

**EFFECT OF ATTITUDE TOWARDS HEARING LOSS ON
HEARING AID OUTCOMES**

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**This Dissertation is submitted as part fulfilment
For the Degree of Master of Science in Audiology**

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CERTIFICATE

This is to certify that the dissertation entitled '**Effect of attitude towards hearing loss on hearing aid outcome**' is the bonafide work submitted in part fulfillment for the degree of Master of Science (Audiology) of the student (Registration No. 16AUD010). This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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This is to certify that this masters dissertation entitled '**Effect of attitude towards hearing loss on hearing aid outcome**' is the result of my own study under the guidance of Dr. Manjula P., Professor of Audiology, Department of Audiology, All India Institute of Speech and Hearing, Mysore, and has not submitted earlier in any other University for the award of any Diploma or Degree.

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Abstract

The performance of individuals wearing hearing aid varies. Even when fit appropriately, some show good outcome while others do not. There are various reasons for this variation from individual to individual. The present study aimed to measure the attitude of individuals towards hearing loss through a questionnaire (ALHQ) and outcome of a hearing aid through speech identification score and IOI-HA questionnaire. Translation and validation of the questionnaire from English version (Saunders & Cienkowski, 1996) to Kannada was done in the present study. The questionnaire was administered to ten naïve hearing aid users. To know the effect of attitude towards hearing loss on hearing aid outcome, data on ALHQ (Pre-and post-), speech identification scores (SIS) (pre- and post-), and international outcome inventory (IOI-HA) were collected.

The result indicates that there is a significant correlation between ALHQ and SIS. There was a significant difference between pre- and post- ALHQ and pre- and post- SIS score. Further, there was significant positive correlation between SIS and IOI-HA. The present study supports the literature in that the negative attitude towards hearing loss will affect the outcome from the hearing aid. In addition, the use of hearing aid will change the attitude towards hearing loss and hearing aid outcome.

Key words: ALHQ, validation, hearing aid outcome

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Chapter 1

INTRODUCTION

It is well known that the performance of individuals wearing hearing aid varies. Even when fit appropriately, some show good outcome while others do not. There are various reasons for this variation from individual to individual. Saunders and Haggard (1992) have given three main domains which reduce the outcome; they are psychoacoustic, cognitive, and psychosocial. The psychoacoustic factors affecting the performance include frequency, intensity, and temporal factors (Glasberg & Moore, 1989; Saunders & Haggard, 1992). Similarly, central and cognitive processing also affects the performance, both with and without hearing aids (Hayes & Jerger, 1979; Jerger, Jerger, Oliver, & Pirozzolo, 1989). In recent years, clinicians and researchers are cognizant of the psychosocial attitude towards hearing loss affecting the hearing aid outcome. It has been reported that hearing aid use is lower among individuals reporting general negativity towards amplification (Hickson, Hamilton, & Orange 1986; Wilson & Stephens, 2002). Individuals who fail to accept their hearing loss or hearing aids perceive that their hearing impairment has little impact, or little effect on daily life (van den Brink , Wit, Kempden, & van Heuvelen. 1996; Brooks & Hallam, 1998), and consider hearing aids to be stigmatizing (van den Brink et al., 1996).

Cox (2003) reported that the APHAB (Abbreviated Profile of Hearing aid Benefit) scores showed moderate correlation to pure tone thresholds and monosyllabic word recognition scores. Hawas and Niswander (1985) found low correlation between audiometric variables and the Hearing Performance Inventory (HPI). Similarly, it

would be logical to expect that individuals with less hearing impairment would perceive greater benefit from hearing aids than individuals with more impairment. Other factors like psychosocial attitude towards hearing loss tend to produce low correlation between audiometric measures and subjective self-report questionnaire and reduced outcome of hearing aid users irrespective of degree of hearing impairment. The non-auditory factors such as pre-use expectations (Cox & Alexander, 2000), motivation, and desire to acquire amplification (Brooks & Hallam, 1998), stigma associated with hearing aids (Stock et al., 1997), and personality have been shown to relate to reported hearing aid satisfaction, use, and/or benefit.

Attitude towards hearing loss or hearing aids a major factor that can reduce the performance in individuals with hearing impairment. Gatehouse (1994) observed significant positive correlations between attitudes towards hearing aid with its use and satisfaction. Another study looking at the relationship between a person's attitude toward hearing aids and later use and satisfaction was made by Brooks and Hallam (1998). It was reported that people with negative attitudes toward hearing aids may be less likely to make the initial consultation and thus may not be reached by a survey like the ones carried out by Brooks and Hallam (1998). Further, acceptance of hearing loss prior to hearing aid fitting has thus been shown to positively influence both hearing aid uptake and hearing aid use.

Several studies have examined the influence of attitudes toward hearing loss and hearing aids on hearing aid outcomes (Hickson et al., 1986; Brooks, 1989; Gatehouse, 1994; Hallam & Brooks, 1998). Using the Hearing Attitudes in Rehabilitation Questionnaire (HARQ), Hallam and Brooks (1996) found that clients

who were least distressed by their hearing difficulties and reported not wanting or needing a hearing aid used their aids least frequently in listening situations. Gatehouse (1994) and Hickson et al. (1986) found a significant positive relationship between attitudes toward hearing aids and their use. In the present study, the aim was to check the attitude towards hearing loss among individuals through self-report questionnaire, and further to find out how the attitudes affect the hearing aid outcome.

Questionnaires are useful as they provide the user's perspective regarding the outcome and supplement laboratory based outcome measures. A questionnaire that attempts to evaluate the psychosocial attitude has been developed, i.e., Attitude towards Loss of Hearing Questionnaire (ALHQ) (Saunders & Cienkowski, 1996). Such questionnaire measures are used for assessing the psychosocial factors, and they are patient-centered methods that simulate real world listening situation. The majority of hearing outcome measures are questionnaire based such as Hearing Handicap Inventory for the Elderly, (HHIE; Ventry & Wiensten, 1982); Satisfaction with Amplification in Daily Life (SADL, Cox & Alexander, 1999); Client Oriented Scale of Improvement (COSI, Dillon et al., 1997) and International Outcome Inventory – Hearing aids (IOI-HA, Cox, 2002).

The ALHQ is a tool to elucidate some of the underlying psychosocial issues that lead to the refusal to acquire or to use amplification and serves as a counseling tool prior to fitting a hearing aid. The clinician will use these modules to counsel the patient when his or her ALHQ score on a particular subscale or subscales indicate an attitude that is potentially detrimental to hearing aid outcome. Studies have shown that counseling individuals regarding attitudinal issues at the time of hearing aid

fitting can increase hearing aid use and/or decrease perceived handicap (Surr et al., 1978; Brooks, 1989; Abrams et al., 1992; Kapteyn et al., 1997).

The ALHQ consists of 24 items in five subscales that evaluate the social and emotional impact and adjustment to hearing loss perceived, absence of support from significant others, hearing aid stigma, and awareness of hearing loss importantly. The ALHQ scores were not highly correlated with age or degree of hearing loss. It was reported that the reliability of the subscales was adequate for the development of the assessment tool but that two of the five subscales (hearing aid stigma and awareness of hearing loss) had reliability values lower than would be acceptable for general clinical use (Saunders & Cienkowski, 1996).

Need for the study

It has been documented that audiological and non-audiological factors contribute in effecting the hearing aid outcome. Several researchers have found that certain non-audiological factors contribute as much, if not more, to the variance in self-assessed handicap than the audiological correlates (Cox, Alexander, & Gray, 2007; Gatehouse, 1994; Marcus-Bernstein, 1986). However, only 18 to 25% of older adults with impaired hearing own hearing aids (Davis & Mueller, 1987). Because hearing problems among older adults occur during a period of heightened physiological change (e.g., increase in chronic illness and memory loss) and probable modification of living pattern because of retirement, bereavement, separation from family, relocation, or institutionalization, retention of a sense of control may be of particular importance to psychological well-being (Baltes & Reizenzein, 1986; Lachman, 1986). A study revealed that 39% of older adults with hearing impairment

over the age of 50 years do not seek professional help for hearing impairment, and 58% do not own hearing aids (Hartley, 2005; Schneider et al, 2010).

It is necessary to assess non-audiological factors which affect outcome from hearing aid. The psychosocial attitude towards hearing loss is one of the major factors which affect the outcome from the hearing aid. Questionnaire measures are used for assessing the psychosocial factors, and they are patient-centered methods that simulate real world listening situation. The questionnaire that attempts to evaluate psychosocial attitude has been developed, i.e., Attitude towards loss of Hearing Questionnaire (ALHQ; Saunders & Cienkowski, 1996). This questionnaire has to be translated to assess the individual's attitude towards hearing loss, and how it affects the hearing aid outcome.

It is important to know that once individuals with hearing impairment start using hearing aid they try to adjust and change daily life routine with hearing aid, they change their social life communication style, stigma related hearing loss or hearing aid, they will try to acknowledge about their hearing loss and they will try accept their hearing problem. These changes may help individuals to have positive attitude or negative towards hearing loss or hearing aid, and change in attitude may or may not make difference in the hearing aid outcome. In the present study, it is intended to study if there is any effect of hearing aid use on change in attitude and hearing aid outcome.

The questionnaire used in the present study needs to be validated. The questionnaire has measure, what it supposed to measure in the context. The questionnaire needs to be validated based on the relevancy, reliability, understanding ability, and appropriateness. It is important to know that how different attitude

towards hearing loss will affect the outcome and also it is important to know how does use of hearing aid will affect attitude towards hearing loss and hearing aid outcome

The present study aimed to measure the attitude of individuals with hearing loss and outcome from a hearing aid. The specific objectives include

1. To validate questionnaire on attitude towards loss of hearing (ALHQ) and administer on individuals with SNHL.
2. To find out psychometric properties of ALHQ
3. To know the effect of attitude towards hearing loss on speech identification scores
4. To know whether the use of hearing aid changes the attitude towards hearing loss.
- 5 To compare between post Speech identification scores and post ALHQ Scores

Chapter 2

REVIEW OF LITERATURE

Hearing loss is one of the most common health issues in the world today. However, only one out of every five people who could benefit from hearing aids actually wears them. Reduced hearing acuity can not only be frustrating to the person but also for those around him/her. There have been several studies that connect hearing impairment to decline in mental functions. People with a hearing loss are two to five times more likely to experience cognitive decline than someone with normal hearing.

Hearing aids are the one of the major management strategies for permanent hearing loss. Hearing aids are primarily useful in improving the hearing and speech comprehension of people who have hearing loss. Hearing aids usually improve the user's social, psychological, and physical sense of well-being (Brooks & Hallam, 1998)

The performance of individuals with hearing loss fitted with amplification devices varies from individual to individual, even with proper fitting. There are a few of them who show good outcome and a few who show reduced outcome. The three main domains which reduce the outcome include psychoacoustic, cognitive, and psychosocial (Saunders & Haggard, 1992). In recent years clinicians and researchers have reported that psychosocial attitude towards hearing loss affect the hearing aid outcome. It has been reported that usage of hearing aid is lower among individuals reporting general negative emotions towards amplification (Hickson et al., 1986; Wilson & Stephens, 2002).

Popelka, et al. (1998) had measured prevalence of hearing aid use among older adults with hearing loss identified factors associated with those currently using hearing aids. They included 1629 adults participants with hearing loss in the age range from 48 to 92 years. They reported that the prevalence of ever using a hearing aid among those with any level of hearing loss was 20.7%. However, 29.3% of hearing aid owners no longer used their hearing aid. Overall, 14.6% were current hearing aid users, and 6.1% were past users. Higher prevalence rates of current usage were associated with older ages ($p < 0.001$), in both men and women. Further, the prevalence of current hearing aid use among participants with a moderate hearing loss was 32%. Current hearing aid use among those reporting hearing handicap was 33%. Thus, it is required that the barriers to hearing aid use are identified for the intervention to be more effective.

