

**MEASURING LEVELS OF STRESS AND DEPRESSION IN
MOTHERS OF CHILDREN USING HEARING AIDS AND COCHLEAR IMPLANTS:
A COMPARATIVE STUDY**

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Hearing impairment is an exceptional circumstance that restricts the child's ability to communicate verbally. Depression is a common stress-related response for hearing parents of children with hearing loss. Evidence suggests that mothers are more inclined than fathers to experience depression in response to their child's hearing loss (Mavrolas, 1990; Meadow-Orleans, 1995; Prior, Glazner, Sanson & Debelle, 1988) and mothers with depression have been found to be less effective at nurturing language and psychosocial development in their children. The aim of the study was to compare the levels of stress and depression in mothers of children using hearing aids and children who had cochlear implants. 50 mothers of children with bilateral profound hearing loss were divided into two groups according to the rehabilitation option used. Two self reporting scales Parental Stress Index (PSI) & Centre for Epidemiologic Studies Depression Scale (CESD) duly translated into Telugu were used for the study. 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. The results on CESD revealed high depression levels in both groups with no significant difference in the mean scores between groups. Hence, the present study highlights the need for the rehabilitative professionals to focus on family-based intervention for children with hearing impairment.

Parents contemplating the birth of a child share a hope that their child will enjoy access to the full array of life options. As hearing loss is not a visible handicap, hearing parents who give birth to a deaf child are often unaware of the child's hearing loss. Hearing loss if undetected and untreated can result in the delay of speech, language, and communication skills. The diagnosis of deafness in a child often leads to a crisis in the life of the parents. 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 (Nancy & Mellon, 2009).

A parent adjusting to a child's diagnosis of hearing loss commonly ascends through a series of emotional stages. Stein and Jabaley (1981) described three stages of parental responses to the diagnosis of hearing handicap in their child: (1) an initial expression of anger toward the professionals who diagnosed the deafness in their child; (2) subsequent expressions of anger toward the child as they find it increasingly difficult to deny the existence of the hearing loss; and finally (3) the acceptance of the hearing impaired child by the parents, which marks the transition from sadness and anger to the development of adaptation and coping behaviors. Successful resolution of parent's anger and grief at diagnosis is important to the child's future as these feelings may otherwise be manifested as depression. Depression can negatively affect a child's outcome, as depressed mothers have been found to be less sensitive to their child's need and hence are less effective at nurturing language and psycho-social development in their children.

Children may be especially vulnerable to the impact of maternal depression as they are dependent on the quality of maternal care-giving and emotional responsiveness (Beardslee, Bemporad, Keller, & Klerman, 1983). Abidin (1986) and Quittner, Glueckauf and Jackson (1990) (as cited in Orlans, Spencer & Sanford, 2004) have studied the psychological reactions of mothers of children with disabilities and stated that mothers of children with disabilities experience more stress related to parenting than do mothers of children without these conditions. [Calderon, Marschark, Clark and Greenberg \(1993\)](#) as well as [Calderon, Martin, Greenberg, and Kusche \(1991\)](#) were able to show that successful coping on the mother's part had a significant influence on child development. Luterman (1999) (as cited in Punch & Hyde, 2010) maintained that the self-esteem of the parents, particularly the mother, is the crucial key to the child's success, and that all clinical endeavors should be devoted to empowering and increasing parents' self-confidence. Moeller (2000) (as cited in Punch & Hyde, 2010) has shown that family involvement, and particularly maternal self-efficacy has a positive influence on deaf children's language development and other outcomes. The more successful the mothers were in acquiring helpful strategies for coping with their deaf child, the better developed were the children's emotional sensitivity, reading competence, and problem-solving behavior. The children also exhibited less impulsive behavior, higher cognitive flexibility, and better social competence (Hintermair, 2006).

Adjustment to an exceptional child is an ongoing process marked by varying degrees of grief, anger and worry (McDowell, 1976). Addressing rehabilitative options for a child's hearing loss presents daunting challenges. Matkin (1981) reported that the focus of routine audiological monitoring of amplification must include not only the child's auditory status and the function of hearing aids but also the function of the auditory training system (in school) and the parent's participation in the rehabilitation program.

