity were 0.90, 0.89, 0.58, 0.83 and 0.76 respectively [19].

Before completion of the questionnaires, mothers signed a written consent form and were asked to answer all of questions. Then collected data were analyzed using MANOVA to evaluate the difference in the mean general health level between the study groups and ANOVA to compare the mean general health of study groups. Tukey's post hoc test was also used for pairwise comparisons of the groups. All tests performed in SPSS 16 software at a significance level of 0.05.

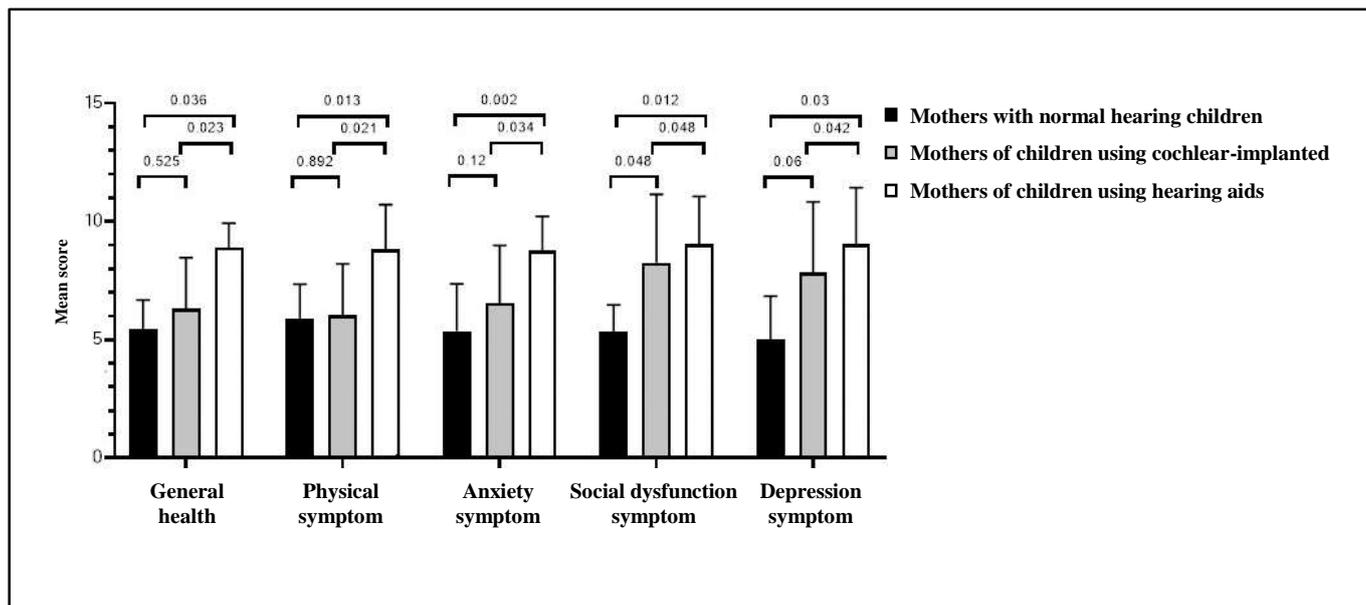
## Results

The mean  $\pm$  standard deviation of age for mothers was 29.7  $\pm$  2 years old, and for their children it was 3.7  $\pm$  4-year-old. These children had undergone hearing rehabilitation for 20  $\pm$  2 months. MANOVA test results showed that there was a statistically significant difference in general health dimensions between the study groups ( $F_{(4,112)} = 13.74$ ;  $p < 0.05$ ; Wilk's  $\Lambda = 0.450$ ). Based on the ANOVA test results, all general health dimension scores were higher in the mothers of children using CIs than the mothers of children using HAs ( $p < 0.05$ ). The difference in the general health of the mothers of children using CIs and the mothers with NH children was not statistically significant ( $p = 0.5$ ), but the

difference between the mothers of children using HAs and the mother with NH children was statistically significant ( $p = 0.02$ ). Comparison of the means of general health dimensions (physical symptom, anxiety symptom, social dysfunction symptom, and depression symptom) is showed in Table 1, also the results of the Tukey's test for pairwise comparisons of groups are shown in Fig. 1.

## Discussion

The purpose of this study was to compare the general health of the mothers of children using CIs with mothers of children using HAs and the mothers of NH children in four dimensions of anxiety symptom, depression symptom, social dysfunction symptom, and physical symptoms. The general health of the mothers with children using HAs was significantly low compared to the mothers of NH children. Since the hearing impairment is untreatable, it can cause a high stress in mothers, which can continue even years later [20]. Similar results were obtained by Narimani et al., comparing the health of the mothers of exceptional children in Ardabil, north western of Iran [14]. The results our study are also consistent with the results of Movalleli et al. who compared the general health of the mothers of hearing-impaired and deaf children [17]; Aliakbari Dehkordi et al. who compared the stress levels of the mothers of exceptional children in



**Fig. 1. Comparisons of the mean general health scores between mothers of children using cochlear implants, mothers of children using hearing aids and mothers with normal hearing children. p-values are indicated on top of bars for each comparison.**

Karaj, Iran [13], and Chu and Richdale who compared the sleep quality, depression, stress and anxiety of the mothers of exceptional children [21]. The results of the present study showed that cochlear implantation in children with severe to profound hearing loss leads to better general health of their mothers compared to mothers of children using HAs. This is against the results of Sarant and Garrard [15] and Quittner et al. [16]. Marschark et al. found that CIs and HAs provide an access to sounds for deaf children. Hearing more speech and environmental sounds can lead to the beneficial use of language, social development, and academic achievement [22]. Since cochlear-implanted children were rehabilitated during 18–24 months, improved speech skills and comprehension in children after rehabilitation may affect their mothers' general health. Due to a bond between mother and child, they feel comfortable and safe in social environments and experience less stress in dealing with challenges. This justifies the lower general health of mothers of children using HAs. It can be attributed to use of HAs and communication problems in their children.

One of the limitation of this study is that only one of the parent (mothers) was evaluated. Hearing loss and deafness can affect the quality of life and general health of all family members. Improvement of their general health should be taken into account. Hence, further studies are recommended on the general health of other family members of hearing-impaired children, especially fathers.

### Conclusion

Cochlear implantation can lead to more improvement in the general health of the mothers of hearing-impaired children in terms of anxiety, depression, social dysfunction and physical compared to the use of hearing aids due to improving their speech/language skills.

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### Conflict of interest

The authors declared no conflicts of interest.

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