Meister et al. (2008) reported the relationship between pre-fitting expectations and willingness to use hearing aids among hundred adult hearing aid candidates (Mean age = 68.6 years). The subjects completed a questionnaire comprising of a number of different aspects of expectation and some additional variables potentially influencing willingness to use hearing aids. Based on the outcome of the questionnaire, a linear regression model predicting motivation to use hearing aids was calculated and evaluated. Three among the 11 parameters contributed significantly to the model of willingness. The three predictor variables were expectations towards improvement of quality of life, stigmatization, and self-rated hearing ability. They accounted for about 55% of the variability in the data for willingness. Examination of a sub-sample three months after the survey revealed a distinct relationship between willingness and the decision to obtain or decline hearing aids. In the opinion of the

authors, the results strongly encourage supporting positive expectations in order to motivate individuals with hearing impairment to use hearing devices.

Lunner (2003) conducted two experiments to investigate possible relationships between cognitive function and hearing aid use. In Experiment 1, 72 first-time hearing aid users were tested for speech recognition in noise with and without hearing aids. Cognitive function was assessed by tests of working memory (reading span test) and verbal information-processing speed. The results indicated that, after controlling for age and hearing loss, significant correlations exist between the measures of cognitive performance and speech recognition in noise, both with and without hearing aids. High cognitive performance was associated with high performance in the speech recognition task.

In Experiment 2, 17 first-time hearing aid users, with either high- or low-working-memory capacity, were tested an experimental hearing aid which processed the sound differently depending on whether or not speech was detected. The results revealed that those with high working-memory capacity were better than those with low capacity at identifying and reporting the specific processing effects of the aid.

The literature relevant to the study has been given under the following headings:

2.1 Effects of non-audiological factors on hearing aid outcome.

2.2 Effects of general negativity towards hearing loss on hearing aid outcome

2.3 Effect of attitude towards hearing loss on hearing aid outcome.

2.1 Effects of non audiological factors on hearing aid outcome.

Individual's demographics

Tomita et al. (2001) compared the demographics of a group of hearing device users (n = 71) and a group of non-users with hearing impairment (n = 156). The results revealed significant differences (p= 0.05) in race and living status. Eighty-seven percent of the minority group did not use a hearing device, compared to 66% of white (majority) individuals. Similarly, individuals who lived with someone else were half as likely to use a hearing device, relative to individuals who lived alone, i.e., 11% and 21%, respectively. No significant differences were reported for age, gender, education level, or marital status. A small sample size, however, limits the generalization of these results.

Gender: Gender effects on audiological rehabilitation outcomes measurement have received scant attention from researchers. Cox and Alexander.(1999) found a significant gender effect in two of the subscales of the abbreviated profile of hearing aid benefit (APHAB). Specifically, on the background noise subscale, women reported fewer difficulties than men, and on the aversiveness subscale, women showed less aversiveness to sounds after amplification. Garstecki and Erler (1998) identified gender differences that potentially affect older adults seeking audiological care as well as their adherences to audiological recommendations. These authors compared male and female older adults who either accepted professional advice to use hearing aids or ignored such advice. Female and male groups differed significantly from each other on several scales of communication profile for those with hearing impairment.

Age: Gatehouse (1994) found that the younger subjects with hearing loss reported more handicap than their elderly subjects. Garstecki and Erler (1996) found that older adults generally reported fewer handicaps on the communication profile for the hearing impaired than the normative military subjects.

Personality: Cox and Alexander. (1999) pointed out that relatively little is known about the impact of personality variables on outcomes measurement. Researchers have found significant relationship between certain personality variables and self-assessed handicap. Research has shown a direct relationship between self-perceived disability (attitude towards hearing loss) and personality traits. Cox and Alexander.(1999) had found that hearing aid users who were more extroverted reported greater benefit from hearing aids than introverted users. Further, there was a tendency for more extroverted hearing aid users to report more problems in the unaided condition and a fewer problems in aided condition.

Social support: Garstecki and Erler (1998) found that adherent to professional recommendations for audiological rehabilitation had significantly greater support than non-adherents. Several authors have found a significant relationship between satisfaction with and availability of social support and hours of hearing aid use.

Duijvestijn et al. (2003) reported that there is no relationship between degree of hearing impairment and audiological consultation. 84% of individuals with hearing impairment who had consulted a professional about their hearing perceived their hearing to be poor, compared to only 57% of individuals with hearing impairment who had not spoken to a professional about their hearing. Consulters received more social pressure to seek help compared to non-consulters

Kricos (2000) studied the influence non-audiological variables on audiological rehabilitation outcome. Both audiological and non-audiological variables interact with each other to produce a unique predicament for each individual with hearing impairment. The non-audiological factors included were gender, age, personality, and social support.

2.2 Effects of general negativity towards hearing loss on hearing aid outcome

Duijvestijn et al. (2003) reported that 84% of 115 individuals with hearing impairment, who had consulted a professional about their hearing, perceived their hearing to be poor; compared to only 57% of 166 individuals with hearing impairment who had not spoken to a professional about their hearing. van den Brink et al. (1996) reported that participants who had not consulted their general practitioner about hearing impairment appeared to be more accepting of hearing impairment as a part of growing old. Van den Brink et al. (1996) reported that hearing aid users acknowledged significantly ($p < 0.05$). More benefits of amplification, compared to non-users who had or had not consulted their general practitioner about hearing impairment

Expectations about hearing aids are closely linked with attitude and have also been found to influence Hearing aid adoption. Meister et al. (2008) examined the relationship between 'willingness to use hearing aids', measured prior to Hearing aid fitting, and hearing aid adoption, three months later, in a sample of 100 hearing aid candidates. A group of hearing aid adopters reported being significantly ($p < 0.005$) more willing to use hearing aids, relative to those who had not adopted hearing aids three months later. Positive expectations regarding the impact hearing aids would have on quality of life been a strong predictor of willingness to use hearing aids.

Individuals who expected that hearing aids would not be negatively perceived by others were also more willing to use hearing aids. The authors suggested that positive hearing aid expectations should be encouraged in clinical settings to facilitate greater hearing aid uptake.

Wallhagen et al. (2009) had studied stigma experienced by older adults with hearing loss. In a qualitative study, the authors conducted interviews over one year with two partners where one partner had hearing loss. The participants were naive or had not worn hearing aids in the past year. The authors reported that perceived stigma emerged as influencing decision-making processes at multiple points in individual having hearing loss. Of hearing loss, such as initial acceptance of hearing loss, whether to be tested, type of hearing aid selected, and when and where hearing aids were worn. The stigma was related to two interrelated experiences, alterations in self-perception, ageism, and external societal forces, such as health and hearing professionals and media perceived stigma by the individuals. The authors made perceived stigma to two subgroups named experience of stigma and reinforced stigma, under experienced stigma there is altered self-perception it may be like ‘feeling physically wrong within me’ or it may be individuals don’t think they have problem and dependent on hearing aid. Ageism like individuals may think if anyone sees wearing hearing aid they will think that he is old. In reinforced stigma, individuals may change their stigma regarding hearing loss when they seek help from hearing professions, or partners or general people.

2.3 Effect of attitude towards hearing loss on hearing aid outcome

Several researchers have demonstrated that perceived severity can influence the decision to seek an audiological consult and to obtain hearing aids (Carson, 2005; Duijvestijn et al., 2003; Palmer et al., 2009; Popelka et al., 1998; van den Brink et al., 1996). Palmer et al. (2009) reported that a single measure of self-perceived hearing ability was predictive of hearing aid purchase among a sample of 802 adults (age range: 18 to 97 years). The probability of purchasing a hearing aid decreased as perceived hearing ability increased and it was significant ($p < 0.001$). Similarly, using a custom made, 41-item attitude questionnaire, van den Brink et al. (1996) reported that perceived severity distinguished hearing aid users ($n = 59$) from non-users who had ($n = 37$) and had not ($n = 39$) consulted a general practitioner about hearing impairment.

The results of the study by Hickson et al. (1986) showed that attitude was associated with occasional or non-use of hearing aids; whereas the remaining groups (“strongly positive toward help” and “essentially positive”) showed consistent *use*. Those clients with “rejection of hearing aids and the entire rehabilitation process” type attitude were not fitted with hearing aids and were not included in this analysis.

Attitudes towards Hearing Loss, Including Acceptance of and Coping With Hearing Loss:

Garstecki and Erler (1998) found significantly higher uptake among males who accepted their hearing loss and found hearing loss less stigmatizing than among males who did not accept their hearing loss and found it stigmatizing. Helvik et al. (2008) found that the use of maladaptive behaviors was related to the decrease of hearing aid uptake. Humes et al. (2003) examined the differences between groups of successful and unsuccessful hearing aid candidates matched for age, gender, and

hearing loss. Three groups were compared: (a) non-adherents, (b) adherents who subsequently rejected their hearing aid, and (c) adherents accepting and using their hearing aid. The results obtained with the Communication Profile for the Hearing Impaired (CPHI; Demorest & Erdman, 1987) demonstrated that the non-adherent group (uptake) had poorer problem awareness and greater denial of communication problems. The non-adherents also had better self-acceptance and less stress associated with their hearing problems.

Van den Brink., Wit, Kempen, and Heuvelen (1996) reported that the hearing aid users involved in their study had received significantly ($p < 0.05$) more social support, relative to non-users who had and had not consulted a general practitioner about hearing difficulties. Hearing-aid users also perceived their significant ($p < 0.05$).Others as more positive about hearing aids, compared to non-users who had spoken to a general practitioner about hearing impairment. Duijvestijn, , Anteunis, , Hoek, , Van Den Brink, , Chenault, , and Manni, (2003) reported that people who had consulted about their hearing impairment received more social pressure to seek help compared to non-consulters.

Brooks (1998) studied the effect of attitude on benefit obtained from hearing aid with the questionnaire which includes factors such as failure to come to terms with the hearing loss, perception of stigma associated with hearing aids, lack of support or even overt hostility from close relative, and withdrawal from social contacts. He investigated the relationship between these attitude measurements and outcome in terms of daily use of the aid four months later. Author had found that there was a significant difference between the positive and negative responders in terms of awareness of hearing loss. In those who said they did not feel they were missing

sounds 63% indicated they were using their aids less than 4 hours per day after four months post fitting, that Of those who felt that their enjoyment of life was diminished in this way, 63% used their aids more than four hours per day after four months. Approximately 40% of the candidates admitted to avoidance behavior and that only 21% used their aids less than four hours per day after four months.

Kochkin (1993) has reported out of 500 hearing impaired individuals only 77% of adults with self-reported did not own hearing aids for reasons that reflected minimization of communication problems or a lack of need for amplification.. In a total, only 66% of non-adopters perceived one or more disadvantages of amplification, 64% could not afford HAs, and 24% did not trust the opinions of health professionals.

