

# Comparative study of third-party disability between mothers of children using hearing aids and those using cochlear implants

## Abstract

**Purpose:** The study aims to investigate on application of ICF framework's third-party disability in mothers of children with pre-lingual hearing impairment using hearing aids and cochlear implants.

**Method:** This is a comparative study of 30 mothers of children (age between 8-12) using cochlear implant (G-1) and 30 mothers of children (age between 8-12) using hearing aids (G-2) was included for the study. A questionnaire was developed based on ICF-CY version, consisting of 46 questions distributed across 9 domains. The questionnaire form in the Hindi language was provided to the participants (mothers) with enough amount of time to complete it. For mothers who were not able to self-administer the tool, the researcher helped by interviewing them. Due to COVID- 19 pandemic and ensuing lockdown most parents (mothers) were unwilling to report to the clinic. Owing to this, to ensure safety of parents and children, data was obtained through virtual mode.

**Results:** Across all domains, the comparison between Group A and Group B indicates no statistically significant difference except for two domains (general tasks and behaviours, communication). When the total third-party disability scores were analysed, it is seen that there is significant difference in third-party disability scores of the two groups.

**Conclusion:** Findings enhances mothers of children with hearing aids report greater third-party disability as compared to mothers of children using unilateral cochlear implant.

**Implication:** The study included only mothers and a limited number of them, hence generalizing the findings to a larger population may not be appropriate.

**Keywords:** mothers of children using cochlear implant, mothers of children using hearing aid, third party disability

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**Abbreviations:** ICF-CY, International classification of functioning and health- children youth; G-1, group 1; G-2, group 2; CI, cochlear implant; HA, hearing aid

## Introduction

Hearing is an important sensory mode for children to develop verbal language. Hearing impairment that is present from birth impacts primarily communication development, but also has lasting effects on social-emotional development, academic achievements, personality development, family interactions and overall quality of life. The identification of a child's hearing loss is a critical life event for parents and a high stress experience. Parents of newly identified deaf children have endorsed a persistent feeling of being overwhelmed and inadequate for the task of raising a deaf child.<sup>1,2</sup> At the time of identification, or closely following, parents are presented with technical information and the need to make decisions about a broad range of options like sensory devices, early intervention, and communication choices.<sup>3</sup> Parenting stress affects parent-child relationships and important child outcomes. Higher levels of parenting stress have been related to poorer social and emotional development and higher rates of behaviour problems in both deaf and hearing children.<sup>4</sup> Birth of a child with mental or physical disability (especially deaf or blind child) imposes an enormous load of stress on the parents especially the mothers.<sup>5</sup>

Different hearing devices are available for children with pre-lingual hearing impairment, to enable them to hear well and develop

verbal communication skills. Among these, hearing aids (HA) and cochlear implants (CI) are widely used devices. A hearing aid (HA) is a miniature electronic device that amplifies the sound and delivers it to the damaged auditory system. Cochlear implant (CI) is a surgically placed electronic device coupled to external components that provides useful hearing and improved communication to adults and children with severe to profound sensory neural hearing loss by electrically stimulating the auditory nerve. Several studies comparing outcomes from hearing aids and cochlear implants in children with congenital severe to profound hearing loss have reported superior outcomes with cochlear implants in areas such as listening, language, speech, verbal communication, academic achievements, and personal-social skills.<sup>6-8</sup>

A child's hearing loss (HL) affects the child, as well as his or her family. The psychological reaction to this diagnosis typically includes feelings of grief, helplessness, guilt and anger, given the central role of hearing to human communication, a sense of isolation within the parent child dynamic is inevitable.<sup>9</sup> Mothers are more inclined than fathers to experience depression in response to their child's hearing loss; they may feel grief, depression, or shame. Some may also ask questions of "why me" and conclude that they are being punished for sins or bad acts of the past.<sup>10</sup> Prakash et al.,<sup>11</sup> aimed to compare the levels of stress and depression in mothers of children using hearing aids and children who had cochlear implants. The results revealed that mothers in both the groups have high stress levels. On comparison the mothers of children who had cochlear implant obtained significantly higher scores than mothers of children using hearing aid on PSI.

Gurbuz et al.,<sup>12,13</sup> reported that the cochlear implant surgery led to reduced anxiety levels in mothers. However, they were still higher than in the control group of mothers of children with normal hearing.