The task of parenting becomes most difficult while opting for an appropriate amplification device, therapy program or a school program for their child with hearing loss. Children born with severe to profound hearing loss are now provided with technological options that can afford them better access to speech and language through audition. Management options for the children with hearing impairment have changed substantially over the decades from conventional amplification devices to cochlear implants. Cochlear Implantation has become an increasingly common rehabilitation option for children with severe to profound hearing impairment (Spencer & Marschark, 2003). Francis, Koch, Wyatt and Niparko (1999) assessed the educational independence in the children with hearing impairment using hearing aid and cochlear implant and found that the children with cochlear implant performed better than children with hearing aid and achieved educational independence by 20th month of post implantation. The rapid rise in the number of children undergoing cochlear implantation has invoked interest among many researchers to assess various areas where cochlear implantation is superior to hearing aid.

Currently, early intervention specialists and educators attitude in rehabilitating children with hearing impairment has changed from emphasizing on the special needs of the child with hearing impairment to that of providing services to the family unit. Recent research has focused on maternal stress and depression as one of the potential factor affecting the outcomes from the various rehabilitation options. Cochlear Implants are now firmly established as effective options in the rehabilitation of individuals with profound hearing impairment, hence a need arises to assess the levels of stress and depression in mothers of children using cochlear implants and compare them with that of hearing aid users. The aim of the current study is to measure and compare the levels of stress and depression in mothers of children with hearing impairment using hearing aids and cochlear implants.

Method

Participants

Mothers of children with bilateral severe to profound sensorineural hearing loss (50 women, *M* age =23.5 years, age range: 20 to 30 years) attending early intervention programs at AYJ National Institute for the Hearing Handicapped, Southern Regional Centre, various hospitals, schools for the deaf located in twin cities of Hyderabad and Secunderabad, Andhra Pradesh, India participated in the study. The subjects were divided into two groups based on the type of rehabilitation option used by their children, Group 1: mothers of children using digital BTE hearing aids (N=25) and Group 2: mothers of children using cochlear implants (N=25). The criteria for inclusion of participants was children with severe to profound sensorineural hearing loss in the age range of 4-7 years (*M* age =5.3 years), age of identification of hearing loss & rehabilitation obtained is 2 years and for the group using implantation the implanted age is 3- 4 years (*M* age =3.3 years). The mothers had minimum educational qualification of 10th grade. The socio-economic status of the family included in the study had a monthly income of less than Rs.6,500/-

Tools

Two standardized self reporting scales namely Parental Stress Index with 14 subscales (PSI) (Abidin, 1995) and Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1997) both adapted in Telugu (a Dravidian south Indian language extensively used in the state of Andhra Pradesh) by Krishnamurthy (2006) were used for the current study. The description of the scales employed is as follows.

Parental Stress Index (PSI) (Abidin, 1995)

The parental stress index is a 120 - item clinical and research questionnaire designed to identify sources of stress in parent - child sub systems using a 5 point rating scale (1= Strongly Agree and 5= Strongly Disagree) with a minimum score of 120 and a maximum score of 600. The PSI yields stress score in three domains - Child domain, parent domain, and life stress. In the child characteristics domain, sub-scales measured are child-related stressors such as child's adaptability (adaptability), acceptability of child to the mother (acceptability), child's demands to the mother in terms of attention, time and effort (demandingness), moodiness and distractibility/ hyperactivity (the child's attention is easily distracted by small and irrelevant stimuli) and degree to which the mother found the child reinforcing (Reinforces parent). In the parent characteristics domain, sub-scales measured are parent attachment to the child (attachment), restrictions imposed by the parental role (Restriction of role), depression, social isolation, relationship with spouse/parenting partner, parental health and parent's evaluation of their competence (sense of competence). Finally, the life stress scale assessed the occurrence of 19 stressful life events over the previous 12 months weighted for their potential impact. 11 of the 19 life events are negative (e.g. death of the family member). Note: In scoring, a high score indicates reduced levels of stress, whereas a low score reflect increased levels of stress.

Centre for Epidemiological Studies Depression scale (CES-D): (Radloff, 1977)

The CES-D is a 20-item scale designed to measure current levels of depressive symptoms and mood in the general population using a 4 point rating scale (1= Rarely or none of the time and 4 = Most or all of the time). Note: A high score reflects greater levels of depression.

Procedure

Following an initial screen all subjects were requested to participate in the study, an oral consent was obtained from all the subjects. A structured interview was conducted and demographic data was obtained. The self report questionnaires were administered to assess the maternal stress and depression. The incompletely furnished questionnaires were discarded. The data collected were subjected to statistical analysis. To find out whether there was a statistical significant difference between the two groups of mothers, a t-Test for Independent Samples was used.