Hawas and Niswander (1985) had compared the Revised Hearing Performance Inventory with audiometric measures. The Hearing Performance Inventory scores were correlated with sensitivity, discrimination, and sensitivity + discrimination measures for 39 subjects with noise induced hearing loss The sensitivity measures were pure-tone averages, using five different frequency combinations, and, spondee threshold. A secondary purpose of this investigation was to provide information regarding the prediction of self-perceived handicap from audiometric measures. The authors concluded that, the highest correlation obtained (0.67) was with monosyllabic speech discrimination in noise, there were not significant differences in correlations among the three types of audiometric measures (sensitivity, discrimination, and, sensitivity + discrimination measures). The audiometric variables accounted for less than half of the variance in Hearing Performance Inventory scores; therefore they are inadequate in predicting the amount of self-perceived hearing difficulties. The need for a variety of hearing handicap scales is discussed.

Attitude towards hearing aid use:

Garstecki and Erler (1998) found that older adult adherents were less concerned about their personal appearances when wearing hearing aids than non-adherents. They were less likely to associate hearing aid use with aging, and they were less likely to feel stress while wearing hearing aids. Non-adherents were more likely to feel stigmatized by hearing aid use..

Brooks and Hallam (1998) had studied Attitude to Hearing Difficulty and Hearing Aids and the Outcome of Audiological Rehabilitation. He had included first-time hearing aid candidates (n= 135) who were administered the Hearing Attitudes in Rehabilitation Questionnaire (HARQ) designed to assess attitudes to acquired hearing loss and hearing aids. Of them 92% were followed up 3 to 9 months after fitting. Attitude scores, age, sex, and sensory thresholds were related to six self-report outcome measures by use of logistic regression.

The major findings were that patients who were least distressed by their hearing difficulties and reported not wanting or needing a hearing aid used their aids least frequently and evaluated them less highly in listening situations. An attitude that wearing a hearing aid was stigmatizing was not predictive of outcome except a report of more difficulty in handling the aid. There were some low but significant correlations between attitudes and sensory thresholds and thresholds also contributed to the prediction of outcome in a few instances.

In a study done by Wilson and Stephans (2002) they have included 140 first-time hearing aid users who were assessed at their initial hearing aid consultation and review after three months. They found that out of 140 individuals, 47(34%) reported that they were self-motivated but the majority, 93(66%) were not self-motivated at

initial assessment. And they had negative attitude towards hearing loss. When author reviewed after three months, only six patients were graded as having a negative attitude. There were 87 patients with neutral attitude and 34 patients with positive attitude towards a hearing aid. It was found that six patients with negative attitude in them 50% had used hearing aid occasionally and 50% had used regular, 93 patient with neutral attitude in them 8% they never used, 17%occasionally, 75% had used hearing aid regularly and 33 patient with positive attitude in them 85% had used hearing aid regularly. And author concluded that 93 individuals had negative attitude before the use of hearing aid, but after three month review only 6 individuals had negative attitude.

Jerram and Purdy (2001) examined the influence of technology, demographic factors, and pre-fitting expectations, attitudes, and adjustment to hearing loss on hearing aid outcome. Clients obtaining new hearing aids completed the questionnaire on personal adjustment to hearing loss, expectations, attitudes toward hearing aids, and hearing aid benefit. Eighty-one percent of the 200 subjects completing the pre-fitting questionnaires returned questionnaires evaluating hearing aid outcome.

Modified Personal Adjustment Scale (MPAS; Sherer & Adams,1983)was used to measure personal adjustment, acceptance of loss, and stress; and the Hearing Attitudes in Rehabilitation Questionnaire (HARQ; Hallam & Brooks, 1996)was used measure attitude towards hearing aids and expectation; hearing aid benefit was measured using the Modified Abbreviated Profile of Hearing Aid Benefit (MAPHAB, Cox& Alexander,2005); and expectations pre-fitting questionnaires for the 162 subjects completing the study. Only 135 subjects completed all items for the expectations questionnaire, so an expectations score was calculated for the 83% It was

found that only two subjects wore their aids one hour or less per day, 48 (26%) wore their aids 1 to 4 hours, and 112 (69%) wore their aids 4+ hours per day. For the 162 subjects completing the study, ratings of overall hearing aid satisfaction ranged from 2 to 20. Only five subjects had satisfaction scores below 10. The mean satisfaction score was 15.33(SD = 3.33). Thus, on an average, people were very satisfied with their hearing aids. Satisfaction and benefit outcome measures were investigated for the 146 subjects completing at least 80 percent of the MAPHAB items. Satisfaction was correlated with benefit scores. The strongest relationship between satisfaction and benefit scores was for difficult listening situations shows satisfaction ratings and MAPHAB benefit as a function of hearing aid use time.

Chapter 3

METHODS

The main aim of the study was to find out the effect of attitude towards hearing loss on the speech identification. The specific objectives of the present study included validating the questionnaire on attitude towards loss of hearing (ALHQ) and to administer it on individuals with sensorineural hearing loss. This was done in order to know whether the use of hearing aid changes the attitude towards loss of hearing. Further, another objective was to compare the speech identification scores and ALHQ scores before the use of hearing aid; as well as to compare the speech identification scores and ALHQ scores after the use of hearing aid. This was done in order to check if there was any change in attitude with use of hearing aid and also to check if this change in attitude had any effect on the speech identification scores. The details of the method to realize these objectives are given below. The research design adopted for the present study was one group pre-test post-test design (Salkind, 2010).

Participants

Two groups of participants were selected for the study. One group (Group I) was for validation and translation of the ALHQ questionnaire (Objective 1). The other group (Group II) was to verify whether the use of hearing aid changes the attitude towards hearing loss and whether the change in attitude brings about change in hearing aid outcome (Objective2, and 3).

a. Group I for translation and validation of ALHQ questionnaire:

Two bilingual speakers were included for translation of the questionnaire.

The bilingual speakers were native speakers of Kannada language having a minimum qualification of bachelor's degree in English medium. They had

good ability to read and write in Kannada. The bilingual speakers were used for translation of the questionnaire. For validation of ALHQ questionnaire, five qualified audiologists with a minimum of five years of experience in dealing with clinical population were included. Five participants with hearing loss were included to verify the correctness of the translated ALHQ.

b. Group II participants were included to verify the objectives of the study. Ten participants were selected based on the following inclusion criteria.

1. Older adults in the age range between 55 and 75 years/
2. Kannada as the native/first language.
3. Moderate to moderately severe sensorineural hearing loss, bilateral or in the better ear.
4. Speech identification scores (SIS) of $\geq 60\%$.
5. Post lingually acquired hearing loss, with adequate speech and language
6. Normal middle ear functioning
7. No experience in hearing aid usage
8. No retro cochlear pathology
9. No other cognitive or neurological complaints

Ethical guidelines for bio behavioral research involving human subjects (Venkatesan, 2009) were followed.

Material:

1. Recorded speech identification test material in Kannada consisting of phonemically balanced (PB) word lists (Yathiraj & Vijayalakshmi, 2005) was

used for obtaining speech identification scores (SIS). It consists of four lists having 25 bisyllabic words in each.

2. Recorded phonemically balanced (PB) test material in Kannada for adults (Manjula, Geetha, Kumar, & Antony, 2014), consisting of 24 lists of Kannada bi-syllabic words, was used to find out the aided SIS in quiet. Out of the 24 lists, six lists were used to obtain the SIS scores.
3. International Outcome Inventory for Hearing Aids (IOI-HA) (Cox & Alexander, 2002) which was translated to Kannada (Thammaiah, Manchaiah, Easwar, & Krishna, 2016) was used to measure the hearing aid outcome.
4. Attitude towards loss of hearing questionnaire (ALHQ) (Saunders & Cienkowski, 1996) – validation and translation into Kannada was done in the present study. This was used to measure the attitude towards hearing loss.

Equipment:

➤ A calibrated sound field audiometer was used to perform routine hearing evaluation, and to collect data in the unaided and aided conditions. To present the recorded speech stimulus for testing, the loudspeaker of the audiometer was kept at 0 degree Azimuth and at one meter distance from the participant.

➤ A calibrated immittance meter was used to ensure normal middle ear functioning of the ears of the participants in the study.

➤ Test hearing aid: A digital BTE hearing aid with a fitting range from mild to severe hearing loss. The hearing aid was connected with an appropriate ear tip and inserted into the test ear. To program the hearing aid, programming

interface, programming cables, NOAH software, and hearing aid specific software in the personal computer personal computer (PC) were used.

Programming of hearing aids:

The air-conduction and bone-conduction hearing thresholds of the test ear of each of the participant were fed into the audiogram module in the NOAH software, after entering the demographic details. The participant's own new hearing aid was connected to the PC through a programming interface (HiPro). The hearing aid was programmed according to the audiogram and NAL-NL1 prescriptive procedure, with the client experience level set to first time user as he/she was a naïve hearing aid user. The frequency specific gain was optimized to ensure audibility of Ling's six sounds. The optimized settings were programmed in the program / memory of the hearing aid. As for the needs of the participant, the volume control and program change switch were enabled or disabled in the hearing aid.

Test Environment:

Air conditioned sound treated single/double room was used to perform the testing.

Procedure:

The following procedure was followed in order to achieve the objectives of the study. The testing was done in two phases.

Phase I: Translation and validation of the Attitude towards Loss of Hearing (ALHQ) questionnaire.

Phase II: Measurement of the attitude and hearing aid outcome.

Phase I: Translation and Validation of the ALHQ

The ALHQ questionnaire, in English, was translated (Phase I A) to Kannada and validated (Phase I B).

Phase I A. *Translation*

The questionnaire was translated using the guidelines provided by American Association of Orthopedic Surgeons (AAOS) (Beaton, Bombardier, Guillemin, & Ferraz, 2000). The translation was done according to AAOS guidelines which involved five stages. They were forward translation (Stage I), synthesizing common translation (Stage II), back translation (Stage III), expert committee review (Stage IV), and field testing of the pre-final form (Stage V).

Stage 1: *Forward translation*

Two Kannada-English bilingual adults who were native speakers of Kannada language produced independent translations of the ALHQ, i.e., Forward translations - F1 and F2. The two translators had extensive familiarity with the local culture, but were unaware of the health concepts examined. Hence, clarifications regarding audiology specific terms were provided by the researcher to facilitate forward translation. Any comments regarding difficult words/phrases/questions and any such doubts during translation were cleared before the forward translation. The forward translations, F1 and F2, of the questionnaire were completed in this stage.

Stage 2: *Synthesizing a common translation*

In this stage, the two forward translations obtained in Stage 1 were compared in order to produce a single reconciled translation. Since translators had their own linguistic style and preference for words, the easier, clearer, and more colloquial of

the two versions was chosen. A single translated version was produced summarizing the common synthesis process. Attempts were made to resolve issues through consensus. Words that were more familiar were taken /considered for the translated version.

Stage 3: *Back translation*

Two separate adult bilinguals from a non-medical background independently translated the common synthesized Kannada translation of ALHQ, is obtained in Stage 2. The translation was back to English, i.e., Back translations - B1 and B2. This helped in detecting inaccuracies in forward translations. An expert panel, consisting of the investigator and a qualified audiologist were involved in the identification of such inaccuracies. There was no much difference in the content between the original ALHQ and the backward translated questionnaire, except for a few grammatical changes that were corrected. The final translated version was conveying same meaning as the original questionnaire. In the backward translated version, they used synonym of particular words of original questionnaire.

Stage 4: *Expert committee review*

A comparison was done of all the versions (Forward translation, synthesized common translation, and back translation) to prepare the pre-final version of the questionnaire. The entire translations were reviewed, the errors were identified and a final version was produced regarding decisions taken to reach equivalence. The errors mainly included i) a few missing parts of translations, which were identified and added; and ii) inappropriate words/phrases/items, and a few grammatical changes, which did not capture the concept very well and were modified to appropriate words.

