



Evaluation of Parental Stress and Quality of Life Among Iranian Parents of Hearing-Impaired Children with Cochlear Implantation History: A Cross-sectional and Descriptive-Correlational Study

Atena Hakimzadeh ¹, Seyedeh Narjes Mousavizadeh ^{2,*}, Amirhossein Shafighi ³ and Fereshteh Javaheri Tehrani ⁴

¹Student Research Committee, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Department of Psychiatric Nursing and Management, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Master of Science in Psychiatric Nursing, Tehran, Iran

⁴Department of Community Health Nursing, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

*Corresponding author: Department of Psychiatric Nursing and Management, School of Nursing and Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran.
Email: n.mousavi@sbmu.ac.ir

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Abstract

Background: Hearing impairment (HI), as the most prevalent sensorineural impairment, can affect both children and their families' quality of life (QOL) by its remarkable consequences, like parental stress (PS). It is a type of stress that parents perceive following their parent-child interactions, alongside the children's mental, physical, or developmental disturbances.

Objectives: Considering the significant catastrophic consequences of HI in both children and their families' QOL, the current cross-sectional and descriptive-correlational study was conducted to investigate the relationship between PS and QOL among Iranian parents of hearing-impaired children with cochlear implantation (CI) history.

Methods: A total of 80 parents of HI children with CI history participated in the current cross-sectional and descriptive-correlational study based on the inclusion criteria and simple random sampling. Therefore, their PS and QOL were evaluated using the "Questionnaire of Clinical and Demographic Information", the "Parenting Stress Index, Fourth Edition Short Form (PSI-4-SF)," and the "36-Item Short Form Survey (SF-36)." Eventually, SPSS version 26 was utilized to analyze the obtained data.

Results: Most of the 80 participants were female (85.0%), housewives (58.8%), and had bachelor's degrees (35.0%). Moreover, PS and QOL in parents of HI children with CI history were relatively low ($\bar{X} = 67.42$, $P < 0.05$) and relatively satisfactory ($\bar{X} = 70.12$, $P < 0.05$) respectively. Eventually, there was a significant ($P = 0.001$) and inverse correlation ($r = -0.811$) between PS and QOL in parents of HI children with CI history.

Conclusions: The level of PS in the parents of HI children with CI history had a strong and inverse correlation with their QOL. Also, at the time of the study, the stress level of the parents was relatively low, and their QOL was reported to be relatively satisfactory. Thus, examining the factors affecting PS and QOL will be effective in achieving permanent, stable outcomes.

Keywords: Parental Stress, Quality of Life, Hearing Impairment, Cochlear Implantation, Children

1. Background

Hearing impairment (HI), the most common sensorineural impairment among human beings (1), is observed in 1 to 3 of every 1000 infants, based on the Centers for Disease Control and Prevention (CDC) (2). In accordance with the latest data, 34 million children have demonstrated HI with various severity globally (3). Hearing impairment in children can be present at birth or

may occur after birth in childhood due to various reasons (4). Regardless of the fact that more severe HI results in more significant complications, all forms of HI can have negative effects on both children and their parents, including the development of parental stress (PS) (5).

Parental stress is a type of stress that parents experience following their inappropriate parent-child interactions, which may be secondary to the children's mental, physical, or developmental disturbances (6).

Accordingly, research conducted by Marie et al., Ishtiaq et al., Dammeyer et al., and Jean et al. have shown unanimously that parents of children with HI experience higher levels of stress than parents of those with normal hearing function. In fact, the above-mentioned studies indicated that HI-related communication and functional limitations among children with HI were associated with disturbances in their parents' emotional well-being, self-confidence, and parental role, limiting parent-child relationships and even leading to further psychological disturbances, such as anxiety, depression, and sleep disorders (7-10). The mentioned consequences can ultimately lead to poor quality of life (QOL) (11). Based on the CDC, the QOL is the "perceived physical and mental health of an individual or a group over time" (12, 13). As declared earlier, parents of children with HI demonstrate poorer QOL than parents of normal children (14). In addition, the correlation between the presence of PS and unfavorable QOL has been unanimously stated by many studies (15-17).