Results

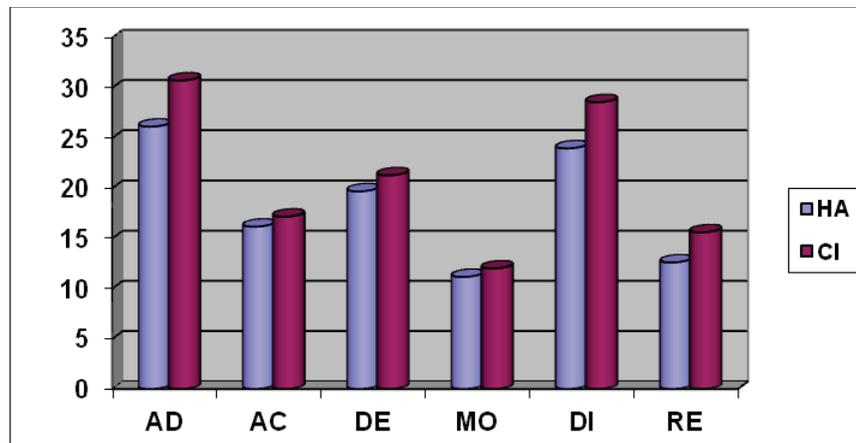
Parental Stress Index

The results obtained on PSI are as mentioned below in Table 1, 2 & 3. The results obtained on the child domain of the parental stress index indicate a significant difference on the sub-scales of adaptability (AD) [$t= 3.596$, $P < 0.01$], distractibility (DI) [$t=2.613$, $p < 0.01$] and reinforces parent (RE) [$t=3.906$, $p<0.01$] whereas no significant difference was found on sub- scales of demandingness, moodiness and acceptability as shown in Table 1 and Figure 1.

Table 1. Means, Standard Deviation & T-Values for the Child Domain Scale of Parenting Stress Index

VARIABLE	HA Group (N=25)		CI Group (N=25)		t Value
	Mean	SD	Mean	SD	
Child Domain					
Adaptability (AD)	26.12	4.91	30.72	4.09	3.596**
Acceptability (AC)	16.16	4.38	17.16	5.64	0.699
Demandingness (DE)	19.68	7.83	21.28	5.36	0.843
Mood (MO)	11.16	3.36	12.00	5.21	0.6778
Distractibility (DI)	23.96	3.57	28.56	8.04	2.613**
Reinforces Parent (RE)	12.60	2.58	15.60	2.84	3.906**

Note: ** $P < 0.01$



HA = Mothers of children using hearing aids, CI= mothers of children using cochlear implant, AD= adaptability, AC=Acceptability, DE=demandingness, MO=mood, DI=distractability & RE= reinforces parent

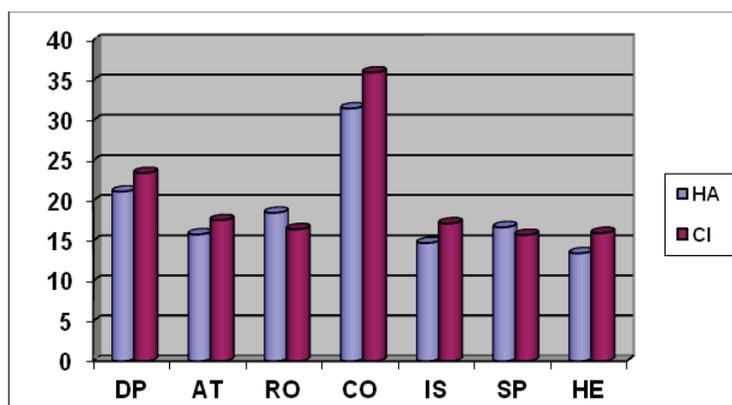
Figure 1. Means for the Child Domain Scale of PSI

On the scale of parent domain of parental stress index, the results indicate a significant difference on the sub scales of Competence (CO) [$t = 2.781$, $P < 0.01$], Attachment (AT) [$t = 2.050$, $P < 0.05$] and Health (HE) [$t = 2.056$, $P < 0.05$] whereas on sub scales of role restriction (RO), depression (DP), social isolation (IS), relationship with spouse/parenting partner (SP) no significant difference was noted as depicted in Table 2 and Figure 2.

Table 2. Means, Standard Deviation & T-Values for the Parent Domain Scale of Parenting Stress Index.

