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Anant Arun
Senior Audiologist, Aanvii
Hearing Solutions Pvt. Ltd,
Mumbai, Maharashtra, India

Vijay Dahiya
Clinic manager, Jaipur
Hearing Solutions, Mumbai,
Maharashtra, India

Development and standardization of self-satisfaction rating scale for individuals using hearing aid

Anant Arun and Vijay Dahiya

Abstract

Hearing loss is the most common sensory deficit in elderly patients. Self-assessment questionnaires for listeners with hearing impairments have been developed by a number of contemporary researchers. Their products are widely used in the audiology clinical setting for patients with hearing loss and related dysfunctions. However, the current questionnaires have limitations, especially when applied to the elderly.

Need for the study: In the Indian market, there are no readily available satisfaction rating materials for providing elderly people with evidence-based information during hearing aid fitting on Indian population.

Aims and objectives: The present study aimed on the development of a self-satisfaction rating scale for individuals using hearing Aid, which is evidence based and can be easily maintained.

Methodology: The present study is complete in the following steps: 1. Preparation of questionnaire 2. Reviewed by 10 audiologists. 3. Familiarity Linearity Rating was done. 4. The validity of the questionnaire was tested quantitatively through Cronbach's alpha method. 5. The questionnaire was divided into 6 Domains and 2 Sub-domains 6. After the development the field testing was done on 100 patients who age is 40 years and above.

Results and discussion: The results have been discussed under the heading off the aforementioned objectives. The first objective of the study was to develop a questionnaire and assess the internal consistency of the same using Cronbach's alpha. The results showed internal consistency using Cronbach's alpha with a value of >0.7 . The second objective was to find out how efficiently the person is able to self-analysis they're hearing according to perception ability. To check the feasibility & perception of individual 6 domains which consist of cost-set of questions are given in which participants has to rate their hearing according to their perception.

Conclusion: The above study showed that hearing aid users are efficient to rate them self on the basis of questionnaire The procedure was followed having each follow up to keep a record that the individual is satisfied with the hearing aid. This scale will help us to provide better service and to follow up with the client to understand that what changes are needed to be done for the client for better and improved services.

Keywords: hearing loss, satisfaction scale, audiology

Introduction

Hearing loss is the most common sensory deficit in elderly patients ^[1]. It may be the result of changes in auditory processing caused by aging i.e., peripheral system, a decline in cognitive processing of speech caused by aging i.e., central system, or both.

The WHO estimates that unaddressed HL costs countries an estimated \$750-790 billion annually in direct health costs and loss of productivity ^[2]. The Global Burden of Disease study estimated that the prevalence of HL rose from 1.2 billion (17.2%) in 2008 to 1.4 billion (18.7%) in 2017 ^[3]. The WHO ranked HL as the third most common cause of years lost due to disability, contributing over 39.5 million years of healthy life lost, an increase from 27 million in 2000 ^[4].

India has a 6.3% incidence of DHL in 1997, according to the WHO ^[5]. From 76.5 million in 2008 to 100 million in 2018, it rose. By 2018, the South Asia region-which includes Afghanistan, Bangladesh, Bhutan, India, Nepal, and Pakistan-had contributed 28.2% of the world's DHL burden, up from 27% in 2012. DHL affects 7.37% of the population in this region, including 2.4% of all children, compared to 4.57% and 0.5% in high-income nations. According to the 2002 National Sample Survey (NSS), 291 out of every 100,000 people examined had HL, the majority of which was deep (32%) and severe (39%).

Correspondence
Anant Arun
Senior Audiologist, Aanvii
Hearing Solutions Pvt. Ltd,
Mumbai, Maharashtra, India

HL was also the leading cause of sensory deficiency [6]. According to the 2011 Indian Census, 2.21% of Indians have a handicap of some kind. Locomotor (20%), vision (19%), and hearing (19%) were the three most prevalent [7]. Hearing disability was described as having trouble hearing daily conversational speech in the 75th National Sample Survey (NSS) (2017-2018) report, although unilateral hearing impairment was not included. According to estimates, 0.3% of people have hearing impairment. Only loud noises or total hearing loss were reported by 49.8% of them [8].

