SELF REPORTED HEARING AID OUTCOME MEASURES USING DISEASE SPECIFIC QUESTIONNAIRE IN HEARING IMPAIRED ADULTS

Ayas Muhammed, Kanaka, Rajashekhar Bellur

Department of Speech and Hearing, Manipal College of Allied Health Sciences Manipal University, Manipal, Karnataka

E-mail of Corresponding Author: ayas.kp@manipal.edu

ABSTRACT

Hearing impairment is one of the most frequent sensory deficits in human population, affecting more than 250 million people in the world. It affects the overall well being and cognition which results in depression and reduced quality of life (QOL).Hearing aids are used to rehabilitate these individuals and quantifying the results of a hearing aid fitting is often an overlooked aspect of the patient rehabilitation. Therefore self reported measures play a major role in assessing the outcomes in aural rehabilitation Objective: To assess the self reported hearing aid outcome using disease specific questionnaire, Abbreviated Profile of Hearing Aid Benefit (APHAB) in hearing impaired adults. Method: 15 subjects with age range of 18-60 years were participated in the study to compare the pre and post (two months) amplification changes with the hearing aid. The outcome of hearing aid fitting was evaluated using APHAB. Results: There were significant changes in hearing aid related aspects and its use. However, it is reported that more benefit with the hearing aid is seen when the device is worn at least for a period of one year. Conclusion: The use of self reported measures in routine clinical settings helps the clinician to select an appropriate amplification device and also provide a scientifically defensible way to measure the real-life success of the hearing aid fitting program and thereby improving their overall quality of life

Keywords: Hearing impairment, self reported measures QOL, APHAB.

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INTRODUCTION

Hearing impairment is one of the most frequent sensory deficits in human population, affecting more than 250 million people in the world [1]. According to the World Health Organization (WHO)*,* hearing impairment and deafness are serious disabilities that can impose a heavy social and economic burden on individual's families. Hearing loss can occur at any age; it has grave consequences on adults, as most of them are employed and will face problems in working situations. The extent of auditory disability again depends upon the degree, the type of loss and the pattern of auditory configuration. Myklebust [2] suggested that hearing loss between 45 and 65 dBHL clearly affects the social interaction and the background information. Mulrow, Aguilar, Endicott, Tuley, Velez, Charlip, et al. [3] reported that the hearing impairment will affect the overall well being and cognition which results in depression. Dalton, Cruickshanks, Klein, Klein,Wiley and Nondahl [4] stated that the hearing loss is associated with reduced quality of life (QOL), hearing handicap and self-reported communication difficulties in older adults.

To overcome such difficulties, auditory rehabilitation is necessary and it can be achieved through hearing aids. It may be true to a certain degree that hearing aid technology has provided a much better performance but, still are not the same as biological ears. Therefore theses individuals face difficulties with the hearing aid when they use it for first time [5]. Therefore, it is important to know how well an individual is getting benefited with the hearing aid and how it contributes to his / her daily life [6]. Quantifying the results of a hearing aid fitting is often an overlooked aspect of the patient rehabilitation. However, quantification helps the clinicians to precisely assess the subjective benefit, a patient perceives from amplification. Cox [7] reported that the patient based outcomes have become increasingly important in evaluating the overall effectiveness of the treatment. The outcome of audiological rehabilitation involving hearing aid fitting is typically evaluated with the use of self-reported measures using standardized questionnaires such as disease specific questionnaires. These measures may include assessment of satisfaction with hearing aids, benefits from hearing aids and also reduction in client's perceived handicap due to the fact that they are wearing hearing aid.

In the new era of consumer driven health care, the client's point of view is being increasingly accepted as a valid and important indicator in the success of treatment. Therefore in the long run, what the practitioner thinks may not matter very much if the client has a different opinion [8]. However until recently, these were given in informal discussions with non-professionals. Most of the professionals (Audiologists) often did not look at client's opinions [9] and they were not regarded as serious scientific data. Therefore, it is important to gather information from the patient's perspective regarding the hearing aid use or benefit.

Lack of published studies and research in hearing aid outcome measures in the Indian scenario has led to the present study. Mortensen [10] stated that the use of disease specific questionnaires, gives an overall understanding of QOL and hearing aid related information. Hence, in the present study, Abbreviated Profile of Hearing Aid Benefit (APHAB)[11], a disease specific questionnaire is administered on hearing aid users before and after two months of hearing aid use to assess the hearing aid benefit in order to understand the hearing impaired individuals as a whole.

MATERIALS AND METHODS

The study was carried out in the Department of Speech and Hearing, Manipal University. Fifteen participants were recruited for the study. A disease specific questionnaire-APHAB was administered before and two months after hearing aid fitting. All the subjects were explained about the potential importance and scientific benefit of reporting the data and consensus obtained.