However, other studies have shown different results from what was mentioned above, stating no significant difference in frequency and severity of PS and poor QOL among parents of children with HI compared to parents of normal children (18, 19). The controversial results may be secondary to various reasons, such as the adaptation process or therapeutic procedures (18-20). Accordingly, cochlear implant (CI) can be referred to as one of the mentioned therapeutic procedures.

A cochlear implant is a small, electronic, surgically implanted neuroprosthesis device that improves hearing function (21). In this regard, based on numerous studies, CI has improved all aspects of families' health by reducing their children's functional and communication limitations (22-24). However, the mentioned statement cannot be generalized to all sociodemographic disparities (25, 26).

Therefore, considering the controversial results of the mentioned studies in the field of HI-PS and PS-QOL correlations, the necessity of conducting more studies in these fields is emphasized. In addition, during the mentioned research, only the linear HI-PS and PS-QOL correlations have been investigated separately. This fact fortifies the importance of conducting comprehensive research that covers both above-mentioned correlations simultaneously.

Another existing gap in most of the conducted studies in this field is the lack of specific and unique characteristics of study samples. The current study has addressed this gap well, as it was conducted on parents of HI children with CI history as a study sample. Therefore, as mentioned before, despite the controversial results,

it can be postulated that the parents of HI children with CI history experience a lower level of PS and better QOL subsequently, as the severity of their children's restrictions has been reduced.

Indisputably, knowing the HI-related limitations and complications, besides their correlations with PS and unfavorable QOL among parents of HI children, can provide a substructure for implementing the necessary measures in order to minimize the previously stated vicious correlations and consequences. Since parents are the fundamental members of every family, all aspects of their health will bring the health of the family and, subsequently, society (27).

2. Objectives

Therefore, considering the limited number of studies that focus on HI children with CI history, as well as the remarkable importance of the concepts of "PS" and "QOL" among their parents, alongside the conflicting and controversial results of existing studies, it is important to investigate the level of PS and QOL among parents of HI children with CI history. Accordingly, the aim of the present study was to determine the severity and frequency of PS and QOL, alongside the correlation between PS and QOL among Iranian parents of HI children with CI history.

3. Methods

The current study was a cross-sectional and descriptive-correlational investigation, which was done from September 2022 until August 2023, in order to identify the relationship between PS and QOL among Iranian parents of HI children with CI history.

3.1. Participants

The participants comprised all parents of children with severe HI (approximate range of 71 - 90 dB (28), based on the medical diagnosis in the medical record (who underwent CI during the last 2 to 6 years and referred to the clinic of ear, nose, and throat (ENT) of Loghman Hakim Hospital. Accordingly, considering that about 100 individuals had the above-mentioned characteristics, the population size of the current study was 100 individuals. Therefore, based on the population size ($n = 100$), the appropriate sample size was at least 80 individuals based on the Krejcie and Morgan table (29). Meanwhile, based on Abidin, the appropriate sample size in studies that evaluate the correlation between variables is at least 50 individuals (30). Accordingly, from the initial 132 randomly selected participants, 103 were eligible

based on the inclusion criteria of the investigation. Of these, only 93 participants declared their consent after providing the required information and the aims of the research. Eventually, only 80 participants fulfilled the entire questionnaire.

3.2. Interventions and Procedures

After obtaining approval from the Ethics Committee of Shahid Beheshti University of Medical Sciences (SBMU), as well as permission from the university's vice-chancellor, we initiated the process of sampling from all parents of children with severe HI who underwent CI and were referred to the ENT clinic of Loghman Hakim Hospital for regular check-ups.

Based on the inclusion criteria, the current study's parents (father or mother) must have had severe HI children aged 3 to 7 years old, their children's severe HI must have been confirmed by an otorhinolaryngologist (based on medical records), and at least one year must have been elapsed from their children's CI surgery. Moreover, the participants must have had voluntary participation and must not have had any physical, mental, or cognitive interfering problems. Besides, the participants must have been able to communicate in Persian. Further, it should be noted that the mentioned children must have been living with their parents. Ultimately, neither parents nor their children must have been in other treatment or counseling interventions that may have interfered with their participation in the present study. Therefore, based on the exclusion criteria, if the participants had not answered more than 10% of the questionnaires, they were excluded from the study. Moreover, they had been allowed to withdraw from the study whenever they wanted.

