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Original Article

A Study of Anxiety Levels Among Parents of Children With Hearing Impairment Before and After Receiving Auditory Intervention at Ramathibodi Hospital

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Abstract

Background: Hearing loss in children impacts their communication ability and daily living. Research has shown a correlation between hearing loss in children and parent's mental health problems. Although anxiety is a common mental health problem globally, few studies have examined anxiety levels among parents of children with hearing impairments.

Objective: To evaluate anxiety levels among parents of children with hearing impairments before and after children received auditory interventions.

Methods: The study recruited 35 parents of children with hearing impairments who received auditory interventions at Ramathibodi Hospital. Parental anxiety levels were evaluated using STAI Form Y-1 (Thai version), supplemented with structured interviews. Parental anxiety levels before and after children received the intervention were compared using paired *t* tests, and content analysis was used to analyze qualitative data from structured interviews. The relationship between parental anxiety and intervention duration was evaluated using Kendall's tau-b correlation.

Results: Most participants were female parents of children with bilateral sensorineural hearing loss (SNHL) using hearing aids (mean age; parents = 41 years, and children = 6 years). The results showed a significant decrease in parental anxiety levels after children received an auditory intervention. Consistent with previous literature, parental anxiety levels were reduced after children received auditory interventions. Reduction in parental anxiety might be associated with a better understanding of children's hearing status, treatment plans, and improvements in children's speech and language development.

Conclusions: This study suggests that appropriate auditory interventions reduce parental anxiety. The interventions should be carefully planned to support children's development and parents' mental well-being.

Keywords: Parental anxiety, Hearing-impaired children, Auditory intervention, Aural rehabilitation

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Introduction

Hearing loss is a common chronic disability worldwide. The World Health Organization (WHO) in 2018 estimated that the global prevalence of hearing loss around 466 million people, which included 34 million children with hearing impairments.[1] Based on global reports of early hearing detection and intervention programs, a universal newborn screening program

showed a prevalence of permanent hearing loss of about 2 to 3 infants in every 1000 live births.[2] According to the Department of Empowerment of Persons and Disability in 2024, the total number of the population registered for communication disorders are about 432 482 cases or 19.12% of all cases with disability. The number of registered communication disorders can be divided into to 5435 cases or 1.26% for the number of children (≤14 years) with hearing difficulty.[2] Hearing is essential for speech and language development, social-emotional development, and cognitive function, especially in children; therefore, the essential milestones will be interrupted when babies are born with hearing loss. Early detection and intervention programs are necessary for successful speech and language development among children with hearing impairments.[4-6] However, a delay in proper diagnosis and intervention may result in significant speech and language development problems. Expected negative consequences of hearing loss in children include speech and language developmental delay, lack of social interaction, and poor academic performance.[7-9] Notably, the consequences of hearing impairment are not limited to the affected children as it also impacts their parents' or caregivers' mental well.[10-13] Parents of children who are hearing impaired may experience multiple stages in their mental health status before accepting that their children have hearing difficulties.[14]

One study has demonstrated that parents of children with hearing impairment had a greater chance of experiencing a mental health disorder (eg, stress) than parents of children with normal hearing.[15] Some studies argued that raising children who have hearing impairments was complicated by challenges that could contribute to an increased chance of stress.[16, 17] For example, parents may experience mental health disorders when they first learn about their children's failed hearing evaluation. Moreover, parents may be overwhelmed by detailed information about the consequences of hearing loss, treatment processes, and hearing device manipulations.[18, 19] Unfortunately, parents' mental health problems may negatively influence a child's treatment outcomes as well as parent-child relationship.[20] Consistent with family-centered care, it has been suggested that healthcare providers pay attention to parents' mental health status, which will benefit children's well-being and development.[21]

Some studies reported no significant differences in stress levels between parents of children with normal hearing and those with hearing impairment. These studies argued that stress levels may be influenced by various external factors, including sample characteristics, amount of the available support, and access to resource.[22-24] They also reported that frequent auditory intervention for children with hearing impairments could decrease parents' stress level. When children's speech and hearing development are appropriate, stress levels may not significantly differ between parents. Therefore, because the level of stress may be altered by external factors, focusing solely on parental stress may lead to an underestimation of the impact of children's hearing ability on parents' mental health. Research should be expanded to other mental health conditions to ensure that proper prevention and intervention for mental health problems are provided for parents of children who have hearing impairments.