Saburi et al.,<sup>14</sup> analysed anxiety and depression in mothers of deaf children after receiving a cochlear implant. They found that the level of depression and anxiety was much higher in mothers of children during the process of qualification for the implant compared to mothers of children after the implant surgery.

Mothers of hearing-impaired children were also of the opinion that they did not have enough free time for themselves and that they received less emotional support in the situation they had to confront than did husbands.<sup>15,16</sup> 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.<sup>17</sup>

In addition to the pressures and tensions encountered by them, almost all parents with disabled children have many stresses and sources of anxiety due to the special problems and needs of their children. where mothers are particularly prone to increased stress due to high level of responsibility in attending appointments, managing hearing devices, and provision of home care and therefore considered to develop different ways of coping strategies as compared to fathers. Since the mother is the first person who communicates directly with the child and the primary caregiver right from day one, mothers may experience a lot of stress and anxiety even years after identifying hearing loss of their children.

Having a child with a disability affects the family life significantly. This aspect can be better explained by the concept of third-party disability under International Classification of Functioning and Disability (ICF) given by World Health Organization (WHO),<sup>18</sup> which refers to the disability and functioning of the family members due to the health condition of the significant others. The ICF attempts to address the difficulties that are faced by not only the person who has a health condition but also the difficulties that are faced by the family members due to his/her health condition. This may help us in planning rehabilitation not only specifically but also holistically.

Considering the high prevalence of childhood hearing loss in India and lack of studies in this area, there is a need to explore the challenges and concerns of mothers of hearing-impaired children. This will help in providing strategies during rehabilitation of these children, leading to better adjustment and adaptation of these mothers. Current study focusses on application of ICF framework's third-party disability in mothers of children with pre-lingual hearing impairment using hearing aids and cochlear implants.

## Materials and methods

This study received approval from the Ethics Committee of AYJNISHD, Mumbai. A total sample of 60 participants. Group A consisted of 30 mothers of children using unilateral cochlear implant. Group B consisted of 30 mothers of children using binaural hearing aids. The sample was selected based on specific criteria for the mothers and also for their children with hearing impairment using either cochlear implant or hearing aids and are listed below.

### Inclusion criteria for children

1) Age range 8-12 years, 2) Pre-lingual severe to profound bilateral hearing loss, 3) Use of binaural digitally programmable hearing aids (Group B), 4) Use of unilateral cochlear implant, 5)

with or without a hearing aid to the other ear (Group A), 6) Using the hearing device regularly and attending therapy or school, 7) No associated impairments such as ADHD, Autism, Mental Retardation, 8) No cochlear or auditory nerve abnormalities, in case of CI group, 9) No sibling with hearing loss or other impairment.

### Inclusion criteria for mothers

1) Normal hearing and clinically normal communication abilities as ascertained by detailed history-taking and informal observation, 2) Ability to understand and speak Hindi language fluently, 3) Biological mothers of the child. Stepmothers, foster mothers, adoptive mothers and single mothers were excluded, 4) other variables such as education of mothers and socio-economic status were not controlled but information about the same was noted.

### Tools

Components and domains of the ICF and existing ICF-based tools measuring third-party disability were reviewed. A measurement tool was developed based on the ICF framework to study third-party disability in mothers of children with pre-lingual hearing impairment using hearing aids and cochlear implants across multiple domains within activities and participation and environmental factors. Five ASLP experienced with ICF and third-party disability concepts reviewed and approved the developed tool and it translated into Hindi using standard translations procedures and protocols. The final reviewed and approved tool addressed 9 domains. That are General task and demands, self-care, Communication, Interpersonal Interaction and Relationship, major life areas, environmental factors, Attitude, Community and Social Life, Support and Relationships. The 9 domains are assessed based on 46 statements with a 5-point response scale ranging from "Complete problem" rated as 4 to "no problem" rated as 0. Higher ratings/scores suggestive of greater third-party disability.

### Procedure

Data of children using hearing aids and cochlear implants were obtained from the Audiology clinic of the institute and from schools for CWHI. Due to COVID-19 pandemic and ensuing lockdown most parents (mothers) were unwilling to report to the clinic, so data was obtained through virtual mode.

Mothers were interviewed in detail and detailed case history was obtained to ascertain the above mentioned inclusion and exclusion criteria. The tool was presented to the participants through Google forms and at a time convenient to them, participants (mothers) were verbally interviewed on the same through a video call. While filling forms if subject had any doubts about the test items, tester provided clarification through phone call. The responses were documented appropriately. Obtained data were tabulated and analysed.