VARIABLE	HA Group (N=25)		CI Group (N=25)		t Value
	Mean	SD	Mean	SD	
Parent Domain					
Depression (DP)	21.12	4.14	23.44	5.62	1.661
Attachment (AT)	15.80	2.87	17.56	3.18	2.050*
Role restriction (RO)	18.48	4.09	16.44	6.95	1.263
Competence (CO)	31.48	6.49	35.96	4.76	2.781**
Isolation (IS)	14.72	4.26	17.16	5.08	1.839
Spouse (SP)	16.68	4.02	15.72	3.76	0.870
Health (HE)	13.44	3.24	15.96	5.20	2.056*

Note: * $P < 0.05$ ** $P < 0.01$



HA=Mothers of children using hearing aids, CI=mothers of children using cochlear implant, DP= depression, AT=attachment, RO=role restriction, CO=competence, IS=isolation, SP=spouse relation & HE=health

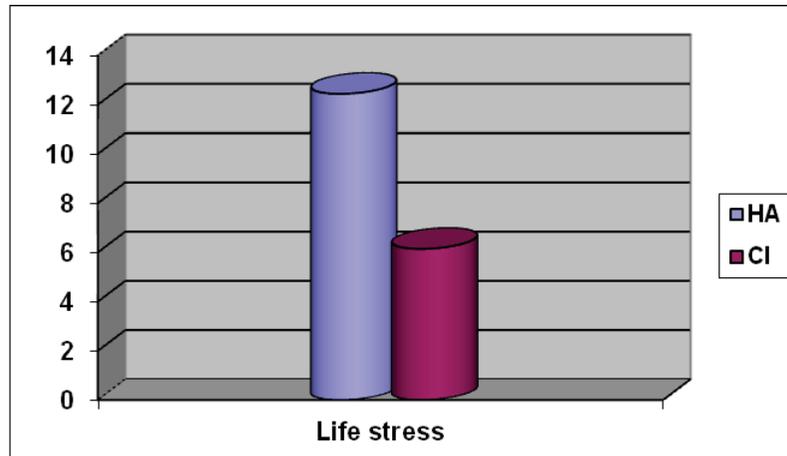
Figure 2. Means for the Parent Domain Scale of PSI

The scores obtained on the PSI Life Stress domain are depicted in Table 3 and Figure 3 reveals a significant difference in the scores between the mothers of children using cochlear implants and hearing aids on all nineteen life stress conditions.

Table 3. Means, Standard Deviation & T-Values for the Life Stress Domain Scale of Parenting Stress Index.

VARIABLE	HA Group (N=25)		CI Group (N=25)		t Value
	Mean	SD	Mean	SD	
Life stress	12.44	8.82	6.16	0.31	3.049**

Note: ** P < 0.01



HA=Mothers of children using hearing aids, CI=mothers of children using cochlear implant

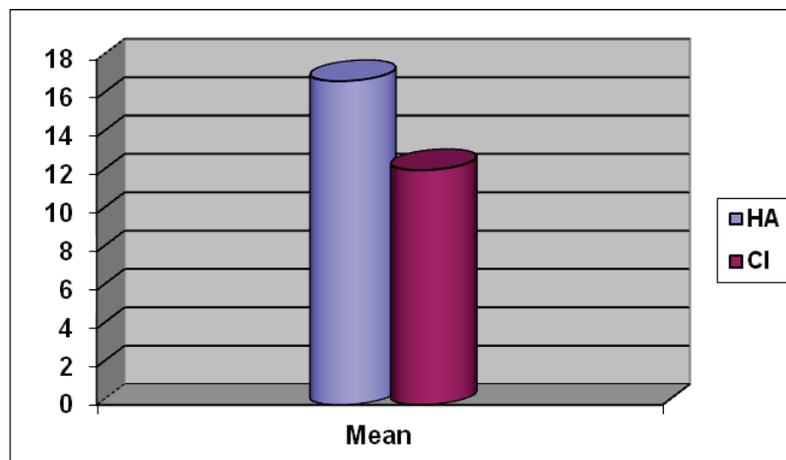
Figure 3: Means for the Life Stress Domain Scale of PSI

Centre for Epidemiologic Studies Depression Scale (CESD)

The CES-D scale is designed to measure levels of depressive symptoms and mood using a 4 point rating scale. The 20 item scale was administered on both groups. Table 4 compares the scores obtained by group 1 and group 2 on the CESD scale and indicates no significant difference in CESD scores of both groups of mothers across all test items on the scale

Table 4 Means, Standard Deviation & T-Values on the CSED Scale.