Anxiety is a common mental health disorder and is defined as a specific response that people experience under stress. Unlike stress, which can be eliminated when the situation is resolved, anxiety remains even when a particular worry or concern has passed.[25] In the absence of proper treatment, anxiety may develop into an anxiety disorder (eg, panic disorder, phobias, social anxiety, and posttraumatic stress disorder).[26] A common approach to assess anxiety is by using standardized questionnaires such as

the State-Trait Anxiety Inventory (STAI).[27] These questionnaires evaluate anxiety levels using rating scales and present a result in a numerical form. Previous literature reported that parental anxiety levels improved after their children received appropriate treatments.[17, 28-30]

Causes of anxiety may change depending on important life events. For example, during a child's auditory diagnostic phase, causes of anxiety for parents may include hearing test results, diagnostic processes, and treatment options.[18] When children start auditory interventions, causes of parental anxiety may relate to children's communication, social-emotional development, and academic achievement.[31, 32] Eventually, when children reach higher grades in school, parents may experience anxiety regarding their children's future and career path.[18, 33, 34]

To better understand anxiety among parents of children with hearing impairments receiving regular auditory interventions, we studied parental anxiety as a function of children's duration in an auditory intervention program. This study aimed to compare the levels of anxiety in parents of children with hearing impairment before and after children received an auditory intervention and evaluate the relationship between parental anxiety levels and the duration of participation in an auditory intervention program. We hypothesized that parental anxiety levels would be reduced after their children started an auditory intervention, and parental anxiety would continuously decrease with more participation in an auditory intervention program.

Methods

Participants

This study was conducted by survey and structured interview method at the Speech and Hearing Clinic, Faculty of Medicine Ramathibodi Hospital, from September 2021 to December 2021. The number of participants was determined based on statistical power calculations using a power level of 1.00 and a significance level (α) of 0.05. In total, 35 participants were recruited. All participants met the following inclusion criteria: 1) parents aged at least 20 years with a child aged under 18 years diagnosed with bilateral sensorineural hearing loss, who has received an auditory intervention (ie, hearing aid fitting, auditory training and speech therapy [private and/or group activities], and parental support counseling), at the Speech and Hearing Clinic, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand; 2) parents who could read, write, and fluently use Thai language; and 3) parents were willing to participate in this study and provided written informed consent as approved by the Institutional Review Board of the Faculty of Medicine Ramathibodi Hospital, Mahidol University.

Procedures

All participants completed 2 questionnaires; a questionnaire covering personal information and a questionnaire to evaluate parental anxiety, the Thai version of the State-Trait Anxiety Inventory (STAI Form Y-1).[35] The personal information questionnaire collected general information about parents and children, such as age, gender, family income, child's age at hearing diagnosis, and duration of hearing intervention. The STAI Form Y-1 questionnaire comprises 20 questions with responses on a rating scale from 1 (not at all) to 4 (very much so). The Thai version of the STAI has good internal consistency (Cronbach's alpha coefficients 0.86-0.92) and reliability (0.73-0.92). Generally, the STAI Form Y-1 questionnaire provides a measurement of parental anxiety levels using 10 questions

related to negative perspectives and 10 questions related to positive perspectives (eg, "I feel calm" and "I feel tense"). The STAI total score ranges from 20 to 80 points, and scores are classified into 3 groups: low anxiety (20-39 points), medium anxiety (40-59 points), and high anxiety (60-80 points).

This study also conducted informal structured interviews with parents, and their permission was sought for the interviews to be voice-recorded for further analysis. In the interview, parents were encouraged to discuss their pre- and post-intervention levels of anxiety. The interview comprised 3 open-ended questions: "Have you had feelings of anxiety, and in your opinion, what are the causes of that feeling?"; "Can you describe your feelings when you are having anxiety?"; and "If you had experienced anxiety, what could you do to help to reduce your anxiety level". In summary, each participant completed the 2 questionnaires and an interview in a single session, which lasted approximately 30-45 minutes. Importantly, all participants willingly agreed to participate in this study without compensation.