Stage 5: *Field testing of pre-final version*

This was the last stage before producing the final version of the translated questionnaire. Five participants were interviewed using the pre-final version of questionnaire. The participants chosen for the pre-final version were other than targeted participants. For each item, the participant's opinion about how he/she interprets the question was collected along with their responses to those questions. If the participant did not understand or wrongly interpreted any word/phrase/question, then the way in which the researcher clarified them was also noted. Further, the participants were also asked if any question made them uncomfortable or if they felt that any item was not relevant to them. The opinions and responses were analyzed to check the correctness of translation and necessary changes were incorporated to prepare the final version of the questionnaire. There were no modifications of words/phrases, the participants were able to understand and interpret the questions and there were no difficulties to understand the question.

Phase I B. Validation

The translated version of ALHQ was converted to a tabular form and given to five experienced audiologists who had a minimum five years of experience in dealing with clinical population. Their opinions were taken regarding relevancy of the questions used, reliability, understanding ability, and appropriateness on a five-point rating scale for each question. The audiologists were asked to fill the columns by giving a rating number from one to five. Each number was defined for each question in the questionnaire. The rating was defined as given in the Table 3.1.

Table 3.1: Rating scale for different aspects to check validation.

<i>RATING</i>	<i>RELEVANT</i>	<i>RELIABLE</i>	<i>UNDERSTANDING ABILITY</i>	<i>APPROPRIATENESS</i>
1	not relevant	not reliable	difficult to understand	absolutely inappropriate
2	probably not relevant	probably not reliable	fairly understandable	slightly inappropriate
3	possibly relevant	possibly reliable	moderately understandable	neutral
4	More relevant	More reliable	good understanding	slightly appropriate
5	highly relevant	highly reliable	easy to understand	absolutely appropriate

The rating scores were collected from the five audiologists on each parameter of each question. The rating on different parameters for each of the 24 questions as given by the five audiologists was then averaged. If the average rating scores on any of the parameters was below 3.5, then the questions were modified suitably. The average rating score was below 3.5 for four questions out of 24 questions in the questionnaire. Those four questions were re-translated using the five stages and re-validated. The modifications suggested by the audiologists were incorporated in the

questionnaire. The modifications included use of appropriate words/phrases/items, and a few grammatical corrections.

Phase II: Measuring the attitude towards hearing loss and hearing aid outcome

Routine audiological evaluation such as pure-tone audiometry, speech audiometry, and immittance evaluation were carried out to select the participants for the study. The unaided speech identification score (SIS) was measured through a calibrated sound field audiometer. A digital BTE hearing was programmed based on the needs of the participants

Phase II A. Measuring attitude towards hearing loss:

The attitude towards hearing loss was measured using the following steps.

- i. The Kannada version of ALHQ was administered to the participants in order to know the self-reported information on the attitude towards hearing loss. The participants were instructed to fill up the demographic data, and asked to read and understand the questions properly, and tick 'YES/NO' as answer for the questions. The scoring was done based by assigning 0 for negative response , 1 for positive response for some questions and 2 for positive response for some questions based on the factor loading on principal component analysis (PCA).
- ii. The participant's own hearing aids were programmed as mentioned in the previous section.
- iii. In order to know about any changes in the attitude after usage of hearing aid, the participants were administered the ALHQ after four weeks of hearing aid use. The pre- and post- ALHQ scores were compared to know about the change in attitude after usage of the hearing aid.

Phase II B. Measuring the hearing aid outcome

- i. Aided speech identification scores (SIS) was measured using the recorded speech identification test in Kannada, i.e., phonemically balanced (PB) word list in Kannada (Yathiraj & Vijayalakshmi, 2005). The presentation level of the word list was 40 dB HL through the loud speaker of the audiometer. The participant was instructed to repeat the words heard. The total numbers of correctly repeated words was considered as the speech identification scores (SIS).
- ii. The International Outcome Inventory for Hearing Aids (IOI-HA) (Cox & Alexander, 2002) in Kannada (Thammaiah, Manchaiah, Easwar, & Krishna, 2016) was administered after four weeks of hearing aid use. This was done through interview, either through face-to-face or over telephone.

Test re-tests reliability.

The data were collected from participants in order to check for test re-test reliability.

Thus, data on ALHQ (pre- and post-), SIS (pre- and post-) and IOI-HA (post-only) were tabulated for each participant. The data were subjected to statistical analyses.

Statistical analyses

The data collected from each test participant were tabulated and analyzed using Statistical Package for the Social Sciences (SPSS for windows, version 17) software.

1. Shapiro-Wilk test of normality was performed to know the distribution of data.
2. Descriptive statistics was carried out to summarize the data,
3. Inferential statistics was performed to know the difference and relationship between the attitude and performance with the hearing aid.

3.1 Pearson's coefficient correlation was used to check correlation between ALHQ questionnaire and Speech Identification Scores.

3.2 Paired t-test was used to check the difference between pre- ALHQ questionnaire scores and post- ALHQ questionnaire scores. The paired t-test was again used to check the difference between pre-SIS scores and post-SIS scores.

4. Cronbach's Alpha test was used to analyze test-retest reliability of ALHQ questionnaire scores.
5. Principle component analysis was done for the Factor extraction of ALHQ subscales.

Chapter 4

RESULTS

The main aim of the present study was to compare the effect of attitude towards hearing loss on hearing aid outcome in individuals. The specific objectives of the study were:

- 1 To validate questionnaire on attitude towards hearing loss (ALHQ).
- 2 To find out psychometric properties of ALHQ
- 3 To evaluate the effect of attitude towards hearing loss on hearing aid outcome.
- 4 To know whether the use of hearing aid changes the attitude towards hearing loss.

To find out the relationship between post speech identification scores and IOI-HA scores with ALHQ Scores the ALHQ is used to measure attitude towards hearing loss. The ALHQ scores before hearing aid use (pre-ALHQ) and after hearing aid use (post-ALHQ) were compared in order to measure the change in attitude towards hearing loss. The SIS and IOI-HA were used to measure the hearing aid outcome. The SIS measured before (pre-SIS) and after the hearing aid use (post-SIS), IOI-HA measure after the use of hearing aid, was compared with the attitude on ALHQ measure.

The results are provided under the following headings:

4.1 Validation of the Attitude towards Hearing Loss Questionnaire (ALHQ)

For validating the questionnaire, the data from the questionnaire were analyzed by assigning a score of 2 for a 'Yes' answer with a factor loading value of greater than 0.600, a score 1 for a 'Yes' answer with factor loading less than 0.600,

and a score 0 for 'no' answer. Principal component analysis with varimax rotation was then performed to subgroup the components of the ALHQ.

4.1.1 Factors extraction of ALHQ subscales

4.1.2 Calculation of participant scores on ALHQ scales

4.2 Effect of attitude on SIS and IOI-HA

4.3. Effect of use of hearing aid on attitude towards hearing loss.

4.4. Effect of use of hearing aid on SIS

4.5. Effect of attitude after hearing aid use on IOI-HA

4.6 Correlation between IOI-HA (International outcome inventory-of Hearing Aid) and SIS

4.7 Test- re-test reliability of ALHQ

4.1 Validation of ALHQ questionnaire

The questionnaire was given to five experienced audiologists to validate on four parameters using a five-point rating scale. The ratings obtained from each audiologist on each question were averaged for each parameter (Relevant, Reliability, Understanding ability, and Appropriateness). The average rating score is given in Table 4.1. The average score of ≥ 4 (out of 5) was considered to be acceptable in terms of it being reliable, relevant, and able to understand the question, and most appropriate to the questionnaire.

Table 4.1: Mean rating scores five audiologists who validated each question in terms of each parameter

	Relevant	Reliability	Understanding ability	Appropriateness
Q1	4.4	4.6	4.4	4.4
Q2	5	4.6	4.6	4.6
Q3	4	3.4	3.4	4
Q4	4.8	4.4	4.8	5
Q5	4	4.2	4.4	4.2
Q6	4.2	4.4	3.4	3.6
Q7	4.4	4.4	4.6	4.4
Q8	3.4	3.6	3.4	3.6
Q9	4.6	4.6	4.2	4.6
Q10	4.8	4.8	4.4	4.6
Q11	4.4	4.4	4	4
Q12	3.4	3.8	3.2	4
Q13	4.4	4.4	4.8	4.8
Q14	5	4.8	4.8	5
Q15	4.4	4.4	4.8	4.8
Q16	4.8	4.8	5	4.8
Q17	4.6	4.8	4.8	4.6
Q18	5	4.8	4.8	5
Q19	3.8	3.8	3.4	3.4
Q20	4.8	4.8	4.4	4.4
Q21	4.4	4.4	4.4	4.8
Q22	4.8	4.8	4.6	4.8
Q23	4.8	4.8	4.6	4.8
Q24	5	4.8	4.8	5

It was found that four out of 24 questions had average score below 3.5. Those questions (Q3, Q8, Q12 and Q19) were retranslated and revalidated in the same procedure. The average scores of the revalidated questionnaire are given in Table 4.2.

Table 4.2: Revalidated mean score of questions with each parameter

	Relevant	Reliability	Understanding ability	Appropriateness
Q3	4.4	4.2	4.2	4.4
Q8	5	4.4	4.8	4.4
Q12	4.2	4.2	4.2	4.8
Q19	4.4	4.4	4.4	5

4.1.1 Factors extraction of ALHQ subscales

The data from questionnaire were analyzed designating a value of 1 for a YES response and a value of 0 for a NO response. Principal components analysis (PCA) with varimax rotation was then used to extract psychometrically valid scales from the 24 questions. An 8-factor solution was chosen. Eight factors will explain more than 50% of variance, which will not create a unmanageable scales of ALHQ data. The PCA uses the inter-item correlations to group the questionnaire items into factors/scales. The items in each factor have stronger relationships to each other than they do to the questionnaire items in other factors. Table 4.3 shows the factor loading of the different questions of different subscales or factors.

The final solution consists of four factors from 24 different questions, which explained 77% of the total variance. The final version of the questionnaire is in Appendix. The factor loading

Was interpreted as follows:

- Factor 1: Social impact of hearing loss (SIHL), scale consisting of nine items addressing an issue of how they are able adjust in society, and how negative emotions affect in communicating with public due to hearing impairment.
- Factor 2: Acceptance and awareness of hearing loss (AAHL) scale consisting of six items addressing issues of acceptance and acknowledgement of hearing loss; and how well they are aware about their hearing loss, and how well they accept that they have hearing impairment.
- Factor 3: Support from others (SFO) scale addresses the support that they get from others, when they have hearing difficulties..
- Factor 4: Hearing aid stigma and emotional impact of hearing loss (HAS&EIHL) scale addresses about how they associate hearing

impairment or hearing aid to negative things, and the effect of negative emotions due to hearing impairment.

Table 4.3: *Results of factor extraction and different domains with factor loading of each question*

<i>Factor name</i>	<i>Item number</i>	<i>Factor loading</i>
Social impact of hearing loss	2	0.785
	12	0.589
	16	0.903
	17	0.508
	18	0.679
	19	0.538
	20	0.639
Acceptance and awareness of hearing loss	21	0.597
	3	0.708
	5	0.739
	10	0.778
	22	0.887
	23	0.831
Support from others	24	0.550
	6	0.694
	13	0.681
	14	0.656
Hearing aid stigma and Emotional impact of hearing loss	15	0.614
	1	0.939
	4	0.596
	7	0.780
	8	0.879
9	0.731	

4.1.2 Calculation of subject scores on ALHQ scales

If a questionnaire is to be used as a clinical tool it must be easy and quick to score and interpret. For scoring, zero point were given for the negative response (negative attitude) and two points were awarded for a positive response to those factor loading greater than 0.600(eg. 2, 3, 5etc.), and one point awarded for a positive response to those questions with factor loading less than 0.6000 (eg., 4,12,17&19).