Self-assessment questionnaires for listeners with hearing impairments have been developed by a number of contemporary researchers. Their products are widely used in the audiology clinical setting for patients with hearing loss and related dysfunctions. However, the current questionnaires have limitations, especially when applied to the elderly. First, the majority of the questionnaires were created for all adults with hearing impairment caused by noise, ototoxic drugs, or injury, not just those with age-related hearing loss. The Client-Oriented Scale of Improvement (COSI) [22], for instance, is a valid self-reporting questionnaire that asks the hearing-impaired patient to name five listening situations in which they have difficulty [17]. Although COSI is an open-set format, it asks the patient to name five listening conditions. Clinicians use this information in counselling and creating a rehabilitation plan. As a result, older adults may struggle more with this kind of question and require more time than other adults with hearing loss. The Abbreviated Profile of Hearing Aid Performance (APHAP) [9], one of the most widely used questionnaires, is useful for quantifying the degree of difficulty caused by hearing loss in adult patients. However, it does not take into account specific age-related hearing loss characteristics like hearing difficulty with fast-rate speech and working memory capacity. Second, a significant portion of the self-reporting questionnaires concentrate on assessing how well a person uses a hearing aid in a variety of listening situations. For instance, there are only seven items on the International Outcome Inventory for Hearing Aids (IOI-HA) [10], which has been translated into 24 languages and is used worldwide. These items assess whether or not people with hearing impairments improve their ability to hear after wearing hearing aids on a daily basis. Additionally, hearing aid users frequently use the Speech Spatial and Quality of Hearing Scale (SSQ) [11], Profile of Hearing Aid Benefits (PHAB), and Satisfaction with Amplification in Daily Life (SADL) [12]. However, those self-assessment questionnaires are not applicable to elderly individuals who do not use hearing aids but have a suspicion of having hearing loss. Thirdly, the current generation of elderly questionnaires primarily examine the negative effects of hearing loss on emotional and social issues. Representative of the questionnaires for elderly patients with hearing impairment are the Korean Evaluation Scale for Hearing Handicap (KESHH) and the Hearing Handicap Inventory for the Elderly (HHIE). However, they concentrate on a person's physical condition, personal characteristics, and the psychological, social, and emotional issues brought on by hearing loss. As a result, rather than providing a straightforward assessment of hearing loss, these scores offer a comprehensive and complex index. In conclusion, none of these questionnaires specifically mentions the degree to which presbycusis itself is related to

hearing loss. In this regard, the current study's objective was to develop and standardize a hearing screening tool for elderly people who want to assess their own hearing loss using hearing aids. The outcomes will give an important self-evaluation poll, yielding open doors for prior clinical mediations and better treatment choices.

Need For the Study

In the Indian market, there are no readily available satisfaction rating materials for providing elderly people with evidence-based information during hearing aid fitting on Indian population. However, anyone who is interested can purchase English-language materials from a variety of commercial sources. We ought to have at least a few scales for patient satisfaction in Indian languages for patients over 40 years old by now, given that our profession is approximately 60 years old and India is a multilingual country. However, a comprehensive market analysis will reveal that, despite the availability of some self-developed resources, audiologists in India still struggle with evidence-based practice due to a lack of specialized resources for Indian languages. As a result, the creation of such a scale is desperately needed in the Indian context.

Aims and objectives

The present study aimed on the development of a self-satisfaction rating scale for individuals using hearing Aid, which is evidence based and can be easily maintained.

Methodology

Questionnaire: Preparation of questionnaire Aspects related to Self-Satisfaction Rating Scale for Individuals Using Hearing Aid_While keeping these in mind, statements for the questionnaires were formed through patient feedbacks. This questionnaire was developed in English (APPENDIX-I), which was reviewed by 20 audiologists to make sure that the language of the questions remains relevant according to the client to understand their perception level.

Familiarity Linearity Rating was done through the 20 audiologists, who is working in hearing aid dispensing industry from last 5 years and 20 Normal Hearing person who are fluent in Hindi and Indian English language and they are proficient and their native language should be Indian English and Hindi. A sample questionnaire was administered first while considering the patient reviews on the same.

The judges were requested to change the questions they thought were irrelevant or to add their thoughts to the questions they were given. After receiving the items and objectives from the 40 judges (20 audiologists, 10 Indian Hindi Speaker, 10 Indian English Speaker), 6 words were selected for each section for the development of the scale following their validation. For the purpose of developing the Rating Scale, the words with ratings of Most Relevant and Very Useful (4) and Most Appropriate and Useful (3) were retained. The words that received ratings between zero and two were removed from the scale and omitted from the Rating Scale. Finally, a final questionnaire was drafted and administered.

The validity of the questionnaire was tested quantitatively through Cronbach's alpha method. Questionnaire (APPENDIX-I), was made in different domains to self-administration rating scale for hearing aid users at the time

of fitting or reprogramming. The questionnaire was divided into Own Voice, Speech Understanding At Home, Speech Understanding At Noisy Situation, Speech Understanding At Group Conversation, Environmental Sound, and Background.

Noise/Sound and further it was subdivided into on the basis of understanding and quality of voice/sound the individual is perceiving. This questionnaire was developed to check the perception level quality of noise and loudness according to their perception level. After the development the field testing was done on 100 patients whose age is 40 years and above.