The frequency distribution for each option on the five-point rating scale from 'No Problem' ('0') to 'Complete Problem' ('4') was obtained (Figure 1a) & (Figure 1b). For each of the nine domains in Table 1, the number of respondents providing a particular rating was calculated for each statement. Descriptive statistics of medians and percentiles were obtained for scores in each domain (Table 2). To assess whether the data obtained followed the normal distribution or not, Shapiro-Wilk test was performed for each of the nine domains for the two groups (Table 3). Mann Whitney U test and independent t test was administered to compare the domain-wise distributions for the two groups (Table 4).

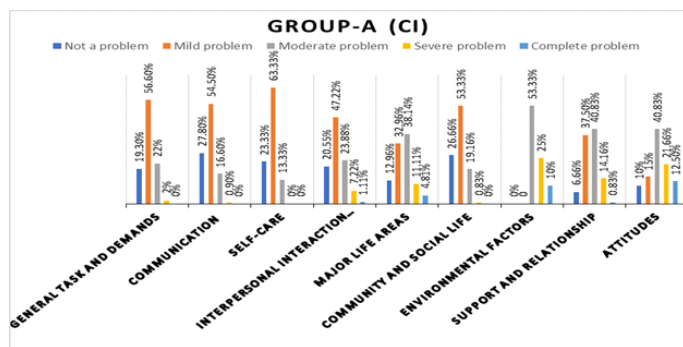


Figure 1(a) Domain frequency distribution of responses (in percentage).

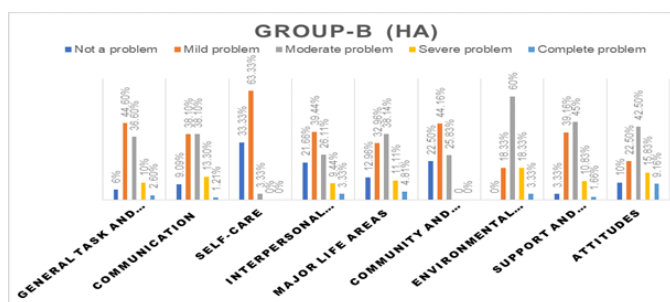


Figure 1(b) Domain frequency distribution of responses (in percentage).

Table 1 Details of participants (Mothers)

Participants (Mothers)	GROUP A (Cochlear implant)	GROUP B (Hearing aid)
Number (N)	30	30
Age	28 years to 37 years (Mean: 32.766, SD: 2.50)	28 years to 37 years (Mean: 32.166, SD: 2.33)
Type of Family	Nuclear: 14 Joint Family: 16	Nuclear: 9 Joint Family: 21
No. of Siblings	No siblings: 9 1 sibling: 16 2 siblings: 5	No siblings: 4 1 sibling: 17 2 siblings: 9
Education	< S.S.C.- 5 H.S.C.- 13 Graduates- 12	< S.S.C.- 9 H.S.C.- 11 Graduates- 10
Occupation	Housewife: 14 Working: 16	Housewife: 19 Working: 11
Family income per month	<Rs. 10000/- 16 >Rs. 10000/- 14	<Rs. 10000/- 21 >Rs. 10000/- 9

Table 2 Descriptive statistics domain-wise for the two groups

Domains	Group- A (CI)			Group- B (HA)						
	Min	Max	Percentile			Min	Max	Percentile		
			25	50	75			25	50	75
Domain-1 (General task and demands)	2	8	5	5	6	5	11	7	8	9
Domain-2 (Communication)	7	13	9	9.5	11.2	11	24	16	17.5	19.2
Domain-3 (Self-care)	0	2	0.75	1	1	0	2	0	1	1
Domain-4 (Interpersonal interaction and Relationship)	4	10	6	7	8	4	12	7	8	9
Domain-5 (Major life areas)	12	22	13	15.5	17	8	19	13	15	16
Domain-6 (Community, social and civic life)	2	7	3	3.5	5	2	9	4	5	5.25
Domain-7 (Environmental factors)	3	7	4	5	5.25	3	6	3	4	5
Domain-8 (Support and relationship)	4	11	5.75	7	7.25	4	10	5	7	8
Domain-9 (Attitudes)	5	13	7	8	9	6	13	6	7.5	9
Total scores	53	71	59.7	63	66	60	82	66.7	72.5	77