All the four scales are scored such that positive responses means negative attitude towards hearing loss, and consequently a higher score, means a poorer attitude. Scoring is given in Appendix -2 for each question and each subscales. That is compared with low scoring individuals, subject with higher scores feel that their hearing loss has more social impact (scale 1, SIHL) and they are less acceptance and less aware of their own hearing difficulties (scale2, AAHL), and they feel that they are not getting any support from people because of their hearing difficulties have poor support from others (scalen3, SFO), and they report more hearing aid stigma and emotional (scale 4, HAS&EIHL).. Final ALHQ questionnaire is give in the Appendix 1. Scoring for the ALHQ is given in Appendix- 2.

4.2 Effect of attitude on SIS and IOI-HA

The scores from attitude towards hearing loss questionnaire (ALHQ), aided speech identification score, and IOI-HA scores were analysed in order to find out the effect of attitude towards hearing loss on hearing aid outcome. It was ensured that there were no significant outliers, and hence all the data were retained for analyses. Initially, the data were tested for normality. For this, Shapiro-Wilk test was performed. The overall and subscale scores of ALHQ and aided SIS from 20 participants were subjected for Shapiro-Wilk normality test. Prior to this,

Table 4.4: *Normality results of Shapiro wilk test*

<i>Parameters</i>	<i>Significance (p).</i>
Social and Emotional Impact of Hearing Loss	0.306
Acceptance and Awareness of Hearing Loss	0.472
Support From Others	0.057
Hearing Aid Stigma & Emotional Impact of Hearing Loss	0.064
Total	0.594
Speech Identification Score	0.053

On Shapiro Wilk test, all the data from different sub-scales followed normal distribution (i.e., $p > 0.05$), as shown in Table 4.4. Since the data were normally distributed, parametric statistical analyses were performed.

Correlation between ALHQ and aided speech identification score

The data were normally distributed. Hence, Pearson correlation measurement was carried out to check the correlation between scores on subscales of ALHQ and aided speech identification score. That is, the correlation between SIHL (scale of ALHQ) and aided SIS, AAHL (scale of ALHQ) and aided SIS, SFO (scale of ALHQ) and aided SIS, and, HAS&EIHL (scale of ALHQ) and aided SIS was found out. Table 4.5 depicts the correlation between different subscales and aided SIS, prior to use of own hearing aid.

Table 4.5: Pearson's correlation coefficient between each subscale of ALHQ and SIS

	SIHL	AAHL	SFO*	HAS&EIHL	TOTAL
SIS	-0.614*	-0.447*	-0.654	-0.605*	-0.716**

Note: * indicates $p < 0.005$; ** indicates $p < 0.001$

A significant negative correlation was obtained between SIHL sub-scale of ALHQ and aided speech identification score ($r = -0.614$; $p < 0.005$), i.e., as the scores of SIHL increased, the aided SIS decreased.

A significant negative correlation between AAHL sub-scale of ALHQ and aided speech identification score ($r = -0.447$; $p < 0.005$) was obtained i.e., as the AAHL scores increased, the speech identification score decreased. ..

A significant negative correlation between SFO subscale of ALHQ and aided speech identification score ($r = -0.654$, $p < 0.001$) was obtained, i.e., as the SFO scores increased, there was a decrease in the speech identification scores.

A significant negative correlation between HAS&EIHL subscale of ALHQ and aided speech identification score ($r = -0.447$; $p < 0.001$) was obtained, i.e., as the HAS&EIHL scores increased, the speech identification score decreased.

A significant negative correlation between total score of ALHQ and aided speech identification score ($r = -0.714$; $p < 0.001$) was obtained. i.e., as the scores ALHQ increased, there was a decrease in speech identification scores. The Pearson's correlation coefficients are given in Table 4.5.

4.3. Effect of use of hearing aid on attitude towards hearing loss.

To know the effect of use of hearing aid on attitude towards hearing loss subscale scores and total scores of pre-ALHQ were compared with subscales scores and total scores of post-ALHQ(after 4 weeks of usage of hearing aid). In order to examine if the distribution of data collected, Shapiro-Wilk test was performed. Each subscale scores of pre-ALHQ and scores of post-ALHQ from ten participants were subjected to Shapiro-Wilk normality test. Prior to this, it was ensured that there were no significant outliers, and hence all the data were retained for analyses. On Shapiro-Wilk test, majority of the data followed normal distribution, as shown in Table 4.6,. Since majority of the data were normally distributed, parametric statistical analysis was performed.

Table 4.6: *Significance of different parameters on Shapiro Wilk test of normality*

<i>Parameters</i>		<i>Significance (p)</i>
Pre-ALHQ	SIHL	0.273
	AAHL	0.988
	SFO	0.151
	HAS&EIHL	0.624
	Total	0.826
Pre-SIS		0.170
Post-ALHQ	Post-SIHL	0.410
	Post-AAHL	0.050
	Post-SFO	0.157
	Post- HAS&EIHL	0.392
	Post-Total	0.944
Post-SIS		0.883

The mean, median, and standard deviation (SD) of subscales of Pre-ALHQ, and post- ALHQ scores, and the total pre- and post- ALHQ scored were computed. The values of mean, median and standard deviation are given in Table 4.7.

Table 4.7: Mean, median, and standard deviation (SD) of pre- and post- ALHQ and SIS scores

<i>Parameters</i>		<i>Mean</i>	<i>Median</i>	<i>SD</i>
Pre-ALHQ	SIHL	6.90	7.00	3.315
	AAHL	6.70	7.00	2.584
	SFO	3.60	4.00	2.797
	HAS&EIHL	3.90	3.00	2.514
	Total	21.10	21.50	10.104
Pre-SIS		18.90	19	2.726
Post-ALHQ	Post-SIHL	5.10	5.00	1.370
	Post-AAHL	2.40	2.00	.843
	Post-SFO	3.00	3.00	2.357
	Post-HAS&EIHL	1.90	2.00	1.287
	Post-Total	12.40	13.50	4.169
Post-SIS		20.50	20.50	1.853

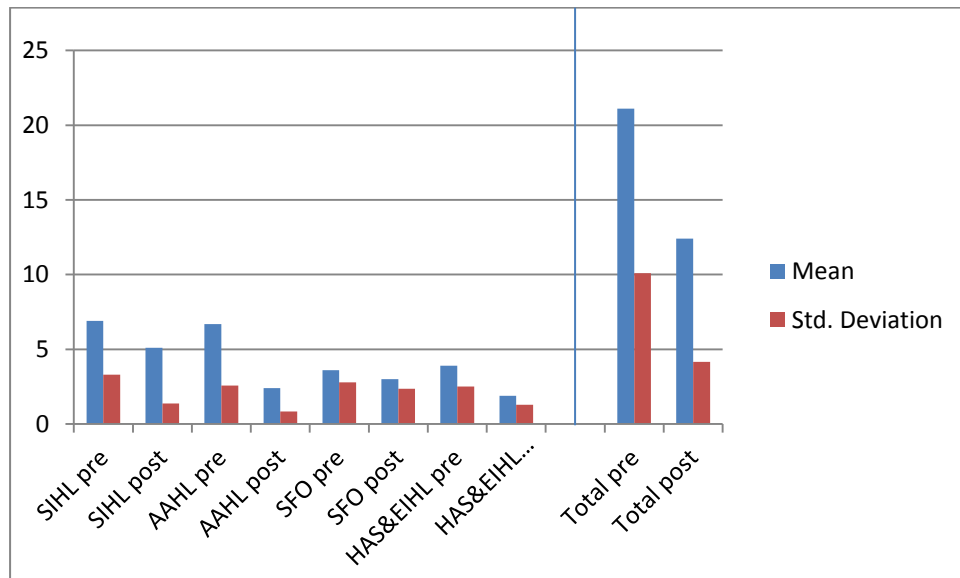


Figure 4.1: Mean and standard deviation of scores on subscales and total score on ALHQ

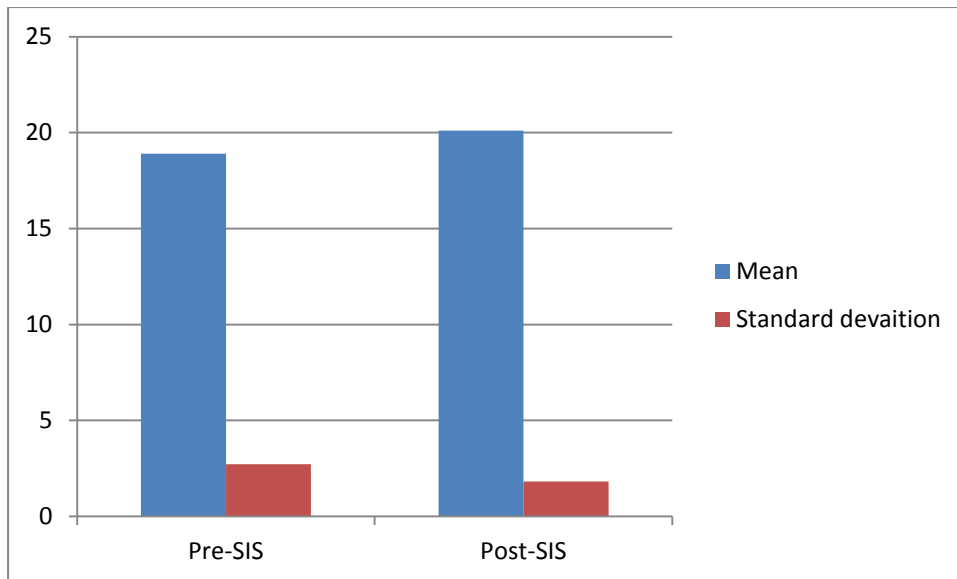


Figure 4.2 Mean and standard deviation of pre- and post- SIS

Comparison between pre-ALHQ scores and post-ALHQ scores

Paired t-test was performed, since the data were normally distributed, to compare between pre-ALHQ scores and post-ALHQ scores to know whether use of hearing aid changes the attitude towards hearing loss. Each subscale of pre-ALHQ was compared with each subscale of post-ALHQ scores. Table 4.8 shows the statistical differences between the pre ALHQ score and post ALHQ score.

Table 4.8: Significant difference between pre-ALHQ and post-ALHQ scores on paired t test.