Afterward, in the next first meeting, the "Clinical Demographic Information Questionnaire", the "Parenting Stress Index, Fourth Edition Short Form (PSI-4-SF)," and "36-Item Short Form Survey (SF-36)" were completed through self-reporting methods.

The "Clinical Demographic Information Questionnaire", which was designed by the authors, has comprised both parents and their children's information. It is necessary to indicate that the approach of qualitative content validity was utilized in order to evaluate the mentioned questionnaire's validity.

The SF-36 was designed in 1993 by Ware et al. to assess the QOL. This questionnaire contains 36 questions that measure the QOL based on physical and mental health. This questionnaire has 9 criteria for the QOL, including 1 criterion for health status fluctuations during the last year, 4 criteria for physical health, and 4 criteria for emotional-psychological functioning. The total score of this questionnaire is between 0 and 100, with different

scoring methods for each of the 36 questions (Table 1) (31). Moreover, total scores above 50 indicate a pleasant QOL level. Eventually, the reliability of this questionnaire was reported by Montazeri et al., with Cronbach's alpha coefficient between 0.77 and 0.9 (32).

Table 1. The Method of Scoring Based on the "36-Item Short form Survey (SF-36)" (22)

Questions	Score
1 – 2 – 20 – 22 – 34 – 36	
1	100
2	75
3	50
4	25
5	0
3 – 4 – 5 – 6 – 7 – 8 – 9 – 10 – 11 – 12	
1	0
2	50
3	100
13 – 14 – 15 – 16 – 17 – 18 – 19	
1	0
2	100
21 – 23 – 26 – 27 – 30	
1	100
2	80
3	60
4	40
5	20
6	0
24 – 25 – 28 – 29 – 31	
1	0
2	20
3	40
4	60
5	80
6	100
32 – 33 – 35	
1	0
2	25
3	50
4	75
5	100

Moreover, the PSI-4-SF was designed by Abdin and Loyd in 1983 and 1985, respectively. It has 36 items in three subscales, including parental confusion,

ineffective parent-child interaction, and problematic child characteristics, which evaluate the stress score of the participants. The scoring method is based on a Likert scale ranging from completely disagree (score 1) to completely agree (score 5), with the total score ranging from 36 to 180. Accordingly, scores above 90 indicate the presence of stress (33). Eventually, the internal consistency of this questionnaire was reported by Fadaei et al. as 0.8 to 0.9 (34).

It should be indicated that the questionnaires utilized in the present study have been used frequently in local and foreign investigations, and their validity has been confirmed (Cronbach's alpha coefficients above 0.7) (35-38).

3.3. Statistical Analysis

Descriptive statistics were implemented to examine descriptive (mean and mode) and dispersion (variance and standard deviation) indices. Furthermore, the variance test and t-test, alongside Pearson's correlation coefficient, were utilized to compare the mean score of PS and QOL and to determine the correlation between variables, respectively. Eventually, the gathered data were analyzed with the aforementioned methods using SPSS version 26, considering the amount of test error and the significance level of 0.05.

3.4. Ethical Considerations

The present study was approved by the Research Ethics Committee of Shahid Beheshti University of Medical Sciences and has an ethics code (number IR.SBMU.RETECH.REC.1401.822). In the current research, the ethical principles of voluntary participation, permission to withdraw, providing information, and confidentiality were considered to the greatest extent. In addition, written informed consent was obtained from the participants.

4. Results

4.1. Sociodemographic Characteristics and Descriptive Indices of Participants

Most of the 80 participants were female (85.0%), housewives (58.8%), and had bachelor's degrees (35.0%). Moreover, the mean age of parents, children, and CI were 34.01 ± 7.41 , 5.37 ± 1.27 , and 3.66 ± 1.16 , respectively. Eventually, the mean scores of the QOL and PS were 70.12 ± 11.88 and 67.42 ± 16.41 , respectively (Table 2).

