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ORIGINAL ARTICLE

Development and Standardization of Hearing Handicap Inventory for Adult (Screening Version) in Nepali Language

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Abstract Hearing handicap inventory for adult- screening version (HHIA-S) is one of the widely used questionnaire for assessing hearing handicap among adult population over the short period of time. This questionnaire has been translated in many languages worldwide including Indian, Sweden, and Spanish. However, there is lack of such questionnaire in Nepali language. Hence, this study is aimed at developing and standardizing the HHIA-S questionnaire in Nepali language. The English version of the HHIA-S was translated to the Nepali language using the translation-back-translation method. Further, it was given to 10 native Nepali speakers for content validation. The final HHIA-S Nepali version was then administered to 70 normal native Nepali speakers and 50 hearing impaired Nepali speaker. The responses were analyzed, and Cronbach's alpha was calculated to measure the internal consistency of the questionnaire. Results showed that the HHIA-S Nepali version has a Cronbach's alpha score of 0.94 for normal hearing group and 0.93 for hearing impaired group, which is considered good reliability. The HHIA-S Nepali version developed in this study is found to be valid and reliable. Hence, it can be used as a screening tool for assessing hearing handicap among Nepali population.

Keywords Hearing Handicap · Questionnaire · Nepali · Screening · Adult

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Introduction

Language is the major form of communication. It has a key role in establishing social relationships in day-to-day activities of an individual. Inability to communicate effectively can have adverse effect in quality of life of an individual. Individual with hearing impairment faces difficulties in day-to-day communication. Hearing handicap is the measure of impact of hearing impairment in individual's everyday situations [1].

There are only few kinds of questionnaire for assessing the impact of hearing impairment on the quality of life. Hearing handicap inventory for adult/Screening version [2] is one of the self-reported outcome questionnaire for adults that assesses the impact of hearing loss on a patient's social, emotional, and psychosocial well-being in a short period of time It can be utilized in a variety of therapeutic circumstances, including auditory screening, first interviews, advice, qualification, and evaluation, as well as individual use and satisfaction with sound amplification equipment and evaluation of the efficacy of auditory rehabilitation programs [3]. Hearing handicap inventory for elderly screening version (HHIE-S) was developed mainly for elderly population above 60 years old [4] and HHIA/S is the revised and adapted form of HHIE-S which is developed mainly for young hearing-impaired adult population. HHIA-S consists of ten questionnaires using three-point Likert scales, with five items for emotional subscales and five items for social subscales. The maximum overall score of the HHIA/S is 40, where a high score indicates a high psychosocial disability described by patients caused by the hearing loss[5].

In the field of activity limitation and participation restriction, the HHIA/S is utilized to evaluate intervention results. Activity limitation is defined as the result of

functional performance impairment, or the inability to do a specific task or action. Participation restriction (handicap) refers to a person's ability to participate in everyday activities and indicates how they have adapted to their surroundings as a result of their hearing loss and handicap[6]. HHIA/S is rapidly applied and easily understood, and the HHIA-S questionnaire is recommended by the American Speech-Language-Hearing Association (ASHA) as an auditory screening tool [7]. Stewart and cooperators researched the validity of the HHIA-S questionnaires with respect to the perception of hearing loss in the adults and demonstrated that the questionnaires are highly sensitive and specific in the detection of hearing loss in this population[7].

HHIA has been translated into different languages like Spanish [8], Brazilian Portuguese language[9]. However, there are very few translations of screening version of HHIA[8, 9]. Literature shows a good reliability among the various version of questionnaires. In a study done in Japanese language, HHIA/S showed kappa coefficient of 0.842 which suggest excellent test–retest reliability[10].

The availability of self-reported questionnaires is rare in Nepali context. Since developing language-specific questionnaires is time-consuming and demands a lot of effort, translating standardized questionnaires to the local languages is very practical[10, 11]. Despite Nepal being multilingual country with multicultural background, there is lack of such studies and questionnaires in Nepali language. As literacy rate of Nepal is less, population who can read and write English is very less with majority depending on the native languages for communication. Hence, administration of any English questionnaire becomes difficult and time consuming with a possibility of getting less reliable results. Further, it is also difficult for investigators to make live translation of the questionnaire to the patient every time which could be highly influenced by researcher's language proficiency. So, there is a need to develop and standardize the HHIA/S in Nepali language.