Participants were selected based on following criteria. They should have bilateral moderate senosri-neural hearing loss with an age range between 18 years to 60 years. All the participants were fitted with digital hearing aid monaurally and most importantly a first time user. People with congenital hearing loss and with past history of hearing aid usage were excluded from the study. Age, gender and duration of loss are noted in order to avoid its influence on the outcome of the study.

APHAB is used to quantify everyday life problems associated with hearing impairment. It is a 24 item self-assessment inventory (*table-1)*.APHAB provides scores for 4 subscales. Each item contributes to only one subscale, and there are six items for each subscale, distributed randomly within the inventory. A higher APHAB score indicates more perceived difficulty in a particular situation and also certain items are written with a reversed logic (i.e., 'always' means fewer problems). This pattern is followed to maximize the validity and reliability of the data. Once the participants fulfil the selection criteria,

questionnaires will be administered immediately after being fitted with hearing aid and two month subsequently. Scoring is done on a percentile based on the questions *(table-2)*.Questionnaire is self-administered; however, if the client requires assistance, the questionnaire can be interview assisted. The pre and post hearing aid outcome measured using the questionnaire were entered separately in Statistical Package for Social Sciences (SPSS v:14) system and analyzed. Median and Inter quartile range for each domain is calculated. Comparison of baseline scores and the scores after hearing aid fitting was carried out by using Wilcoxon rank test and "p*" v*alue smaller than 0.05 is considered to be statistically significant.

RESULTS

The results of the current study are given under four domains. In ease of communication domain, there are six items pertaining to the daily situations. The pre median score obtained were 75% with interquartile range (IQR) from 50-87, which indicated that the subjects exhibited difficulties with communication more than 50% of the time. However, after the fitting of hearing aid, the post median scores were 50% with IQR of 25-75, indicating improvement. It is to be noted that the lesser post values indicates benefit with the use of hearing aid which was statistically significant at 0.05 level ('p' value=.00).Reverberation domain mainly assesses the communication in reverberant conditions such as classroom, dining room and other closed room situations. The obtained pre median scores for the six items were 75% with IQR ranging from 50-87 and post median scores of 50% with IQR from 50-75. Statistically significant scores were obtained at 0.05 levels ('p' value= 0.001).Background Noise domain mainly assesses the effective communication abilities in the presence of noise. Pre and post median scores were 50% with IQR ranging from 25-75 and no statistically significant changes observed at 0.05

level ('p' value =.78).In Aversiveness domain, it assess the unpleasantness of environmental sounds experienced during the usage of hearing aid. The pre median score obtained were 25% and the post median scores were 50%, which was statistically significant at .05 level ('p' value of .00).All the four domain results are given in *table-3*.

DISCUSSION

The present study focused on assessing the hearing related changes in fifteen adults (seven females & eight males) with hearing impairment before and after two months of hearing aid fitting. In the Ease of communication domain, all the subjects have reported that, after they got accustomed to the hearing aid and they hardly asked the speaker to repeat themselves in one to one conversation, mainly in quiet room situations. These changes indicate that with the appropriate amplification, participants were able to communicate better in the social context [7]. Two participants (female & male) did not show improvement for the questions such as "conversing with friends and other family members at home". They had faced difficulties in understanding speech earlier which resulted in avoidance of using hearing aid. On probing, it was found that they did not wear the aid regularly. It is reported that improvement in communication and sound quality can be achieved in people those who uses hearing aids regularly [12]. Mortenson [10] reported a similar result in ease of communication domain on a participant after the usage of hearing aid for two weeks. No relative benefit with hearing aid options and modifications were reported by any participant, however studies are reported that use of digital hearing aid can give better quality in speech perception thereby improving the communication status [13].

All the participants reported difficulty in reverberant conditions without the hearing aid which was improved with the use of hearing aid. However, in situations such as watching movies or television, all the participants expressed

difficulties, [13, 14]. Reverberation can cause significant changes in speech quality and can have a very negative impact on speech intelligibility as it affects the temporal and spectral cues [15]. Myers & Palmer [16] reported a case study in which the reverberant subscale scores improved after three months of hearing fitting. During the three months, 28% benefit was noted and by the end of twelve months, it was up to 39%. This indicates that better scores can be obtained after a long term use of hearing aid. Reverberation is present in most daily listening situations. Although moderate amounts of reverberation do not affect speech recognition performance in normal hearing listeners, reverberation has a detrimental effect on speech intelligibility in listeners with hearing impairment and elderly listeners [17].

In Background Noise, the participants reported that there is not much benefit with the hearing aid in the presence of noise. There were four participants who reported of more than 15% improvement in hearing in the presence of back ground noise, but faced difficulty when an air conditioner or fan was on. Adjustments and re – programming of hearing aid was done for six participants who reported of no significant benefit with the hearing aid. These difficulties in understanding speech of others when the fan was on could be attributed to their progressive nature of hearing loss and age [18]. It was also seen that before the fitting of hearing aid, the participants have rated the scores at the higher end, indicating a difficulty. Thus the reason for reduced benefit in this domain needs to be addressed in future for the selection of hearing aids and accommodate various features such as feedback cancellation and other noise reduction strategies, thereby improves the speech perception in various adverse conditions [19,20].