<i>Parameters</i>	<i>T</i>	<i>Significance (p)</i>
PreSIHL and PostSIHL	2.212	0 .054
PreAAHL and PostAAHL	6.442	0.000
PreSFO and PostSFO	1.406	0.193
PreHAS&EIHL andPostHASEIHL	3.254	0.010
PreTOTALandPost TOTAL	4.233	0.002

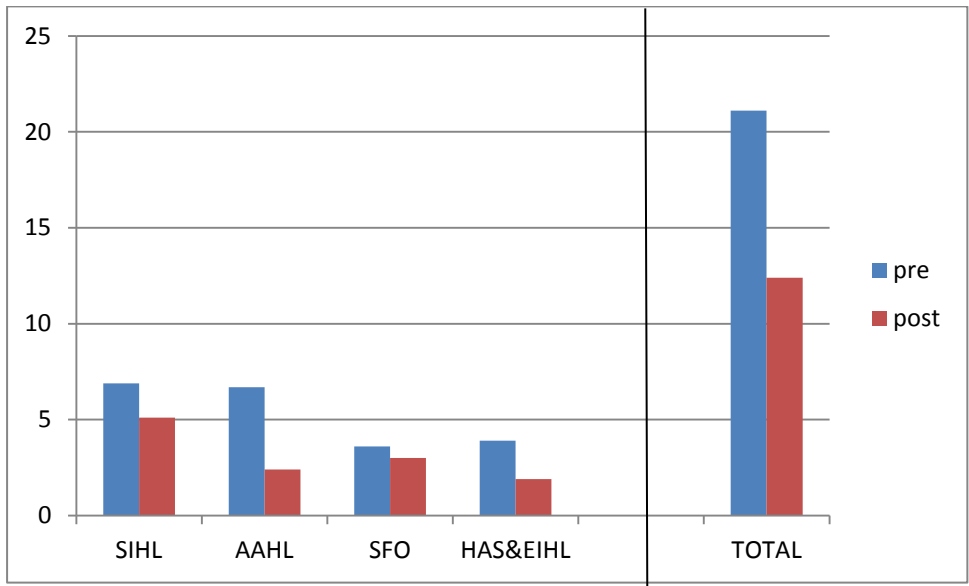


Figure: 4.3 Comparison of mean pre- ALHQ subscale scores with post ALHQ subscale scores

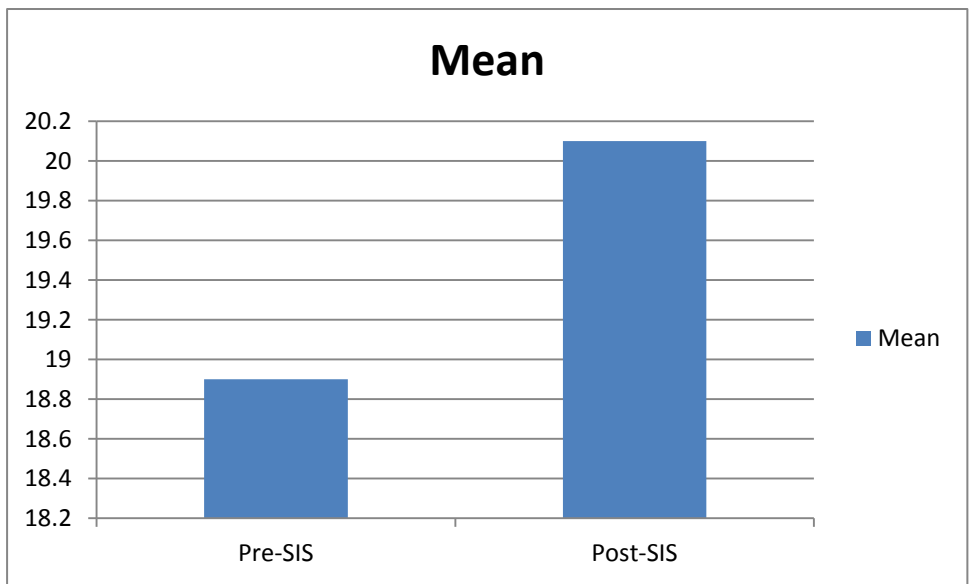


Figure 4.4 Comparison between mean score of pre-SIS with post-SIS

It was found that there was no significant difference between pre-SIHL (scales of ALHQ) and post-SIHL (scales of ALHQ), in examination of the mean SIHL scores, it was noted that the post SIHL (scales of ALHQ) was better when compared between pre-SIHL (scales of ALHQ) scores.

It was found that there was a highly significant difference ($p=0.00$) between pre-AAHL (scales of ALHQ) and post AAHL (scales of ALHQ) scores, i.e., use of hearing aid had changed the attitude towards acceptance and awareness of hearing loss. Further, it was found that post AAHL sub-scale of ALHQ was better when compared to pre AAHL sub-scale of ALHQ.

It was found that there was no significant difference between pre-SFO sub-scales of ALHQ and post-SFO sub-scales of ALHQ, i.e., there was no change in the attitude towards support from others even after using a hearing aid..

It was found that there was a significant difference ($p= 0.010$) between pre HAS&EIHL sub-scale of ALHQ and post- HAS&EIHL sub-scales of ALHQ. On examination of the mean scores of HAS&EIHL It was found that post scores were better when compared to pre HAS & EIHL score. The use of hearing aid changed the negative attitude of hearing aid stigma to positive attitude of hearing aid stigma.

There was a significant difference between total scores of pre ALHQ scores and total post ALHQ score. The post ALHQ score were better when compared to pre ALHQ score. The use of hearing aid had changed the negative attitude towards hearing loss to positive attitude towards hearing loss.

Since the standard deviation was slightly higher, Wilcoxon Signed Ranks Test was also administered to cross check the results obtained from paired t-test. The results obtained from both the tests agreed with each other. The results from Wilcoxon signed rank test are given in Table 4.9

Table 4.9: *Significant difference between pre-ALHQ and post-ALHQ scores on Wilcoxon signed rank test.*

<i>Parameters</i>	<i>Z</i>	<i>Significance</i>
PreSIHL-PostSIHL	-1.913	0.056
PreAAHL-PostAAHL	-2.677	0.007
PreSFO-PostSFO	-1.342	0.180
PREHAS&EIHL- PostHAS&EIHL	-2.214	0.027
PreTOTAL-PostTOTAL	-2.654	0.008

From the above findings it can be inferred that use of hearing aid has an effect on the attitude towards hearing loss.

4.4. Effect of use of hearing aid on SIS

To check if there was a significant difference between the pre-SIS and post-SIS, paired t-test was administered. This revealed a significant difference between Pre-SIS and Post-SIS ($t=-2.499$; $p<0.02$).

4.5 Effect of attitude after use of hearing aid on IOI-HA

To see the effect of attitude after the use hearing aid on IOI-HA the total post scores of ALHQ and its subscales are compared with scores IOI-HA. Table 4.10 provides the correlation values between post ALHQ scores and hearing aid outcome.

Table4.10: *Pearson correlation coefficient (r) between Post scores of ALHQ and IOI-HA*

	<i>Post ALHQ scores</i>				
	SIHL	AAHL	SFO	HAS%EIHL	TOTAL
IOI-HA	-0.785*	-0.157	-0.468*	-0.445*	-0.675*

Note: * indicates $p < 0.005$

It was found that there was a significant negative correlation between post-ALHQ score and IOI-HA score ($r = -0.675$, $p < 0.005$) which says that if there is a change in ALHQ score there will be change in the hearing aid outcome or vice versa could also be true. is the negative correlation reveals that with increase in scores of ALHQ, there is a concomitant decrease in hearing aid outcome.

A significant ($p < 0.005$) negative correlation ($r = -0.785$) between SIHL (subscale of ALHQ) and IOI-HA was obtained. i.e., as the scores SIHL (subscale of ALHQ) increase, there is decrease in IOI-HA scores.

A significant ($p < 0.005$) moderate negative correlation ($r = -0.468$, $r = -0.445$) between SFO, HAS&EIHL (subscales ALHQ) and IOI-HA was obtained i.e., as there is increase SFO and HAS&EIHL (subscales of ALHQ) scores ,there is decrease in scores of IOI-HA

It was found that there is no correlation between AAHL (subscale of ALHQ) and IOI-HA, which says that increase in score of AAHL, there is no change in hearing aid outcome..

4.6 Correlation between IOI-HA (International outcome inventory-of Hearing Aid) and SIS

Significant ($p < 0.01$) positive correlation ($r = 0.943$) between IOI-HA and SIS, was obtained i.e., as there is an increase SIS there is increase in scores of IOI-HA. It can be concluded as the SIS increases there is increase in hearing aid outcome.

A change in the attitude after use of hearing aid was found when it was compared between pre-ALHQ and post-ALHQ scores (as in Section 4.3). There was a significant difference ($p < 0.002$) when pre-SIS was compared between post-SIS. Since there was a correlation between ALHQ and speech identification scores, (as in Section 4.2). From this it can be inferred that change in attitude will affect SIS. And there is a highly positive correlation between IOI-HA and SIS (as in Section 4.5). Thus, it can be concluded that change in the attitude also changes the speech identification score and hearing aid outcome

4.7 Test Re-test Reliability

The data from the six participants who completed the ALHQ a second time were analyzed to examine test-retest reliability. The Cronbach's alpha was measured to know the internal consistency. The test-retest reliability coefficient that yielded different α -values for each scale as provided in Table.4.11. An α of 0.94 for social impact of hearing loss; α of 0.95 for acceptance and awareness of hearing loss, α of 0.94 for support from others, and α of 0.96 for hearing aid stigma and emotional impact of hearing loss. The α was 0.98: for the and total ALHQ scores. Test-retest alpha values greater than 0.8 is considered to be excellent. All the measures of ALHQ have an alpha of greater than 0.8 and thus the ALHQ is an excellent tool in terms of test re-test reliability.

Table 4.11: *Test-retest reliability results of subscales of ALHQ (Cronbach's*

<i>ALHQ scores</i>	<i>Cronbach's alpha</i>
Social impact of hearing loss	$\alpha = 0.94$
Acceptance and awareness of hearing loss	$\alpha = 0.95$
Support from others	$\alpha = 0.94$
Hearing aid stigma & emotional impact of hearing loss	$\alpha = 0.96$
Total ALHQ score	$\alpha = 0.98$

Chapter 5

DISCUSSION

The objective of the study was to evaluate the effect of attitude towards hearing loss on hearing outcome in individuals who are naive hearing aid users. Performance of individuals with flat and sloping sensorineural hearing loss was assessed in terms of attitudes and SIS. The data were tabulated and analyzed. The following sections provide the discussion of the results of the present study under different headings as listed below.

5.1 Psychometric properties of ALHQ.

5.2 Effect of attitude towards hearing loss on hearing aid outcome.

5.3 Effect of use of hearing aid on attitude.

5.4 Effect of change in attitude after the use of hearing aid on hearing aid outcome.

The ALHQ is used to measure attitude towards hearing loss. The ALHQ scores before hearing aid use (pre-ALHQ) and after hearing aid use (post-ALHQ) were compared in order to measure the change in attitude towards hearing loss. The SIS and IOI-HA were used to measure the hearing aid outcome. The SIS measured before (pre-SIS) and after the hearing aid use (post-SIS), IOI-HA measure after the use of hearing aid, was compared with the attitude on ALHQ measure.

5.1 Psychometric properties of ALHQ

This study was also aimed to confirm the psychometric properties of the ALHQ. The data were collected from 20 participants and principal components analysis was run. The 24 item ALHQ questionnaire resulted in with four subscales, i.e., social impact of hearing loss (SIHL), acceptance and awareness of hearing loss

(AAHL), support from others (SFO), and hearing aid stigma and emotional impact of hearing loss (HAS&EIHL). There were slight differences in the translated version subscales from the original subscales (Saunders & Cienkowski, 1996) of ALHQ. The social and emotional impact of hearing loss was combined together by Saunders and Cienkowski (1996), but it was divided in the present study. The awareness and acceptance of hearing loss was divided in the study by Saunders and Cienkowski, and it was included together in the present study. The subscale of support from others remains same in the present study. The Subscale of hearing aid stigma was retained as separate subscale in the study done by Saunders and Cienkowski(1996), it was combined with emotion impact of hearing loss in the present study. The rationale for including each of the four sub-scales in the final ALHQ is described in the following sections.