Table 3 Test of Normality

Shapiro-wilk test				
Domain	Groups	P-Value	Significance	
General tasks and demands	A (CI)	0.08	Normally distributed	
	B (HA)	0.13	Normally distributed	
communication	A (CI)	0.35	Not normally distributed	
	B (HA)	0.37	Normally distributed	
Self-care	A (CI)	0	Not normally distributed	
	B (HA)	0	Not normally distributed	
Interpersonal interaction and relationships	A (CI)	0.18	Normally distributed	
	B (HA)	0.22	Normally distributed	
Major life areas	A (CI)	0.13	Normally distributed	
	B (HA)	0.59	Normally distributed	
Community social and civic life	A (CI)	0.13	Normally distributed	
	B (HA)	0.67	Not normally distributed	
Environmental factors	A (CI)	0.01	Not normally distributed	
	B (HA)	0	Not normally distributed	
Support and relationship	A (CI)	0.11	Normally distributed	
	B (HA)	0.09	Normally distributed	
Attitude	A (CI)	0.02	Not normally distributed	
	B (HA)	0	Not normally distributed	

**Table 4** Tests administered for each domain and the significance of the difference in scores of the two groups

Domains	Distribution of scores	Test statistic	Difference between the two groups
Domain-1 (General task and demands)	Normal	Independent Sample t-test	Significant
Domain-2 (Communication)	Not normal	Mann-Whitney U	Significant
Domain-3 (Self-care)	Not normal	Mann-Whitney U	Not significant
Domain-4 (Interpersonal interaction and relationship)	Normal	Independent Sample t-test	Not significant
Domain-5 (Major life areas)	Normal	Independent Sample t-test	Not significant
Domain-6 (Community, social and civic life)	Not normal	Mann-Whitney U	Not significant
Domain-7 (Environmental factors)	Not normal	Mann-Whitney U	Not significant
Domain-8 (Support and relationship)	Normal	Independent Sample t-test	Not significant
Domain-9 (Attitude)	Not normal	Mann-Whitney U	Not significant
Total scores	Normal	Independent Sample t-test	Significant

## Results

**Domain 1 – General task and demands:** Domain 1 consists of 5 statements that evaluate the two group mothers in their general aspects of carrying out single or multiple tasks, organising routines, and handling stress. The minimum and maximum obtainable scores for this domain are “0” and “20” respectively. The maximum obtained score for the domain is 8 for Group A and 11 for Group B. Maximum frequency is seen for the response “mild problem” i.e. 56.6% for Group A and 44.6% for Group B. Response suggesting that the both group of mothers shows maximally “mild degree” of difficulty in their general task and demands. We have observed Group B has higher scores for rating ranging from moderate to complete problem as compared to those of Group A. Since a higher scores indicates more problem, third-party disability in the domain of “General task and demands” for Group B is greater than that for Group A. Independent Sample t-test value of -7.16 with obtained p value is <0.05, indicates that significant difference between third-party disability of mothers of children using cochlear implant and those using hearing aid in the domain of General task and demands. ( $t=-7.166$ ;  $df=58$ ;  $p<.001$ )

**Domain 2 – Communication:** Domain 2 consists of 11 statements and aims to evaluate the mother’s general and specific features of communicating to their children by language, signs and symbols, including receiving and producing messages, carrying on conversations, and using communication devices and techniques. The minimum and maximum obtainable scores for this domain are “0” and “44” respectively. The maximum obtained score for the domain is 13 for Group A and 24 for Group B. Maximum frequency is seen for the response mild problem i.e. 54.5% for Group A and 38.1% for Group B. Response suggesting that the both group mothers show maximally “mild degree” of difficulty in their communication. In this domain, we have observed Group B has higher scores for rating ranging from moderate to complete problem as compared to those of Group A, this suggest that the mothers of children using Hearing aid show greater third party disability as compared to the mothers of children using cochlear implant. Mann-Whitney U revealed statically significant difference between Group A and Group B. ( $U=12.5$ ;  $Z=-6.5$ ;  $P<.001$ )

**Domain 3 - self-care:** Domain consists of 1 statement and it focus on caring for oneself, washing and drying oneself, caring for own body and body parts, dressing, eating and drinking, and looking after own health. The minimum and maximum obtainable scores for this domain are “0” and “4” respectively. Maximum frequency is seen for the response mild problem i.e. 63.33% for Group A and 63.33% for Group B. Response suggesting that the both group mother’s shows maximally “mild degree” of difficulty. In this domain, we have observed Group A has higher scores for rating ranging from moderate

to complete problem as compared to those of Group B. This suggest that the mothers of children using cochlear implant show greater third party disability as compared to the mothers of children using hearing aid. The two groups differ with respect to median score. The median score for CI group is higher than the median score for HA group. Since a higher scores indicates more problem, third-party disability in the domain of “self-care” for Group A is slightly greater than that for Group B. Mann-Whitney U revealed statically no significant difference between Group A and Group B. ( $U=376.5$ ;  $Z=-1.27$ ;  $P=0.201$ )