Statistical Analysis

Descriptive and inferential statistics were calculated using SPSS version 16.0 (SPSS for Windows, Version 16.0. Chicago, SPSS Inc; 2007). Participants' demographic information was summarized using percentages and means. The levels of parental anxiety before and after their children received auditory interventions were compared using paired-sample *t* test. Finally, the correlations between parental anxiety levels and auditory intervention duration were evaluated using Kendall's tau-b correlation statistics. The qualitative data from the interviews with the 35 participants were analyzed using content analysis. The data were grouped under the same themes by considering the similarity and coherence in the data.

Results

Demographic Information for Parents and Children

Descriptive statistics were used to summarize the general information about participants (Table 1). Most of the parents were female, and the average age was around 41 years. All children were nonsyndromic, diagnosed with bilateral sensorineural hearing loss, and fitted with prescribed bilateral hearing aids. The average age of the children was around 6 years. Most children had severe sensorineural hearing loss with auditory intervention of less than 5 years.

Table 1. Participants' Demographic Information

Demographic Variable	No. (%)
Parents	
Gender	
Female	30 (85.71)
Male	5 (14.29)
Age, mean (SD), y	40.89 (10.64)
Education	
Lower than high school	4 (11.43)
High school	14 (40.00)
College	17 (48.57)

Table 1. Participants' Demographic Information (Continued)

Demographic Variable	No. (%)
Family monthly income, ฿	
< 5000	2 (5.71)
5000-10 000	8 (22.86)
10 001-25 000	15 (42.86)
25 001-50 000	9 (25.71)
> 50 000	1 (2.86)
Marital status	
Separated	4 (11.43)
Married	14 (40.00)
Children	
Gender	
Female	15 (42.86)
Male	20 (57.14)
Age, mean (SD), y	6.23 (2.89)
Degree of hearing loss	
Mild	4 (11.43)
Moderate	5 (14.29)
Severe	18 (51.43)
Profound	8 (22.86)
Age at hearing diagnosis	
< 3 months	3 (8.57)
3 - 11 months	5 (14.29)
1 - 2 years	16 (45.71)
> 2 years	11 (31.43)
Age of hearing aid fitted, y	
< 2	11 (31.43)
2 - 5	18 (51.43)
> 5	6 (17.14)
Years of intervention, y	
< 2	14 (40.00)
2 - 5	16 (45.71)
> 5	5 (14.29)

Overall Levels of Parental Anxiety Before and After Children Received an Auditory Intervention

Parental anxiety levels before and after children received an auditory intervention were determined (Table 2). The level of parental anxiety was higher before the auditory intervention (mean [SD], 55.71 [8.80]), and reduced after the auditory intervention (mean [SD], 45.77 [6.84]). The paired-sample t tests showed that the differences in parental anxiety levels before and after the auditory intervention were statistically significant (95% CI, 6.37-13.40; $P < .001$). with auditory intervention of less than 5 years.

Relationship Between Parental Anxiety and Auditory Intervention Duration

There was an association between parental anxiety level and children's auditory intervention program duration. Parental anxiety levels were lower among parents of children with longer duration of auditory intervention compared with the ones with shorter duration. The percentages of parental anxiety categorized by the duration of auditory intervention were determined (Table 3). Specifically, participants were divided into 3 groups based on their children's duration in an auditory intervention program (< 2 years, 2-5 years, and > 5 years). The total STAI scores were calculated, and participants were categorized into 3 groups: low, medium, and high anxiety. Parents reported either medium or high levels of anxiety before their children received an auditory intervention; however, parental anxiety levels dropped to low or medium after their children received auditory intervention.

Furthermore, the correlations between parental anxiety levels and the auditory intervention duration were evaluated using Kendall's tau-b correlation statistics. The results showed that parental anxiety levels had a statistically significant correlation with auditory intervention duration (τb = -0.36, P = .03). Specifically, a longer duration of auditory intervention for the child was associated with a lower level of parental anxiety.