5.1.1 *Acceptance and awareness of hearing loss sub-scale of ALHQ.*

A high score on the AAHL sub-scale indicates that the individual does not consider his/her hearing loss to be a problem and that he/she does not feel the need for hearing aids. Studies have shown that individuals with lower reported handicap are more likely to abandon their hearing aids than individuals who report more handicaps, even when hearing loss, age, and gender are accounted for (Humes et al., 2003). Similarly, it has been shown that individuals who do not acknowledge their hearing loss use their hearing aids less than individuals who acknowledged their hearing loss (Brooks & Hallam, 1998). Thus, a high score on this scale is likely to lead to poor uptake, poor use, or abandonment of hearing aids.

5.1.2 *Hearing aid stigma and emotional impact of hearing loss sub-scale of ALHQ.*

A high score on this scale indicates that the individual may associate hearing aids with aging and embarrassment. This has been shown to be a common sentiment among the young and elderly alike (Kochkin, 1993; Eler & Garstecki, 2002) and is a problem because studies have shown that negative attitudes towards hearing aids result in less hearing aid use and lower satisfaction (Brooks, 1989; Garstecki & Eler, 1998; Wilson & Stephens, 2002).

5.1.3 *Social impact of hearing loss sub-scale of ALHQ.*

A high score in this indicates people will have poor social communication skills. He/she feels that hearing problem is a burden for them and people give negative comment to that, avoid meeting new people, avoid communicating with new people, and will have fear of saying wrong things. Thus they will have poor social life. Studies have shown that negative attitude towards social life after having hearing difficulties, will reduce the use of hearing aid, and gives rise to reduced outcome (Kricos et al., 1991; Kochkin, 1993; Eler & Garstecki, 2002).

5.1.4 *Support from others sub-scale of ALHQ.*

A high score in this indicates that people do not get significant support from the family or friends and thus they are likely get poor attitude towards hearing loss. Studies have shown that family support is important for individuals with hearing impairment, people who will not get support from others, they try to withdraw, use of hearing aid less, and thus they get reduced outcome (Brooks & Hallam, 1998).

5.2 Effect of attitude towards hearing loss on hearing aid outcome

In a study by Hickson et al. (1986, 1999), it was shown that attitude was associated with occasional or non-use of hearing aids; whereas the remaining groups (“strongly positive toward help” and “essentially positive”) showed consistent *use*. Those clients with “rejection of hearing aids and the entire rehabilitation process” type attitude were not fitted with hearing aids and were not included in analysis.

Brook (1998) had studied the effect of attitude on benefit obtained from hearing aid with the questionnaire which included factors such as failure to come to terms with the hearing loss, perception of stigma associated with hearing aids, lack of support or even overt hostility from close relative, and withdrawal from social contacts. He investigated the relationship between these attitude measurements and outcome in terms of daily use of the aid four months later. He had found that there was a significant difference between the positive and negative responders in terms of awareness of hearing loss. People with negative attitude, at four months post fitting, were using their aids less than four hours per day. People with positive attitude used their aids more than four hours per day after four months. Approximately 40% of the candidates admitted to avoidance behaviour and that only 21% used their aids less than four hours per day after four months. Both studies have shown that negative attitude towards hearing loss make significant reduction in hearing aid outcome.

The results of the present study explain about the effect of attitude towards hearing loss on SIS. There is a highly negative correlation ($r = -0.714$) between scores of ALHQ (including sub-scale) and SIS, which was significant ($p < 0.001$). That is, as the scores in the ALHQ increases there will be a decrease in the SIS. A high score in

the ALHQ indicates there is more negative attitude towards hearing loss, which reduces SIS.

In the present study, it was seen that there was a negative correlation ($r = -0.614$) between SIHL (subscale of ALHQ) and SIS. A high score in SIHL indicates that individuals with poor social interaction, poor communication after getting hearing problem, will show reduction in SIS.

In the current study, there was a negative correlation between AAHL, SFO, and HAS&EIHL subscales of ALHQ with the SIS. A high score indicates that individual does not consider his/her hearing loss to be a problem and that he/she does not feel the need for hearing aids. Further, high scores in these scales indicates that people who get poor support from others, associate hearing aids with aging and embarrassment; and that the individual does not consider his/her hearing loss to be a problem, and that he/she does not feel the need for hearing aids. This probably reduces in SIS in addition to the inherent hearing impairment.

Since there is a highly significant positive correlation between SIS and IOI-HA ($r = 0.943$, $p < 0.001$). As the SIS increases, the IOI-HA scores also increase which means that there is increase in the hearing aid outcome. It can be deduced that a high score in ALHQ shows reduced scores in SIS and IOI-HA, which means that reduced hearing aid outcome.

The present finding has support from literature, as the negative attitude towards hearing loss or hearing aid increases the outcome from the hearing aid also reduces (Gatehouse, 1994; Brooks 1989; Wilson & Stephens 2002; Garstecki & Erler 1998). This was significant in the present study.

5.4 To know the Effect of use of hearing aid on attitude

Wilson and Stephans (2002) included 140 first-time hearing aid users who were assessed at their initial hearing aid consultation and review after three months. They found that out of 140 individuals, 47(34%) reported that they were self-motivated but the majority, 93(66%) were not self-motivated at initial assessment. And they had negative attitude towards hearing loss. When author reviewed after three months, only six patients were graded as having a negative attitude. There were 87 patients with neutral attitude and 34 patients with positive attitude towards a hearing aid. It was found that of the six patients with negative attitude, 50% had used hearing aid occasionally and 50% had used regularly. Among 93 patients with neutral attitude, 8% never used, 17% used occasionally, 75% used hearing aid regularly. Among 33 patients with positive attitude, 85% had used the hearing aid regularly. Though 93 individuals had a negative attitude before the use of hearing aid, after three month review only 6 individuals had negative attitude. Thus, the use of hearing aid changes the attitude.

The result of the present study explains about effect of use of hearing aid on attitude. There is a significant difference between pre-ALHQ score and post ALHQ scores ($p < 0.005$) in the present study. That is use of hearing aid had changed the attitude towards hearing loss. The post ALHQ scores were reduced when it was compared with pre-ALHQ scores. Thus, reduced negative attitude towards hearing loss was noted on post ALHQ scores.

Each subscale of ALHQ was compared before and after hearing id use. It was found that there was a significant difference between AAHL and HAS&EIHL subscales of ALHQ ($p < 0.001$). This implies that use of hearing had changes the attitude

of acceptance and awareness towards hearing loss; and also use of hearing aid had changes the attitude towards hearing aid stigma and emotional impact of hearing loss.

There was no significant difference between SFO subscale scores of ALHQ before and after hearing aid use. This implies that use of hearing aid did not make any difference in attitude towards family support. This needs to be assessed after a long-term use of hearing aids.

The present findings get support from the literature, in which the use of hearing aid reduces the negative attitude towards hearing loss. Wilson and Stephens (2002) have said that at the initial stage of assessment, 93 people were not self-motivated and had a negative attitude towards hearing loss. But the review after three months revealed that only six people had negative attitude towards hearing loss.

5.5 To check weather change in attitude after the use of hearing aid will change hearing aid outcome.

The present study explains about the change in hearing aid outcome due to change in attitude after the use of hearing aid outcome. The present study reveals that, that there is a high correlation between ALHQ and SIS. Where change in the scores of ALHQ will reflect in change in the SIS. The results of effect of use of hearing aid on SIS shows that there is a significant difference between pre-SIS and post-SIS on paired *t* sample ($t=-2.499$; $p<0.005$). That means hearing aid use had improved the SIS. This could also be explained in terms of acclimatization to hearing aid.

There is a high correlation between ALHQ and SIS, from this it can be concluded that change attitude also changes the SIS. From these findings it can be deduced that the use of hearing aid changes the ALHQ scores and SIS. Since SIS and

IOI-HA are highly correlated, change in SIS results in change in scores of IOI-HA, it can be implied that change in attitude also results in change hearing aid outcome.

Chapter 6

SUMMARY AND CONCLUSIONS

The present study aimed to measure the attitude towards hearing loss and outcome from a hearing aid. The study included translation (from English version to Kannada version) and validation of the Attitude towards Loss of Hearing Questionnaire (ALHQ). Translation of ALHQ was done using AAOS guidelines which include five stages. The stages were Stage 1 for forward translation, Stage 2 for synthesizing a common translation, Stage 3 for backward translation, Stage 4 for expert committee review approach, and Stage 5 for Pre-final testing. The questionnaire was validated by five experienced audiologists.

The study was conducted on 10 participants with moderate to moderately severe sensorineural hearing loss. Routine audiological tests were performed to ensure participant selection criteria. The ALHQ questionnaire was administered soon after fitting hearing aid and speech identifications scores (SIS) were obtained before and after four to six weeks of hearing aid use. The ALHQ and IOI-HA questionnaire were also administered after four to six weeks of hearing aid use.

The data on ALHQ scores (pre- and post-), SIS (pre- and post-) and IOI-HA (post only) scores were tabulated for 10 participants. Descriptive statistics and inferential statistics were carried out using SPSS software (v 17 for Windows). The findings, limited to the study, are summarized in the following aspects.

6.1 Effect of attitude on speech identification scores

The data were normally distributed, parametric statistical analyses were performed.

- ✓ Significant negative correlation between ALHQ and SIS was obtained. There was a significant negative correlation between subscales of ALHQ and SIS.
- ✓ As the scores of ALHQ or the subscales of ALHQ increases, there is a decrease in the SIS.

6.2 Effect of use of hearing aid on attitude towards hearing loss.

Pre-ALHQ scores were compared between post-ALHQ score to check effect of attitude towards hearing loss after the use of hearing aid. The data were normally distributed, parametric statistical analyses were performed.

- ✓ Significant difference between pre-ALHQ scores and post-ALHQ score were obtained
- ✓ Significant difference was obtained between pre- and post- scores of AAHL, HAS& EIHL (subscales of ALHQ), and ALHQ.
- ✓ There was no difference between pre- and post- scores of SIHL,SFO subscales of ALHQ and SIS, though the post ALHQ scores were better.
- ✓ Non-parametric test was carried out to check difference between pre and Post ALHQ scores, since standard deviation was high. Similar results were obtained.

6.3. Effect of use of hearing aid on SIS

Pre-SIS was compared between post-SIS to check effect on SIS with the use of hearing aid.

- ✓ Significant difference between pre-SIS and post-SIS was obtained, post-SIS were better.

6.4 Effect of attitude after use of hearing aid on IOI-HA

- ✓ Significant negative correlation between post scores of ALHQ and post scores of IOI-HA was obtained.
- ✓ Significant negative correlation was obtained for post scores of SIHL & HAS-EIHL subscales of ALHQ and IOI-HA score.
- ✓ There was no correlation between post scores of AAHL&SFO(subscales of ALHQ) and IOI-HA scores.

6.5 Correlation between International outcome inventory-of Hearing Aid and SIS

Post-SIS and IOI-HA scores were compared

- ✓ Highly significant correlation between post-SIS and IOI-HA scores were obtained.

To summarize the study, the ALHQ questionnaire, which measures attitude towards hearing loss, was translated from English to Kannada and it was validated. The questionnaire was administered on individuals with moderate to moderately severe hearing loss to check attitude towards hearing loss, and the SIS was measured. The ALHQ and SIS were measured before and after hearing aid use.

People with increased ALHQ scores will have reduced SIS, which means individuals with more negative attitude towards hearing loss will have reduced SIS, and individuals having positive attitude towards hearing loss will have increased SIS.

Further, use of hearing aid will make changes in attitude towards hearing loss. That is, negative attitude towards hearing loss can change to positive after the use of hearing aid. In addition, change in attitude towards hearing loss will make changes in the hearing aid outcome.