**Domain 4- Interpersonal interactions and relationships:** Domain 4 consists of 6 statements and evaluate the mothers maintaining and managing interactions with other people, in a contextually and socially appropriate manner, such as by regulating emotions and impulses, controlling verbal and physical aggression, acting independently in social interactions, and acting in accordance with social rules and conventions.. The minimum and maximum obtainable scores for this domain are “0” and “24” respectively. The maximum obtained score for the domain is 10 for Group A and 12 for Group Maximum frequency is seen for the response mild problem i.e. 47.22% for Group A and 39.44% for Group B. Response suggesting that the both group i.e. mothers of children using CI and mothers of children using HA show maximally “mild degree” of difficulty in their interpersonal interactions and relationships. In this domain, we have observed Group B has higher scores for rating ranging from moderate to complete problem as compared to those of Group A. This suggest that the mothers of children using hearing aid show greater third party disability as compared to the mothers of children using cochlear implant. Independent Sample t-test value of -1.711 with obtained p value is <0.05, indicates that significant difference between third-party disability of mothers of children using cochlear implant and those using hearing aid in the domain of General task and demands. ( $t=-1.711$ ;  $df=58$ ;  $p=.092$ )

**Domain 5 - Major life areas:** Domain 5 consists of 9 statements carrying out the tasks and actions required to engage in education, work and employment and to conduct economic transactions. The minimum and maximum obtainable scores for this domain are “0” and “36” respectively. The maximum obtained score for the domain is 22 for Group A and 19 for Group B. Maximum frequency is seen for the response mild problem i.e. 29.44% and Group B maximum frequency is seen for the response moderate problem i.e.38.14. The two groups differ with respect to median score. The median score for CI group is higher than the median score for HA group. Since a higher scores indicates more problem, third-party disability in the domain of “major life areas” for Group A is greater than that for Group B. In general, on the domain of “Major life areas” Group A has higher scores for

rating ranging from severe to complete problem as compared to those of Group B. This suggest that the mothers of children using Cochlear implant show greater third party disability as compared to the mothers of children using Hearing aid. Independent Sample t-test value of 1.095 with obtained p value is  $>0.05$ , indicates that no significant difference between third-party disability of mothers of children using cochlear implant and those using hearing aid in the domain of General task and demands. ( $t=-1.095$ ;  $df=58$ ;  $p=.278$ )

**Domain 6- Community, social and civic life:** Domain 6 consists of 4 statements about the actions and tasks required to engage in organized social life outside the family, in community, social and civic areas of mother’s life. The minimum and maximum obtainable scores for this domain are “0” and “16” respectively. Maximum frequency is seen for the response “mild problem” i.e. 53.33% for Group A and 44.16% for Group B. Response suggesting that the both group i.e. mothers of children using CI and mothers of children using HA show maximally “mild degree” of difficulty in their community, social and civic life. In this domain, we have observed Group B has higher scores for rating ranging from moderate to complete problem as compared to those of Group A. This suggest that the mothers of children using hearing aid show greater third party disability as compared to the mothers of children using cochlear implant in their “community and social civic life. Mann-Whitney U revealed statically no significant difference between Group A and Group B. ( $U=273.5$ ;  $Z= -2.67$ ;  $P= <.008$ )

**Domain 7- Environmental factors:** Domain 7 consists of 2 statements. The minimum and maximum obtainable scores for this domain are “0” and “8” respectively. The maximum obtained score for the domain is 7 for Group A and 6 for Group B. Maximum frequency is seen for the response “moderate problem” i.e. 53.33% for Group A and 60% for Group B. Response suggesting that the both group i.e. mothers of children using CI and mothers of children using HA show maximally “moderate degree” of difficulty in Domain of environmental factors. In this domain, we have observed Group A has higher scores for rating ranging from severe to complete problem as compared to those of Group B. This suggest that the mothers of children using cochlear implant show greater third party disability as compared to the mothers of children using hearing aid. Mann-Whitney U revealed statically no significant difference between Group A and Group B. ( $U=326.5$ ;  $Z= -1.9$ ;  $P= 0.057$ )