Materials and Methods

English version of HHIA/S developed by Newman et.al [2] consists of ten questionnaires and can be administered within short period of time. All the ten questions are close ended having three options i.e. yes, no and sometimes with the rating of four, zero and two respectively. The total score obtained can be used to categorize degree of handicap [4] as shown in Table 1.

Development of Questionnaire

The English version questionnaire was translated to Nepali language using translation-back-translation method. The questionnaire was translated into the Nepali language by a Nepali linguistic professor. The translated questionnaire was back-translated into the original language (English) by an English professor. Both the translators were native speakers of the Nepali language. The experimenter compared the two translated versions of each questionnaire. Questions that were easily understood and had colloquially used words were selected and a single questionnaire was made for both HHIA/S. Certain words such as hotel, radio, TV etc., were retained in English as these words are often used in Nepali. The translated questionnaire was given to ten native Nepali speakers who had Nepali as their first language for content validity. The speakers were asked to rate the questions on a five-point rating scale where one being very familiar and five being not at all familiar. All the questions which were rated as one or two were considered for the Nepali version of HHIA/S. All the questions which were rated as three or above were reframed and tested again for content validity. All the questions which were considered for the final version of Nepali HHIA/S were rated as one or two by all the Nepali speakers (Provided as supplementary material).

Participants and Procedure

The developed Nepali version of HHI/S was administered among two group of participants to check the internal validity and reliability. All the participants were explained about the aim and objectives of the study. Participants were also given clear instruction regarding scoring procedure and were made to realize how important their honest answer are.

For the control group of normal hearing participants (Group 1), data collection was carried out through online survey mode in the age range of 20 to 40 years.The final Nepali version of the HHIA-S questionnaire was prepared in the e-survey in the form of google forms and distributed through various social platforms by the researchers through convenient sampling.

For the pathological group of hearing-impaired participants (Group 2), data collection was carried out in the tertiary care center by the experienced audiologist. Demographic details including age, gender, education level, and profession was collected from all the participants. A brief case history was taken to account for hearing loss and other ear related problems like tinnitus, vertigo etc. which was followed by general examination of ear, nose and throat when indicated. The severity of hearing loss was assessed based on pure tone audiometry findings.

Table 1 Handicap interpretations for raw scores on the hearing handicap inventory for adult screening version (HHIA-S)

Total score obtained	Degree of handicap
0–9	Normal/No handicap
10–25	Mild-moderate handicap
26–40	Severe handicap

Bone conduction threshold of greater than 25 dB is taken as criteria for sensorineural hearing loss on pure tone Audiometry. Nepali version HHIA/S questionnaires were administered in a sound-treated room through a face-to-face interview. Individuals with conductive, and mixed types of hearing loss and individual having other health related associated problems were excluded from the study. Each question was read out by the experimenter and the clients were instructed to indicate, Yes "No" or "Sometimes" for each of the question. A score of four, zero and two was given to the response "Yes", "No" and "Sometimes" respectively. A total score was obtained by summing up the score of social and emotional domain. All the participants in the both groups were literate with the minimum qualification of secondary school level education (SSLC).

Statistical Analyses

All the response of the questionnaire was analyzed by investigator and converted into numerical form using Microsoft excel. Obtained data were analyzed by using statistical package of social science (SPSS Version 25) software. Descriptive statistical procedures such as frequency and percentages were measured based on the type of questions being addressed. Kaiser–Meyer–Olkin measure of sampling adequacy was calculated to see proportion of variance in each variable and usefulness of factor analysis in the data. Also, Bartlett's test of sphericity was done to see relations among the variables and to make decision about usefulness of factor analyses with the data. Exploratory factor analysis was done using principal component extraction method. The communalities of each item were assessed to see the amount of variance in each variable. The reliability of the HHIA-S was established through comparison Cronbach's alpha value and the intraclass correlation coefficient (ICC) for both normal and hearing-impaired group.