VARIABLE	HA Group (N=25)		CI Group (N=25)		t Value
	Mean	SD	Mean	SD	
Depression	16.880	8.8286	12.24	10.5051	1.69



HA=Mothers of children using hearing aids, CI=mothers of children using cochlear implant,

Figure 4. Means of Group 1 & 2 on CSED Scale

Discussion

Stress among parents is not an inevitable consequence of having children with hearing impairment. A combination of multiple stressors appears to predict the likelihood of the parents experiencing stress and anxiety. Stressors can be defined as those life events that will bring about a change in the family system. The findings of the current study reveals a 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.

Higher scores were obtained for mothers of children using cochlear implant (Mean 30.72) when compared to the mothers of children using hearing aids (Mean 26.12) on the Adaptation (AD) sub-scale in the child domain reveals that the mothers of children using cochlear implant rated their child to be more adaptable as compared to their counterparts which could be attributed to enhanced listening skills that will enable the child to integrate to the environment which in turn will have a positive impact on the mother-child relationship. The higher mean score obtained by mothers of children using cochlear implants (Mean 28.56) when compared to the mothers of children using hearing aids (Mean 23.96) on the Distractibility (DI) subscale in child domain indicates that the mothers of children using cochlear implant have noticed lesser distractibility among their children which could be due to the constant and appropriate auditory feedback received by the children with cochlear implant when compared to their counterparts who do not receive adequate auditory feedback. A cochlear implant provides the recipient with access to sounds he may have not have heard before even when using hearing aids and is better able to self monitor his own speech which will help him to remain focused on a given task and thereby reducing distractibility (Donna, Sorkin & Caleffe-Schenck 2008).

The mothers of children using cochlear implants obtained higher mean score (Mean 15.60) when compared to the mothers of children using hearing aids (Mean 12.60) on Reinforces Parent (RE) sub-scale of child domain indicating that the mothers of cochlear implant users were reinforced by their child's outcome and behavior than their counterparts. The better outcomes and improved performance among cochlear implant users can be directly related to the better reinforcement to their mothers. The findings of Francis et al., (1999) reveal that the performance of children with cochlear implant was better than children using hearing aids. Also, the reduced distractibility and better adaptability to the environment aids the above findings. No significant difference was obtained on the remaining subscales of the Child Domain namely Acceptability (AC), Demandingness (DE), and Mood (MO). The results reflect on the higher expectations of parents of cochlear implant users when compared to their counterparts. Also, the questions on these sub-scales are general reflectors of the handicapping effects which the hearing handicapped children have on their parents.

On the Attachment (AT) sub-scale of the parent domain, higher mean score (17.56) obtained for mothers of children using cochlear implant as compared to the mothers of children using hearing aid (Mean 15.80) revealed that the mothers of cochlear implant users were more attached to their children than their counterparts. These findings could be attributed to the possibility that the parents of cochlear implant users can communicate with their children with ease and receive more reinforcement from their children as discussed above. They also feel more confident and comfortable to take them to 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.

Higher mean scores (Mean 35.96) obtained by mothers of children using cochlear implant as compared to the mothers of children using hearing aid (Mean 31.48) on the Competence (CO) sub-scale of parent domain reveals that the mothers of children using cochlear implant were more competent and had lesser feelings of not being able to handle things easily than their counterpart. The findings suggest that the mothers of children using cochlear implant experienced lesser stress in handling issues as their children were less distracted and more adaptable to their environment. Moreover, the mothers of children using cochlear implant were more confident about their child's outcome. [Calderon et al.,\(1991\)](#) and [Calderon et al., \(1993\)](#) indicated that the more successful the mothers were in acquiring helpful strategies for coping with their deaf child, the better the children's emotional sensitivity, reading competence, and problem-solving behavior developed. The children also exhibited less impulsive behavior, higher cognitive flexibility, and better social competence

Higher mean scores (Mean 15.96) obtained for mothers of children using cochlear implant as compared to the mothers of children using hearing aid (Mean 13.44) indicated that the mothers of children using cochlear implant users had lesser health issues than the mothers of children using hearing aid suggesting that the stress levels had a greater impact on the mothers of children using hearing aid than their counterparts. Moreover the reduced outcomes and increased distractibility in children using hearing aids has lead to greater distress in the mothers thereby affecting their physical and mental well being.