**Domain 8-Support and relationships:** Domain 8 consists of 2 statements about people or animals that provide practical physical or emotional support, nurturing, protection, assistance and relationships to other persons, in their home, place of work, school or at play or in other aspects of their daily activities. The minimum and maximum obtainable scores for this domain are “0” and “16” respectively. The maximum obtained score for the domain is 11 for Group A and 10 for Group B. Maximum frequency is seen for the response “moderate problem” i.e. 40.83% for Group A and 45% for Group B. Response suggesting that the both group i.e. mothers of children using CI and mothers of children using HA show maximally “moderate degree” of difficulty in Domain of support and relationships. In this domain, we have observed Group B has quite higher scores for rating ranging from moderate to complete problem as compared to those of Group A. This suggest that the mothers of children using hearing aid show slightly greater third party disability as compared to the mothers of children using cochlear implant. Independent Sample t-test revealed statically no significant difference between Group A and Group B. ( $t=-0.338$ ;  $df=58$ ;  $p=-0.133$ )

**Domain 9- Attitude:** Domain 9 consists of 4 statements these attitudes influence individual behaviour and social life at all levels,

from interpersonal relationships and community associations to political, economic and legal structures. The minimum and maximum obtainable scores for this domain are “0” and “16” respectively. . The maximum obtained score for the domain is 13 for Group A and 13 for Group B. Maximum frequency is seen for the response “moderate problem” i.e. 40.83% for Group A and 42.5% for Group B. Response suggesting that the both group i.e. mothers of children using CI and mothers of children using HA show maximally “moderate degree” of difficulty in Domain of Attitude. In this domain, we have observed Group A has slightly higher scores for rating ranging from moderate to complete problem as compared to those of Group B. This suggest that the mothers of children using cochlear implant show greater third party disability as compared to the mothers of children using Hearing aid. Mann-Whitney U revealed statically no significant difference between Group A and Group B. ( $U=313$ ;  $Z= -2.067$ ;  $P=0.39$ )

**Total score for all domains**

The questionnaire consists of a total of 46 statements. The minimum and maximum obtainable total scores thus are 0 and 184 respectively. The maximum obtained score for Group A is 71 and Group B is 82. Maximum frequency is seen for mild problem, while for HA group maximum frequency is seen for moderate problem. More mothers from HA group have provided ratings as severe problem as compared to mothers from CI group. This suggests that the mothers of children using hearing aid shows greater third-party disability as compared to the mothers of children using cochlear implant. Independent Sample t-test indicate that the obtained p value is  $<0.05$ , suggesting that there is significant difference in the average total scores of the two group in (Figure 2(a)) & (Figure 2(b)) ( $t= -7.02$ ;  $df=58$ ;  $p=<.001$ ).

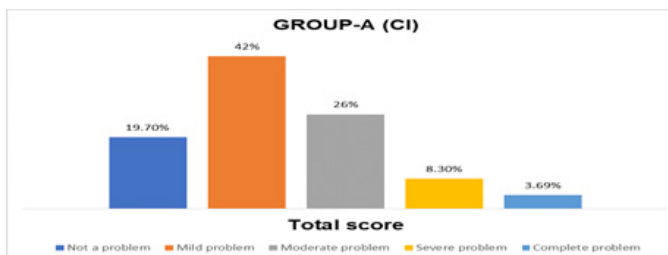


Figure 2(a) Total score frequency distribution of responses in percentage.

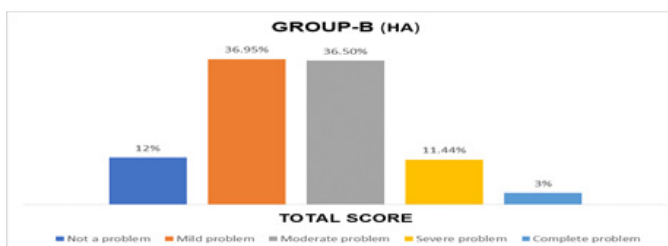


Figure 2(b) Total score frequency distribution of responses in percentage.

**Discussion**

The obtained score for third-party disability between mothers of children with pre- lingual hearing impairment using hearing aids and those using cochlear implants were compared for every domain and overall obtained scores were also compared between the groups. Hence, the results are discussed in terms of domain wise comparison between the groups.