Ethical Considerations

In the present study, all the testing procedures were carried out using non-invasive techniques, adhering to the guidelines of the Ethics Approval Committee of the institute. All the procedures were explained to the participants, and informed consent was taken from all the study participants.

Results

For the control group (Group 1), 70 normal hearing participants within the age range of 20–40 years (Mean age = 25.11 years, standard deviation = 4.44 years) responded to the survey. Among 70 participants, 37 (52.86%) were male and 33 (47.14%) were female. Based on the analysis, it was found that HHIA-S score for the control group varied from 0–14 with the average score of 2.22.

For the pathological group (Group 2), data was collected from 50 bilateral sensorineural hearing-impaired participants within age range of 20–40 years [Mean age = 32.6 years standard deviation = 7.75 years].Out of 50 participants, 26 (52%) were male and 24 (48%) were female. Result showed that, the most participants, 24 (48%) in left ear and 28 (56%) in Right ear had mild degree of hearing loss. The details about degree of hearing loss of all the participants is shown in Table 2.

The score of the HHIA-S for the pathological group varied from 2–38 with the average score of 18.88 and standard deviation of 12.00. After data analyses, it was found that, 13 (26%) of participants reported no-handicap, 19 (38%) of participants reported mild-moderate handicap and 18 (36%) participants reported severe handicap as shown in Fig. 1.

A principal component analysis was used to conduct exploratory factor analyses for the both groups. The factor loading requirements were set to 0.5 as the minimum [12]. To ensure an appropriate degree of explanations, the communality of the scale, which reflects the amount of variance in each dimension, was also analyzed. All the items in both group had communalities above the recommended value of 0.50 [13].

Bartlett's test of sphericity, which provides a measure of the statistical probability that the correlation matrix contains significant correlations among some of its components, was used to quantify the overall importance of the correlation matrix. The results were significant, with a $\chi 2 = 607.78$ ($p < 0.01$) for the normal group and a $\chi 2 = 333.08$ ($p < 0.01$) for the hearing-impaired group indicating that data is suitable for factor analysis. The Kaiser-Mayer-Olkin sample adequacy value, which reflects the data's suitability for factor analysis, was 0.91 for normal hearing group and 0.89 for hearing impaired group which is above the recommended value of 0.6 [13]. Finally, the factor solution derived from the analysis yielded single

Table 2 Percentage of participants with different degree of hearing loss in Right ear and left ear (Hearing impaired group, N = 50)

Right Ear	Left ear
Mild: 28 (56%)	Mild: 24 (48%)
Moderate: 10 (20%)	Moderate: 12 (24%)
Moderately severe: 0 (0%)	Moderately severe: 3 (6%)
Severe: 4 (8%)	Severe: 6 (12%)
Profound: 8 (16%)	Profound: 0 (0%)
Total (N) = 50	Total (N) = 50

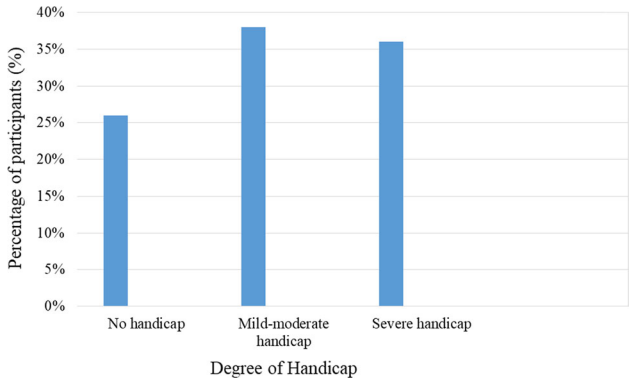

Fig. 1 Percentage of participants with different degree of handicap

factors for the scale in both group, which accounted for the 66.97% of the variation in the data for the normal hearing group and 63.82% for the hearing-impaired group. All the ten items were loaded into single factor for both group with factor loading of more than 0.5 which is above the recommended value [12]. The final results of the exploratory factor analysis for the 10 items are shown in Table 3.