In aversiveness scale, higher the scores indicate that with the usage of hearing aid, the participants had negative influence on loud and unexpected sounds. Three participants reported that the unexpected sounds like vehicle horn, drilling sounds were intolerable when they wore the hearing aid. Due to these difficulties, they tend to switch off the hearing aid in an outside environment and only use it during communication needs. This avoidance in using the hearing aid can cause adjustment difficulties and can affect the overall outcome of hearing aid usage [21]. It is reported [16] that the continuous usage of hearing aid can reduce the difficulties in loud sounds over a one year period. Also by adjusting the gain at higher frequencies, may reduce the discomfort and makes it suitable for the client to use the hearing aid [10].

Therefore From the present study, it can be inferred that, there was a perceived benefit reported with the usage of hearing aid in terms of ease of communication and reverberant conditions. However, no improvement was seen with the hearing aid in the presence of background noise and participants still reported of increased unpleasantness for loud sound on aversiveness scale. This may be due to the limitations in technology incorporated in the hearing aids. There are also other factors which may contribute for the perceived benefit such as the duration, motivation and selection of appropriate hearing aid based on the client's need [22,5]. It is also necessary to keep in mind that immediate improvement in all domains is not to be expected after fitting the hearing aid [9]. Thus by administering the disease specific questionnaires clinician can assess the perceived benefit from amplification. Disease specific questionnaires will give a quantitative data with respect to the benefit of the hearing aid as well as modification requires for the selection of amplification devices. Whereas on the other hand, hearing aid has helped these individuals to perform better in their daily life, there by seen an improvement in overall QOL [23].

To conclude, hearing aid is a well accepted device in the aural rehabilitation of the hearing impaired individuals. Literature has supported the need for

self reported outcome measures for the hearing aid users to quantify the hearing related benefit and overall improvement in quality of life. Though, results of this study cannot be generalized owing to the limited participants, however, it can be clinically implied to use the self reported measure in routine clinical settings to help the clinician in selecting appropriate amplification, monitoring QOL, client satisfaction and thus improving the client – clinician relationship. Further, it can provide a scientifically defensible way to measure the real-life success of the hearing aid fitting program, satisfaction and thereby improving their overall quality of life.

ACKNOWLEDGEMENT

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Table-1: 24 questions in APHAB (Cox,1995)

1	When I am in a crowded grocery store, talking with the cashier, I can follow the conversation.	13	The sounds of running water, such as a toilet or shower, are uncomfortably loud.
2	I miss a lot of information when I'm listening to a lecture.	14	When a speaker is addressing a small group, and everyone is listening quietly, I have to strain to understand.
3	Unexpected sounds, like a smoke detector or alarm bell are uncomfortable.	15	When I'm in a quiet conversation with my doctor in an examination room, it is hard to follow the conversation.
4	I have difficulty hearing a conversation when I'm with one of my family at home	16	I can understand conversations even when several people are talking.
5	I have trouble understanding the dialogue in a movie or at the theater.	17	The sounds of construction work are uncomfortably loud.
6	When I am listening to the news on the car radio, and family members are talking, I have trouble hearing the news.	18	It's hard for me to understand what is being said at lectures or church services
7	When I'm at the dinner table with several people, and am trying to have a conversation with one person, understanding speech is difficult.	19	I can communicate with others when we are in a crowd.
8	Traffic noises are too loud.	20	The sound of a fire engine siren close by is so loud that I need to cover my ears.
9	When I am talking with someone across a large empty room, I understand the words.	21	I can follow the words of a sermon when listening to a religious service.
10	When I am in a small office, interviewing or answering questions, I have difficulty following the conversation.	22	The sound of screeching tires is uncomfortably loud.
11	When I am in a theater watching a movie or	23	I have to ask people to repeat themselves

	play, and the people around me are whispering and rustling paper wrappers, I can still make out the dialogue.	in one-on-one conversation in a quiet room.
12	When I am having a quiet conversation with a friend, I have difficulty understanding.	24	I have trouble understanding others when an air conditioner or fan is on.

Table-2: Scoring in APHAB

	Response	Not a reversed item	Reversed item
A	Always	99%	1%
B	Almost always	87%	12%
C	Generally	75%	25%
D	Half the time	50%	50%
E	Occasionally	25%	75%
F	Seldom	12%	87%
G	Never	1%	99%

Table-3: Results of all four domains in APHAB

	Domain	Pre Median (%) &(IQR)	Post Median (%) (IQR)	Significant Level P value.05
1	Ease of communication	75(50-87)	50(50-75)	.000
2	Reverberation	75 (50- 87)	50(50-75)	001
3	Background Noise	50 (25-75)	50(25-75)	.785
4	Aversiveness	25 (12-50)	50 (50-75)	.000