4.2. Evaluating Parental Stress Among Parents of Children with Hearing Impairment

Since the significance level and mean scores of PS were less than 0.05 and 90, respectively, besides both negative values of lower and upper limits, it can be stated that PS in parents of children with HI was relatively low (Table 3).

4.3. Evaluating Quality of Life Among Parents of Children with Hearing Impairment

As the significance level and mean score of QOL were less than 0.05 and above 50, respectively, besides both positive values of lower and upper limits, it can be stated that the QOL in parents of children with HI was relatively satisfactory (Table 4).

4.4. Evaluating the Correlation Between Parental Stress and Quality of Life in Parents of Children with Hearing Impairment

As the significance level of the Pearson correlation coefficient test between the variables was calculated to be less than 0.05, the null hypothesis (H_0) was rejected, and the alternative hypothesis (H_1) was accepted. That is, it can be stated that there is a significant ($P = 0.001$) and inverse correlation ($r = -0.811$) between PS and QOL in parents of children with HI (Table 5).

5. Discussion

The purpose of the current investigation was to determine PS and QOL among Iranian parents of HI children with CI history. Considering the first purpose of the research, i.e., determining PS among the participants, the results have indicated a relatively low level of PS among Iranian parents of HI children with CI history. That is, the previously mentioned ordinary HI-related catastrophic limitations have not resulted in notable PS among parents of HI children with CI history.

The fact is inconsistent with most similar studies (5, 39, 40). However, the stated contradiction can first be justified by the unique characteristics of the current research participants who were HI children with CI history. As mentioned earlier, CI improves hearing function; as a result, children's sensory and communicative abilities are improved (21), and subsequently, PS among their parents is also reduced, as stated by Continisio et al. (41). Also, as declared by Dev et al., a significant reduction was observed in the level of PS among parents of HI children following their children's CI surgery (42). Furthermore, the time interval between CI and the current research is considerable. In other words, given that the average duration of the mentioned time interval was approximately 3.5 years, most parents have become calm

Table 2. Sociodemographic Characteristics and Descriptive Indices of Participants ^a

Variables	Values	Min	Max
Gender			
Male	12 (15.0)		
Female	68 (85.0)		
Total	80 (100.0)		
Occupation			
Employed	28 (35.0)		
Unemployed	5 (6.2)		
Housewife	47 (58.8)		
Total	80 (100.0)		
Education			
High school diploma	9 (11.3)		
Associate's degree	27 (33.8)		
Bachelor's degree	28 (35.0)		
Master's degree	15 (18.8)		
Doctoral degree	1 (1.3)		
Total	80 (100.0)		
QOL	70.12 ± 11.88	55	85.5
PS	67.42 ± 16.41	42	93
Age of Parents	34.01 ± 7.41	23	56
Age of children	5.37 ± 1.27	3	7
Age of CI	3.66 ± 1.16	2	6

^a Values are expressed as No. (%) or Mean ± SD.

Table 3. Parental Stress Among Parents of Children with Hearing Impairment

Variables	Mean	The Absolute Value of t-Value	Statistical Significance	Mean Difference	95% Confidence Interval of Mean Difference	
					Lower	Upper
PS	67.42	-8.57	0.001	-40.57	-41.716	-39.96

Table 4. Evaluating Quality of Life Among Parents of Children with Hearing Impairment

Variables	Mean	The Absolute Value of t-Value	Statistical Significance	Means Difference	95% Confidence Interval of Mean Difference	
					Lower	Upper
QOL	70.12	7.16	0.001	20.12	19.98	20.25

and accepted this issue, along with the other difficulties and challenges faced by children with HI. This fact was validated by a study conducted by Stanzel and Sierau. In this regard, they stated that as time elapses from the surgery, stress and anxiety symptoms have decreased over time (43). Besides, according to Wiseman et al., CI with modern technology has produced lower stress in parents of children with HI compared to CI with old technology (44). This is a further justification for the low PS of current

research participants, as all of the CIs in the current research were implemented using modern technology.