Table 2. Difference in Mean Parental Anxiety Between Before and After Auditory Intervention

Level of Parental Anxiety	Mean (SD)	*t*	*df*	Sig (2-Tailed)	Mean Difference	SE Difference	95% CI of the Difference
Before	55.71 (8.80)	5.71	34	< .001	10.23	1.73	6.37-13.40
After	45.77 (6.84)						

Table 3. Level of Parental Anxiety Before and After Auditory Intervention

Duration of Auditory Intervention, y	No. (%)					
	Levels of Anxiety					
	Before Auditory Intervention			After Auditory intervention		
	Low	Medium	High	Low	Medium	High
< 2	0	11 (31.43)	3 (8.57)	1 (2.85)	13 (37.14)	0
2 - 5	0	13 (37.14)	3 (8.57)	3 (8.57)	13 (37.14)	0
> 5	0	3 (8.57)	2 (5.71)	3 (8.57)	2 (5.71)	0

Parent Interviews

The structured interviews were consistent with the levels of parental anxiety measured by the STAI. Those parents reported they felt less anxiety after their children received an appropriate auditory intervention. The parents' data showed that causes of anxiety could be classified into 2 main groups: factors related to their child and factors related to the parent themselves (Table 4).

Factors related to their children, the interview data from 35 parents showed that before children had received auditory intervention, most parents felt highly anxious about their children's auditory and communication abilities, 65.71% (23 parents), as well as their social interaction and self-care ability, 34.29% (12 parents).

Factors related to parents themselves showed that parents needed to dedicate a significant amount of time and finances to raise children with hearing impairments. Parents reported spending most of their time with their children, which could lead to stress as they had little time for themselves. Financial problems were also a concern for these families as hearing devices and maintenance could be costly.

There were few examples of quotes exacted from parent interviews that related to factors that influenced parental anxiety: Parent 1: "Before receiving the auditory interventions, I (mother) was very worried that if he could not hear, then how could he communicate?" Parent 2: "I (mother) was worried about how my child could interact with friends and society, and also whether she will be able to help herself in daily living"

Table 4. Summary of Parent Interviews

Factor	Information From the Interviews
Factors that influenced parental anxiety	
Factors related to the child	• Hearing, speech, and language development • Self-care and safety • Academic achievement and future career • Social interaction and social judgment
Factors related to the parent	• Dedication of time for the intervention • Financial support and expenses • Challenges in raising the children
Factors associated with reduction of parental anxiety	
Understanding of treatment and intervention plans	• Parents felt less anxiety when they received information about treatment and intervention plan from medical providers
Speech and language development of children	• Levels of parental anxiety were reduced when parents noticed improvement in their children's speech and language development after the interventions
Support from the group of parents in the hearing clinic	• Exchange of information, empathy, and support among parents in the group led to a reduction in anxiety level
Support from family and medical providers	• The support from family and medical providers could help the parents through problems and obstacles

Levels of parental anxiety were reduced after the children had received an appropriate auditory intervention. Parents felt less anxious when they understood the impact of hearing loss on children's development and the treatment plans for their children. Also, when they noticed their children's improvement in speech and hearing development; for example, children started responding to sounds, developed meaningful words, and showed improved communication skills. Support from the group of parents of children with hearing loss, family members, and medical providers was also important for the reduction of anxiety.

There were few examples of quotes exacted from parent interviews that related to factors associated with the reduction of parental anxiety; Parent 1: "I (mother) felt better when the health care providers spent time with us (family) and described how the hearing loss would impact my child's development and how I can help my child to make progress along with the treatment plans", Parent 2: "It was promising when I (mother) heard my child start making some noises and then saying a word for the first time".

Discussion

This study aimed to investigate levels of anxiety among parents of hard-of-hearing children before and after receiving the hearing intervention and evaluate the relationship between parental anxiety levels and duration of participation in the auditory intervention program. Overall, the results showed that auditory intervention helped decreasing levels of anxiety among parents of children who were hearing impaired. Moreover, a longer duration of time the children had been in the auditory intervention was associated with lower parental anxiety.