No significant difference was obtained in the remaining sub-scales of the Parent Domain namely Depression (DP), Role restriction (RO), Isolation (IS) and Spouse (SP). However as a group the mothers of children using cochlear implant obtained higher scores as compared to their counterparts. The diagnosis of profound sensorineural hearing loss must have equally affected the mothers of children using both hearing aid and cochlear implant. The decision to choose an appropriate rehabilitation option for their child might have been taxing and occupying most of their time. The lower socioeconomic status of the parents of the both groups would have required family support and adjustment to the financial constraints in the family. On the whole both the mothers have undergone similar stress levels in coping with isolation, depression and family support. The results of our study are in accordance with the findings of Punch and Hyde (2010). Life Stress Domain of PSI showed that the mothers of children using cochlear implant had lower mean scores (Mean 6.16) than the mothers of children using hearing aid (Mean 12.44) indicating increased life stress among mothers of children using hearing aid which can be attributed to the aggravated stress levels due to less satisfaction with hearing aid outcomes and more communication difficulties in their children which is in consonance with the findings of Zaidman-Zait and Most (2005).

The findings on Centre for Epidemiologic Studies Depression Scale (CESD):

The mothers of children using cochlear implant obtained lower mean scores (Mean 12.24) than the mothers of children using Hearing aid (Mean 16.880) however, they were not statistically significant indicating that mothers of children using hearing aid were comparatively more depressed than their counterparts. This could be attributed to fact that the handicapping effects of the hearing impairment have equally affected mothers in both groups. Moreover the financial constraints faced by the family due to high expenditure on the maintenance of hearing aids and/ or cochlear implants and the ongoing rehabilitation needs could have been exhaustive and demanding especially on mothers. This could have lead to equal levels of depression in mothers of both groups. The results of the current study can be supported by similar findings of Quittner et al., (1990) who found that mothers of children with severe or profound hearing losses had higher levels of parenting stress and depression, anxiety, and anger as compared to mothers of children with normal hearing. Abidin (1995) also in his study indicated that 16% of the parents of children with cochlear implant scored at or above the clinical cut-off on Parenting Stress Index. Some parents have reported high levels of satisfaction with the outcomes of their children's implantation, but have also reported ongoing concerns about aspects of their children's progress with the implant, as well as stressors involved in the ongoing demands of their children's (re)habilitation.

Conclusion

The findings of the current study reveal 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. Results were also indicative of equal amount of stress in mothers of both groups in certain areas of their life. Hence, the study highlights the psychological needs of mothers which have to be addressed and attended by the rehabilitative specialist. In recent years, the aural rehabilitation professionals have begun to realize the need to redefine the role they play with the child with hearing impairment. Higher stress levels in parents will affect the parent child interaction which in turn may adversely affect the developmental and educational outcomes of children with hearing impairment. Hintermair (2006) in his study showed that high parental stress is associated with frequent socio-emotional problems in the children, thus emphasizing the importance of a resource oriented consulting and support strategy in early intervention, because parental access to personal and social resources is associated with significantly lower stress experience.

The study poses an urgent need to the rehabilitative professionals to provide family-based intervention especially to empower the parents of children with hearing impairment irrespective of the type of rehabilitation options used. Perhaps the predominant message for professionals from these findings are: (a) the need for understanding empathy and the skills to convey these qualities to parents; (b) the need to build up parents' feelings of self-efficacy and competence in undertaking the myriad tasks involved in parenting a child with a cochlear implant or a hearing aid; (c) the importance of flexibility in responding to families' changing needs; (d) the importance of continuing efforts to provide prompt back-up services in case of equipment breakdown; and (e) the necessity for ongoing communication between the professional and children's schools and teachers.

The findings also throw a light on the needs of mothers with children with disability as their increased depression and anxiety levels affects their quality of life. The findings therefore speak very strongly for a

thorough analysis of the situation of the concerned mothers and evaluate their needs to initiate effective rehabilitation programs including stress reduction programs for parents to increase their child management skills and to develop self esteem in mothers. Sufficient opportunities for repeated follow-up interviews also should be encouraged which offer not only information on the children's disabilities but also provide psychological support for the mothers. The current study is focused on mother's reports of stress and depression in Indian context. The fathers and sibling perspectives were not included. A comparison of mothers and fathers reports in terms of stress, emotional support and depression may aid in differentiating patterns of maternal and paternal adjustment in Indian context.

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