6.3 Clinical implications

Based on the findings of the present study,

- ✓ The questionnaire (ALHQ) can be used as clinical tool to elucidate some of the underlying psychosocial issues that lead to the refusal to acquire or to use amplification.
- ✓ It can be used during counselling when his or her ALHQ score on a particular subscale or subscales indicate an attitude that is detrimental to hearing aid outcome. These negative attitudes can be tackled during hearing aid dispensing/counselling so that the clients become successful hearing aid users.

6.4 Future directions

- ✓ The study was conducted in older adult population. Further, study can be conducted on more number of participants for generalizing the findings.
- ✓ The study can be conducted on older adult populations also.

From the study it can be inferred that attitude has an effect on hearing aid outcome. Thus the attitude of individuals should be dealt initially so that the hearing aid outcome improves. This in turn will have an impact on the quality of life of an individual.

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Appendix 1

ALHQ in Kannada

ಶ್ರವಣ ದೋಷದ ಬಗ್ಗೆ ಅಭಿಪ್ರಾಯಗಳ ಪ್ರಶ್ನಾವಳಿ

ಹೆಸರು:

ವಯಸ್ಸು/ ಲಿಂಗ:

ಕೆಲಸ:

ವಿಳಾಸ:

ಸೂಚನೆಗಳು: ಈ ಕೆಳಗಿನ ಪ್ರಶ್ನೆಗಳನ್ನು ಅರ್ಥಮಾಡಿಕೊಂಡು 'ಹೌದು' ಅಥವಾ 'ಇಲ್ಲ' ಎಂದು ಉತ್ತರಿಸಿ

1.	ಶ್ರವಣ ಯಂತ್ರ ಧರಿಸುವುದರಿಂದ ನಿಮಗೆ ವಯಸ್ಸಾದಂತೆ ಅನುಭವ ಉಂಟಾಗುತ್ತದೆಯೇ?	ಹೌದು	ಇಲ್ಲ
2.	ಕಿವಿ ಕೇಳಿಸುವುದು ಕಡಿಮೆ ಆದಮೇಲೆ ನೀವು ಹೊರಗೆ ಹೋಗುವುದು ಮೊದಲಿಗಿಂತ ಕಡಿಮೆ ಮಾಡಿದ್ದೀರಾ?	ಹೌದು	ಇಲ್ಲ
3.	ನಿಮ್ಮ ಶ್ರವಣ ದೋಷದ ಕಾರಣ ನಿಮಗೆ ಅಪೂರ್ಣವೆಂಬ ಭಾವನ ಉಂಟಾಗುತ್ತದೆಯೇ?	ಹೌದು	ಇಲ್ಲ
4.	ಇತರರಿಗೆ ಕಾಣುವಂತೆ ಶ್ರವಣ ಯಂತ್ರ ಧರಿಸುವುದು ನಿಮಗೆ ಸಮಸ್ಯೆ ಅನಿಸುತ್ತದೆಯೇ?	ಹೌದು	ಇಲ್ಲ
5.	ಶ್ರವಣ ಯಂತ್ರ ಕೊಂಡುಕೊಳ್ಳುವುದು ನಿಮಗೆ ಸಂತೋಷದ ವಿಷಯವೇ?	ಹೌದು	ಇಲ್ಲ
6.	ನಿಮ್ಮ ಕುಟುಂಬವರ್ಗದವರು ಮತ್ತು ಸ್ನೇಹಿತರು ನಿಮ್ಮ ಶ್ರವಣ ಶಕ್ತಿಯು ಸರಿಯಿರದ ಕಾರಣ ಕೋಪಗೊಳ್ಳುವರೆ ?	ಹೌದು	ಇಲ್ಲ
7.	ಶ್ರವಣ ಯಂತ್ರ ಧರಿಸಿದಾಗ ಬೇರೆಯವರು ಅದರ ಬಗ್ಗೆ ಮಾತನಾಡಿದರೆ ನಿಮಗೆ ಅಸಮಾಧಾನ ಉಂಟಾಗುತ್ತದೆಯೇ?	ಹೌದು	ಇಲ್ಲ
8.	ಇತರರು ಶ್ರವಣೋಪಕರಣವನ್ನು ಮೂರ್ಕತೆಯೆಂದು ಪರಿಗಣಿಸುವರೆ?	ಹೌದು	ಇಲ್ಲ
9.	ಇತರರು ನಿಮ್ಮಲ್ಲಿರುವ ಕಿವಿ ತೊಂದರೆ ಬಗ್ಗೆ ಆಡುವ ಮಾತುಗಳು ನಿಮ್ಮಲ್ಲಿ ಬೇಜಾರು ಮಾಡುತ್ತದೆಯೇ?	ಹೌದು	ಇಲ್ಲ

10.	ನಿಮ್ಮ ಕಿವಿ ತೊಂದರೆಯಿಂದ ನಿಮ್ಮನ್ನು ಇತರರು ನಿರಂತರವಾಗಿ ನಿರ್ಲಕ್ಷಿಸುತ್ತಾರೆಯೇ?	ಹೌದು	ಇಲ್ಲ
11.	ನೀವು ಕಿವಿ ತೊಂದರೆಗೆ ಒಳಗಾದ ಮೇಲೂ ಮುಂಚಿನಷ್ಟೆ ಆತ್ಮವಿಶ್ವಾಸ ಹೊಂದಿರುವಿರಾ ?	ಹೌದು	ಇಲ್ಲ
12.	ನೀವು ಕಿವಿ ತೊಂದರೆಗೆ ಒಳಗಾದ ಮೇಲೂ ಮುಂಚಿನಷ್ಟೆ ಚುರುಕಾದ ಯೋಚನಾ ಶಕ್ತಿಯನ್ನು ಹೊಂದಿರುವಿರಾ?	ಹೌದು	ಇಲ್ಲ
13.	ಟಿವಿ ಯ ಶಬ್ದದ ಮಟ್ಟದ ಸಲುವಾಗಿ ನೀವು ಕುಟುಂಬವರ್ಗದವರ ಜೊತೆ ವಾದವನ್ನು ಮಾಡುತ್ತೀರಾ ?	ಹೌದು	ಇಲ್ಲ
14.	ನಿಮ್ಮ ಮನೆಯವರು ಹಾಗೂ ಸ್ನೇಹಿತರು ನಿಮಗೆ ಗಮನವಿಟ್ಟು ಕೇಳಿಸಿಕೊಳ್ಳಲು ಹೇಳುತ್ತಾರೆಯೇ?	ಹೌದು	ಇಲ್ಲ
15.	ನಿಮ್ಮ ಮನೆಯವರು ಅಥವಾ ಸ್ನೇಹಿತರು ನಿಮ್ಮ ಜೊತೆ ಮಾತನಾಡಲು ಕಸ್ಸ/ ಶ್ರಮ ಪಡುತ್ತಾರೆಯೇ?	ಹೌದು	ಇಲ್ಲ
16.	ನಿಮ್ಮ ಕಿವಿ ತೊಂದರೆ ಯಿಂದಾಗಿ ಬೇರೆಯವರು (ಕುಟುಂಬದವರನ್ನು ಹೊರತುಪಡಿಸಿ) ಜೊತೆ ನೀವು ಕಡಿಮೆ ಬೆರೆಯುತ್ತೀರಾ?	ಹೌದು	ಇಲ್ಲ
17.	ನಿಮ್ಮ ಕಿವಿ ತೊಂದರೆ ಯಿಂದಾಗಿ ನೀವು ಸಣ್ಣ ಪುಟ್ಟ ಮಾತುಗಳಿಂದ ದೂರ ಉಳಿಯುತ್ತೀರಾ ?	ಹೌದು	ಇಲ್ಲ
18.	ಕಿವಿ ತೊಂದರೆ ಬಂದಾಗಿನಿಂದ ನೀವು ಹೊಸ ವ್ಯಕ್ತಿಗಳ ಜೊತೆ ಬೆರೆಯಲು ಹಿಂಜರಿಯುತ್ತೀರಾ?	ಹೌದು	ಇಲ್ಲ
19.	ನೀವು ಈಗಲೂ ಮುಂಚಿನಷ್ಟೆ ಲವಲವಿಕೆಯಿಂದ ಹಾಗೂ ಮಾತುಕತೆಯಿಂದ ಕೂಡಿರುತ್ತೀರಾ?	ಹೌದು	ಇಲ್ಲ
20.	ಹಲವು ಜನರು ಮಾತನಾಡುತ್ತಿರುವ ಸಂದರ್ಭದಲ್ಲಿ ಇದ್ದಾಗ ಅವರ ಸಂಭಾಷಣೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳುವುದನ್ನು ಬಿಟ್ಟು ಬಿಡುತ್ತೀರಾ?	ಹೌದು	ಇಲ್ಲ
21.	ನೀವು ಸಂಭಾಷಣೆ ಮಾಡುವಾಗ ತಪ್ಪು ಮಾತನಾಡಬಹುದು ಎಂದು ಭಯದಿಂದ ಸುಮ್ಮನಿರುತ್ತೀರಾ?	ಹೌದು	ಇಲ್ಲ

22.	ನಿಮ್ಮ ಸ್ನೇಹಿತರು/ಕುಟುಂಬದವರು ನಿಮ್ಮ ಕಿವಿ ತೊಂದರೆಯ ಬಗ್ಗೆ ಅರ್ಥ ಮಾಡಿಕೊಂಡಿದ್ದಾರೆಯೇ?	ಹೌದು	ಇಲ್ಲ
23.	ನಿಮಗೆ ಕೆಲ ಶಬ್ದಗಳನ್ನು ಕೇಳಿಸುತ್ತಿಲ್ಲವೆಂದು ಅನ್ನಿಸುತ್ತದೆಯೇ? ಉದಾ: ಪಕ್ಷಿ ಚಿಲಿಪಿಲಿ, ಮಳೆಯ ಶಬ್ದ	ಹೌದು	ಇಲ್ಲ
24.	ಈ ಕೆಳಗಿನವುಗಳಲ್ಲಿ ಯಾವುದು ನಿಮ್ಮ ಕಿವಿ ತೊಂದರೆಯನ್ನು ವರ್ಣಿಸುತ್ತದೆ? a) ಗಂಭೀರವಾದ ತೊಂದರೆ ಏನಲ್ಲ b) ಗಂಭೀರವಾದ ತೊಂದರೆ ಆದರೆ ಅದರಿಂದ ಹೊರಬರಬಹುದು c) ತೊಂದರೆ ಹೊರೆಯಾಗಿದೆ	(a) (b) (c)	

ಸಾಮಾನ್ಯ ಅಭಿಪ್ರಾಯ

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ಧನ್ಯವಾದಗಳು

Appendix 2

Scales:

- 1) Social Impact of Hearing Loss (SIHL) Questions:
2,11,12,16,17,18,19,20,21.
- 2) Acceptance and Awareness of hearing loss(AAHL) Questions:
3,5,10,22,23,24.
- 3) Support From Others (SFO) Questions:6,13,15,15.
- 4) Hearing Aid Stigma & Emotional Impact of Hearing Loss(HAS&EIHL)
questions: 1,4,7,8,9.

	Response			Response	
	YES	NO		YES	NO
Question:			Question:		
1	2	0	13	2	0
2	0	2	14	2	0
3	2	0	15	2	0
4	1	0	16	2	0
2	0	2	17	1	0
6	2	0	18	2	0
7	2	0	19	0	1
8	2	0	20	2	0
9	2	0	21	1	0
10	2	0	22	0	2
11	0	2	23	2	0
12	0	1	24	a= 0 b=1 c=3	