**Domain 1 – “General task and demands”:** The results indicated that there was a significant difference in third-party disability between Group A and Group B, with mothers of children using HA reporting greater third-party disability in general task and demands as compared

to mothers of children using CI. Prakash et al<sup>11</sup> reported high stress level in the mothers of children using hearing aid as compared to mothers of children using cochlear implants on sub scales of adaptability, distractibility and reinforce parent in child domain and attachment, competence and health in parent domain on PSI. However, the scores obtained on CESD did not differ significantly. Hashemi et al.,<sup>19</sup> also reported more depression, anxiety and stress in day-to-day activities in mothers of children using hearing aids.

**Domain 2 – “Communication”:** The results indicated that there was a significant difference in third-party disability between Group A and Group B, such that mothers of children using HA showed greater degree of third-party disability with reference to communication as compared to mothers of children using CI. Shivprakash et al.,<sup>20</sup> reported that implanted children comprehended and expressed language in much easier way compared to children with hearing aid. They also noticed that the children with CI took lesser time to learn language as compared to children with hearing aid. This supports the findings of the current study reporting less third-party disability for mothers of child using CI as compared to mothers of child using HA. Many parents related this challenge to the child’s immature speech perception, production competence, and language level. On the other hand, some parents viewed this from a dyadic perspective, expressing dismay that they and their children did not share an easily understood, mutually accessible language. The overall result was frequent frustration, with misunderstandings on the part of both parent and child.

**Domain 3 – “Self-care”:** The results revealed that there was a no significant difference in third-party disability between Group A and Group B. As per the mean scores Group A faced more difficulties as compared to Group B. This suggests that mothers of children using cochlear implant showed greater degree of self-care difficulty as compared to mothers of children using hearing aid. In contrast to the findings of the present study, Hashemi et al.,<sup>19</sup> reported more difficulty in performing day to day activities in mothers of children using hearing aids. Gohari et al.,<sup>17</sup> observed improved general health in mothers of children using cochlear implant compared to the use of hearing aids due to improvement in their speech/language skills. The differences in the results could be attributed to the methodological differences.

**Domain 4- “Interpersonal interactions and relationships”:** The results revealed that there was no significant difference in third-party disability between Group A and Group B. As per the mean scores mothers of children using hearing aid showed greater degree of difficulty in interpersonal interactions and relationships as compared to mothers of children using cochlear implant. Burger et al.,<sup>21</sup> indicated that parents of children using cochlear implants and hearing aids experienced psychosocial stress and affected their relationship with other family members by causing feelings of guilt, hopelessness, and helplessness. Spahn et al.,<sup>22</sup> observed that parents of children with CI and HA feel that their family members supported each other less. These findings are contradictory to the findings of the study done by Prakash et al.,<sup>11</sup> who reported that the mothers of cochlear implant users feel more confident and comfortable to participate in social gatherings when compared to the mothers of hearing aid users who are possibly filled with guilt and fear due to the poor performance of their children.

**Domain 5 – “Major life areas”:** The results indicated there was no significant difference in third-party disability between Group A and Group B. As per the mean scores mothers of children using cochlear implant showed greater degree of difficulty in major

life areas as compared to mothers of children using hearing aid. Most of the participants in both the groups reported it was hard to find a good school for their children and they faced difficulty in teaching academic subjects. Participants in Group A reported that special care was required for cochlear implants as these devices were expensive compared to hearing aids. Even in families whose medical plans covered some expenses related to their child’s implant surgeries, considerable additional expenses were incurred in terms of replacement parts, travel allowances and access to habilitation services. Sach and Whyne<sup>23</sup> reported that children using cochlear implant had difficulty with academic skills such as reading, writing, or mathematics. Meadow-Orlans et al.,<sup>24</sup> observed financial issues related to the implant as everyday concerns.

**Domain 6- “Community, social and civic life”:** The results revealed that there was no significant difference in third-party disability between Group A and Group B. As per the mean scores mothers of children using hearing aid showed greater degree of community, social and civic life difficulty as compared to mothers of children using cochlear implant. Mothers of both the groups reported restricted participation in spiritual activities and family functions. The results also indicated that they experienced greater difficulty in relaxation and enjoyment activities like movies, party etc. However, there seems to be a dearth of studies that have looked into third party disability in mothers with respect to community, social and civic life.