The following points are the Inclusive criteria of patients:

- Having Sensor neural Hearing loss, whether it is unilateral or Bilateral
- No Cognitive decline
- No any medical problem.
- Date of Birth should be above 1st January 1980.
- No any Neurological condition
- No any trauma or conductive component

At the time of Review and Familiarity Linearity Rating the

Audiologists, Hindi and English speakers were provided with the following:

- A covering letter of the researcher
- Bio-data of the researcher
- A copy of the drafted items/objectives The covering letter focused on the following:
- Introduction of the present researcher
- Topic of the research and its objectives
- Explanation of their role in validation

Reliability of studies were performed to evaluate the consistency of self-rating measures relevant to knowledge, confidence, and frequency of adopting approaches at the time of fitting or reprogramming. The confidence scale included 6 domains (=0.86), the understanding scale had 3 levels (=0.6), and the quality scale had 4 levels (=0.88). While 6 domains exhibited adequate internal consistency, knowledge and confidence scales consistency. Additionally, the measures exhibited strong face validity

Results and Discussion

Table 1: The results of familiarity linearity rating of audiologist

S. No	Parameters	Not Relevant (1)	Not Appropriate/need to be change (2)	Most Appropriate and Useful (3)	Most Relevant and Very Useful (4)
1.	Simplicity	0	0	0	4
2.	Familiarity	0	0	0	4
3.	Arrangement	0	0	3	0
4.	Relevancy	0	0	0	4
5.	Feasibility	0	0	3	0
6.	Scoring Pattern	0	0	0	4

Table 2: The results of familiarity linearity rating of speakers

S. No	Parameters	Not Relevant (1)	Not Appropriate/need to be change (2)	Most Appropriate and Useful (3)	Most Relevant and Very Useful (4)
1.	Simplicity	0	0	0	4
2.	Familiarity	0	0	3	0
3.	Arrangement	0	0	3	0
4.	Relevancy	0	0	0	4
5.	Feasibility	0	0	3	0
6.	Scoring Pattern	0	0	0	4

The results were analysed and have been discussed below. The results have been discussed under the heading off the aforementioned objectives.

The first objective of the study was to develop a questionnaire and assess the internal consistency of the same using Cronbach’s alpha. The results showed internal consistency using Cronbach’s alpha with a value of >0.7. This shows that the questionnaire has a good internal consistency validating the requirement that the questions are interrelated.

The second objective was to find out how efficiently the person is able to self-analysis they’re hearing according to perception ability. To check the feasibility & perception of

individual 6 Domains which consist of cost-set of questions are given in which participants has to rate their hearing according to their perception.

Total 3 attempts were taken at the time of fitting or reprogramming; the patient was rating about how much they are satisfied. In the first attempt during the fitting the patients was satisfied less than 50% in across all the domains while in the second attempt after the fine tuning, the patients were satisfied more than 75% while in third and final attempt of fine tuning, the patient was satisfied more than 98%. The Figure 1 compares the score of the patients and Table 1 indicates the Scores of the patients in attempted trail.