Our results were consistent with previous studies by Gurbuz et al[17] and Hashemi et al,[28] that the average level of parents' anxiety was significantly reduced after their children received a hearing intervention. A previous study showed that parents began experiencing some stress during the diagnostic phase following their child's hearing test results and the start of the treatment process.[18] In this study, parents also reported more anxiety during the first few visits, which might still focus on confirming hearing status. Hearing levels and treatment plans might still be unclear for children's intervention (the number of visits depends on the causes of hearing and treatment plans); however, anxiety levels might be reduced in later visits. As the hearing loss levels and impact on children's developments could be identified, and treatment for individuals was planned. Alteration in the levels of anxiety may be associated with psychological stages reflecting acceptance of hearing impairment.[14] At first, parents of children with hearing impairments may experience a denial phase and blame themselves for these problems. They may also have high levels of anxiety about hearing evaluation results, speech and language development, and their children's future. However, parental anxiety may be reduced in later follow-up sessions when parents enter the acceptance phase. After few medical intervention sessions, parents may have received more information from available resources, including treatment plans and possible outcomes from medical professionals.[12]

Parents may also understand important information shared among the parents, such as device care and manipulation and language intervention techniques.[19] Furthermore, anxiety levels could be reduced when parents notice improved speech and language development.[28]

Although the levels of parental anxiety were reduced after auditory intervention,

anxiety could not be eliminated. This study divided participants into 3 groups based on the children's auditory intervention duration. Parental anxiety was lower in the group with a longer intervention program duration, which may be partly related to children's speech and hearing improvement. Key factors may include acceptance of the children's hearing ability, significant progress in children's speech and language development, and academic achievement. However, as our study included a small number of participants, we could not evaluate levels of anxiety directly before the auditory intervention. Instead, we encouraged participants to recall their estimated levels of anxiety at that time. Our results were consistent with a previous study that showed parental mental health gradually improved as their children received further treatments for their hearing impairment.[28]

Other challenging conditions may induce further anxiety episodes, meaning some anxiety could not be eliminated in any group of parents. The interview data supported that causes of parental anxiety may change based on their current situations and their children's important milestones. The interviews showed that the causes of parental anxiety could be grouped into 2 main categories: factors related to parents themselves and factors related to their children. Factors associated with parents included the dedication of a significant amount of time and effort for auditory training before noticeable progress in the child's speech and hearing development. Previous research suggested that taking care of children with hearing impairments or special needs could lead to a significant multidimensional burden, including physical, emotional, psychological, and financial stressors.[11, 13] In several families, one parent had to quit a full-time job and spend most of the time with their hard-of-hearing child; therefore, causes of anxiety may relate to the family's financial situation, and the anxiety might remain during the first few years of intervention.

Causes of parental anxiety were associated with children's hearing ability. The interview data showed that parents felt anxious about their children's academic performance and future career. As hearing loss is a known factor that can compromise children's educational achievement, parents had a high level of anxiety about children's classroom performance.[8, 9] Anxiety about academic performance could result in concern about a child's future career. Moreover, social interaction may also be interrupted by hearing difficulties. Hard-of-hearing children commonly have communication problems that may prevent them from becoming socialized.[7] In our study, parents stated that they were worried about the relationships between their children and classmates in school. They also worried about limitations in speech and language ability that could prevent their children from participating in class activities and induce social separation. In addition, parents were concerned about their children's safety, as they noticed that their children had limitations in sound localization, especially when they were in noisy environments.

The limitations of this study were the lack of eligible participants to evaluate parental anxiety before starting the auditory intervention; therefore, we encouraged the parents to recall the anxiety levels they had experienced in the past through structured interviews. Although the sample size was calculated based on the statistical analysis, but the number of participants was relatively small. The results might involve gender bias since most of the parents were female.

Further studies should evaluate anxiety levels and compare these levels at different time points, such as before, immediately after, and a few years after the intervention. In addition, different hearing devices could have different effectiveness (ie, quality of

sounds, benefit of devices in different degrees of hearing, and compatibility with assistive listening devices), and parental anxiety levels should be compared across various kinds of hearing devices, including cochlear implants, hearing aids, and bone hearing aids.

Conclusions

Hearing loss in children causes an interruption in children's achievement of significant milestones, which could also impact the mental well-being of parents, such as increasing levels of parental anxiety. Although auditory intervention for children with hearing impairments can induce a reduction in parental anxiety, these anxiety levels may not be eliminated. When parents feel less anxious about one condition, a new condition may occur that induces another episode of anxiety. Therefore, medical providers should consider mapping children's essential milestones with parents' concerns so parents' mental status can be carefully monitored.

Additional Information

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