**Domain 7- “Environmental factors”:** The results indicated that there was a no significant difference in third-party disability between Group A and Group B. As per the mean scores mothers of children using cochlear implant showed greater degree of third-party disability with reference to environmental factors as compared to mothers of children using hearing aid. Both the groups of mothers reported that they need financial support for handling their child with hearing impairment. Mothers of children with cochlear implant reported care and maintenance of the device was expensive and difficult. They had to regularly change cables and batteries. The most frequently indicated everyday problem, cited by more than half of the respondents was technical difficulties in equipment maintenance and troubleshooting of the implant. Calderon et al.,<sup>25</sup> reported that parents of children with hearing impairment spend most of the time in maintaining hearing aids and performing therapy-related activities.

**Domain 8- “Support and relationships”:** The results revealed that there was no significant difference in third-party disability between Group A and Group B. As per the mean scores suggests that mothers of children using hearing aid showed greater degree of support and relationships difficulty as compared to mothers of children using cochlear implant. Mothers of both the groups reported that it was hard to find best health care professional for their child as most of them belonged to rural areas. Mothers were primary caretakers, and it was their responsibility to get appointment, travel, and handle the child in all the situations so they were psychologically affected when compared to mothers of normal hearing children. Hence, they required additional support especially from the family members. Guralnick<sup>26</sup> observed that parents of implanted children or children using hearing aids faced the paradoxical situation of feeling that they were not meeting their children’s needs. Sach and Whyne reported that parents described challenges in obtaining services for their implanted child. Furthermore, recent evidence has pinpointed a lack of sufficient number of professionals with specialized training in working with deaf infants and their families in early intervention services.<sup>27-29</sup>

**Domain 9- “Attitudes”:** The results indicated that maximum responses were observed in “moderate problem” i.e., 40.83% for

Group A and 42.5% for Group B. Mann Whitney test revealed that there was no significant difference in third-party disability between Group A and Group B. As per the mean scores Group A faced more difficulties as compared to Group B, suggesting that mothers of children using cochlear implant showed greater degree of difficulty as compared to mothers of children using hearing aid. Most of the participants reported they could have been a better mother if their child did not have a hearing loss. Kumar and Lalitha<sup>30</sup> indicated that mothers were more inclined than fathers to experience depression in response to their child's hearing loss, they felt grief, depression, or shame. Some also asked questions like "why me" and concluded that they were being punished for sins or bad acts of the past. Feher-Prout<sup>31</sup> explained that the time immediately after the diagnosis of hearing loss was usually perceived as the most stressful and parents reported this period as a burden, and it brought about the greatest loss of quality of life to hearing parents.

### Total scores

The results indicated there was a significant difference in third-party disability between Group A and Group B. These responses suggested that mothers of children using HA showed greater degree of third-party difficulty as compared to mothers of children using CI. Many studies have shown that having a child with hearing loss produces stress, anxiety, confusion, shame, social exclusion, and reproach in parents as well as emotional and social problems in other family members. In the present study, the overall third-party disability in mothers of children with hearing impairment using hearing aid show greater disability than cochlear implants across all the domains expect four. Prakash et al.,<sup>11</sup> observed high prevalence of stress levels and depression among mothers of cochlear implant users as well as hearing aid users, however stress and depression levels were comparatively higher in mothers of children using hearing aids than mothers of children using cochlear implants. Spahn and Richter<sup>32</sup> reported psychological distress of parents of hearing aid and cochlear implanted children showed that both groups of parents felt distressed, particularly at the time of diagnosis. However, after CI fitting the parents of cochlear implanted children showed heightened expectations by comparison with the parents of hearing aid children. These findings are contradictory to the findings of the study done by Wirsching<sup>32</sup> he reported CI parents would appear to be much more severely stressed than those of HA children.

### Conclusion

Across all domains, the comparison between Group A and Group B indicates no statistically significant difference except for two domains (general tasks and behaviors, communication). When the total third-party disability scores were analyzed, it is seen that there is significant difference in third-party disability scores of the two groups. This leads to a conclusion that in general mothers of children with hearing aids report greater third-party disability as compared to mothers of children using unilateral cochlear implant.

The present study has provided insights into the difficulties faced by mothers of children using hearing aid and those using cochlear implant. Utilization of present results will help the clinician to counsel the mothers/parents of children with cochlear implant/hearing aid about expected outcomes in the various domains. Information such as that obtained from the study will aid the therapist in holistic habilitation of the child with hearing impairment. However, the study included only mothers and a limited number of them, hence generalizing the findings to a larger population may not be appropriate.

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### Conflicts of interest

No conflicts of interest.

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