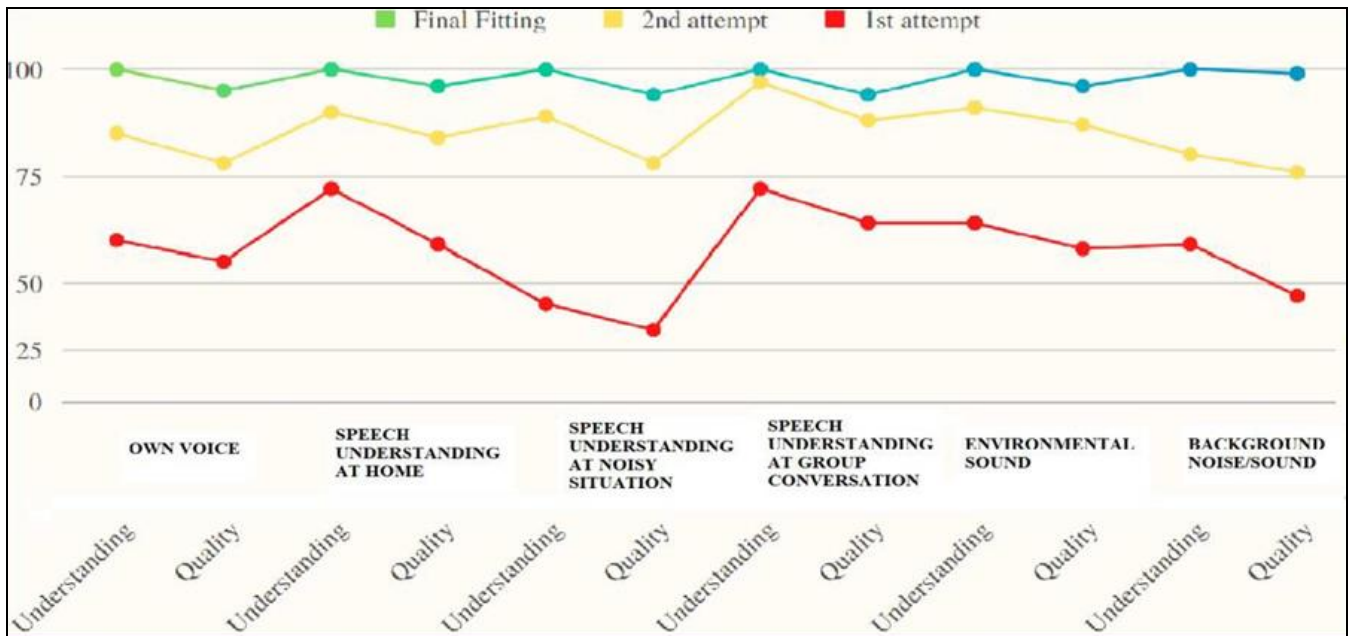


Fig 1: compares the score of the patients in attempted trail

Table 1: Indicates the Scores of the patients in attempted trail

Domain	Sub domain	1 st Attempt	Trail 2 nd Attempt	3 rd Attempt
Own voice	Understanding	60	85	100
	Quality	55	78	95
Speech understanding at home	Understanding	72	90	100
	Quality	59	84	96
Speech understanding at noisy situation	Understanding	45	89	100
	Quality	39	78	94
Speech understanding at group conversation understanding	Understanding	72	97	100
	Quality	64	88	94
Environmental sound	Understanding	64	91	100
	Quality	58	87	96
Background noise/sound	Understanding	59	80	100
	Quality	47	76	99

The very first domain was “own voice” in this on the basis of loudness and quality hearing aid users responses gathered showed that 100% appropriate working according to understanding for own voice was present & in quality 95% participants responded it was appropriate which means quality of loudness was pleasant & participants responded negativity 5% they found the quality was unnatural fine tuning was need to.

When hearing aid users were interviewed, questions directed toward “speech understanding at home, speech understanding at noisy situation, speech understanding at group conversation” speech perception ability on the basis of understanding is 100% appropriate, while 96% in Speech Understanding At Home, 94% in Speech Understanding at Noisy Situation and 94% in Speech understanding at Group conversation, individual responded for “Normal” which indicated that the quality of the speech, speech clarity, better perception ability are good enough through hearing aid after final fitting.

The Environmental sound domain individual were this on the basis of understanding and quality hearing aid user’s responses gathered showed that 100% appropriate understanding & in quality 96% participants responded the quality of environmental sound they are perceiving was normal as compare to normal hearing, 4% perceived it that it was no natural, so, they need fine tuning in their hearing aid.

Similar responses were gathered for the different domain in Background noise/sound in which according to participants understanding 99% responded for appropriate but 1% feel they need fine tuning to increase their loudness for better hearing when the participants were asked about the quality of noise and sound, they responded that they perceive it appropriate they don’t feel to change and fine tune the hearing aid they were satisfied with the hearing aid.

Satisfaction rating scale helped audiologist to fit or reprogram hearing aid in a better way; the responses of the patients are the evidence based and it helps audiologist in multiple ways like: To understand what exactly patient want. To understand the current status of the patient, it helps audiologist to improve their service and many more.

Summary and Conclusion

the above study showed that hearing aid users are efficient to rate them self on the basis of questionnaire in which on the basis of perception and there hearing ability they are asked with few questions and they have responded according, response were in the favor that the participants were satisfied with the hearing aid in different domains, in environmental sound they feel lie then have appropriate hearing as normal and they are able to hear the sound appropriately & on the basis of quality, their quality of sound was normal they do not feel like having any fine tuning in their hearing aid. The procedure was followed

having each follow up to keep a record that the individual is satisfied with the hearing aid. Though this questionnaire we can target population to check the benefits they are benefited with the hearing aid that will help us to provide better service and to follow up with the client to understand that what changes are needed to be done for the client for better and improved services.

Limitations of the Study

- The number of participants taken are less.
- Currently developed in only Hindi and English language.
- Participants are mixed

Further Recommendations

- Should develop in different Indian languages.
- Efficacy study across a larger sample size.
- Converting into an app-based module, so that technology can be used to cater affordable facilities to professionals, caregivers as well as patients.
- Specific participants like First time user and old users.

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Appendix 1: Development and Standardization of Self Satisfaction Rating Scale for Individuals Using Hearing Aid

Developed By-Anant Arun				
Own Voice				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural
Speech understanding at home				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural
Speech understanding at noisy situation				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural
Speech understanding at group conversation				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural
Environmental sound				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural
Background noise/sound				
	1	2	3	
Understanding	Fully Understanding	Partial Understanding	Not understanding	
	1	2	3	4
Quality	Normal	Dull	Occluded	Unnatural

Interpretation