In terms of the QOL, as the second purpose of the research, it can be stated due to the results that the QOL in Iranian parents of HI children with CI history was relatively satisfactory. In other words, based on what was discussed above, since PS caused by HI in children was reduced after CI surgery, a favorable level of QOL was expected. The mentioned fact was emphasized by Tokat et al., as

Table 5. Pearson Correlation Coefficient Between Parental Stress and Quality of Life

Variables	PS	QOL
PS		
Correlation value	1	-0.811
Significance level		0.001
QOL		
Correlation value	-0.811	1
Significance level	0.001	

they declared that CI improved the QOL of parents of HI children multidimensionally (45). Besides, in the study of Umat et al., the satisfactory QOL of parents of HI children with CI surgery was reported (46). Nevertheless, similar to PS, parents' pleasant QOL can be justified by taking into account the previously mentioned time interval between CI and the current research. In other words, since the stress and anxiety symptoms decreased over time after the surgery (43), the QOL improved.

Additionally, it is worth noting that the majority of participants in the current study had a higher level of education (88.7%). Therefore, it can be concluded that their relatively satisfactory QOL and low PS were reasonable due to the mentioned fact. Accordingly, based on the related studies, a higher educational level is correlated with a better QOL (47-49) and a lower level of PS (50, 51). Therefore, it can be hypothesized that educated individuals are more likely to manage challenging situations by employing effective coping strategies. The mentioned hypothesis has been supported by numerous studies (52-54).

As the last purpose of the research, based on the results, there was a meaningful and inverse correlation between PS and QOL in Iranian parents of children with HI. In other words, with the reduction of PS in Iranian parents of children with HI, their QOL was improved, and vice versa. Based on the aforementioned justifications, since the PS of the current investigation's participants was relatively low, the relatively pleasant level of their QOL was entirely acceptable. In this regard, based on Parsaei et al., increased stress levels are related to impaired QOL, which reinforced the illustrated correlation between PS and QOL in the current study (55). Further investigation by Grasaas et al. revealed that stress is associated with reduced health-related QOL, which is in line with what was stated above (56). Intriguingly, Jenaro et al. evaluated the correlation between QOL and PS. They found that dysfunctional interactions and behaviors, inappropriate emotional well-being, and intellectual disability were correlated with a lower QOL in family members. This, in turn, led to an increase in psychological stress (17).

According to Zeng et al., a moderate to low level of QOL was correlated with a high level of PS among the participants. Although the mentioned result was contrary to the present research's findings, they were homogeneous concerning the direction of correlations (inverse correlation) (57).

5.1. Limitations

Considering that the current research was conducted in Tehran and the number of participants from other cities of Iran was restricted, the generalization of the results to the populations of other Iranian cities may be disturbed. Furthermore, one of the limitations of this study was that due to the low economic situation, parents, especially fathers, refused to go to the hearing center for a regular periodical examination of the child's hearing. In order to encourage them to complete the research questionnaires, a session of free hearing tests was considered. Eventually, as the population of the present study was just limited to children with severe HI and a history of CI, it may not reflect the general characteristics of the whole population of HI children.

5.2. Conclusions

Based on the findings, the level of PS in the parents of HI children with CI history had a considerable and inverse correlation with their QOL. That is, the lower the PS level, the better the QOL, and vice versa. Moreover, during this cross-sectional and descriptive-correlational study, it was found that Iranian parents of HI children who had undergone CI within the last 2 to 6 years reported relatively low levels of PS and a relatively high QOL. Therefore, it seems necessary to conduct more studies to illustrate the multiple factors that affect the PS and QOL of these parents in order to improve their well-being.

Footnotes

Authors' Contribution: A.H. conceived the research, collected the clinical data, and performed the statistical analysis. S.N.M., as the corresponding author, re-evaluated

the clinical data, revised the manuscript, performed parts of the statistical analysis, and revised the manuscript. A.H.SH. conceived and designed the evaluation, drafted the manuscript, and re-evaluated the clinical and statistical data. F.J.T. re-analyzed the clinical and statistical data and revised the manuscript.

Conflict of Interests: No conflict of interest is declared in this research.

Data Reproducibility: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: This study is approved under the ethical approval code of "IR.SBMU.RETECH.REC.1401.822".

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Informed Consent: Written informed consent was obtained from the participants.

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