A Cronbach's alpha score was calculated for both group data to see the reliability and internal consistency. The global Cronbach alpha value as found to be 0.94 for normal control group and 0.93 for hearing impaired group when all 10 items of the questionnaire were used for the analyses. The details about the Cronbach's alpha value of all the questionnaire is shown in Table 4.

The result of the corrected item-total correlation, which is used to express the coherence between an item and the other items in the test, is illustrated in Table 5. For the normal hearing group, a higher total-items correlation (0.89) was seen for item 10 and a lower items correlation (0.59) was seen for item 1. Similarly, for the hearing-impaired group data, the highest total-items correlation (0.84) was seen for item 2 and the lower items correlation (0.57) was seen for item 7. The test–retest reliability was found to be good with the intraclass correlation coefficient of (ICC) of 0.94 for the normal hearing group and 0.93 for the hearing-impaired group.

Table 3 Result of factor analyses for both normal hearing group and hearing impaired group

Normal hearing group (N = 70)		Hearing impaired group (N = 50)	
Components	Factor loading	Components	Factor loading
S-5	0.92	E-2	0.88
S-10	0.91	S-5	0.86
S-8	0.88	E-4	0.85
E-4	0.87	S-10	0.83
S-6	0.86	S-3	0.82
E-9	0.84	E-9	0.82
E-2	0.78	E-1	0.80
S-3	0.72	S-6	0.75
E-7	0.71	S-8	0.73
E-1	0.68	E-7	0.63

Table 4 Cronbach alpha value of all the 10 items of the questionnaire for both normal hearing group and hearing impaired group

Normal hearing group (N = 70)		Hearing impaired group (N = 50)	
	Cronbach's alpha if item deleted		Cronbach's alpha if item deleted
E-1	0.94	E-1	0.93
E-2	0.94	E-2	0.92
S-3	0.94	S-3	0.93
E-4	0.93	E-4	0.92
S-5	0.92	S-5	0.92
S-6	0.93	S-6	0.93
E-7	0.94	E-7	0.93
S-8	0.93	S-8	0.93
E-9	0.93	E-9	0.93
S-10	0.93	S-10	0.92

Disscussion

Hearing loss is a condition where a person suffering from it has difficulty perceiving the sound from the environment. World Health Organization (WHO) states that loss of more than 25 dB is considered to be hearing loss and any loss more than that of 40 dB is in itself disabling. The virtue of hearing loss is in a rising trend and is believed to be reached to 10% of world's population by the year 2050[14, 15].Currently, around 16.67% (2.21 million) of total Nepalese population is estimated to have some sort of hearing impairment[16].Number of questionnaires have been developed to assess quality of life of individuals with hearing impairment and around 139 such questionnaires have been reported[17].

Table 5 Corrected items-total correlation for all the 10 items of the Questionnaire for both normal hearing group and hearing impaired group

Normal group (N = 70)		Hearing impaired group (N = 50)	
	Corrected item-total correlation		Corrected item- total correlation
E-1	0.59	E-1	0.74
E-2	0.72	E-2	0.84
S-3	0.66	S-3	0.71
E-4	0.82	E-4	0.81
S-5	0.88	S-5	0.81
S-6	0.81	S-6	0.69
E-7	0.64	E-7	0.57
S-8	0.84	S-8	0.65
E-9	0.80	E-9	0.76
S-10	0.89	S-10	0.77

Hearing handicap inventory for adult screening version (HHIA-S) is the most commonly used questionnaire to evaluate hearing handicap within short period of time. The main aim of this study is to develop quick and reliable questionnaire in Nepali language as there is lack of such questionnaire in native Nepali language. The current questionnaire is intended to assess and address quality of life of an individual with hearing impairment as hearing impairment has direct impact on everyday communication[18].

Hearing loss is hidden disabling condition and it can silently make the person disable in social and emotional aspect. This study is intended to provide a quick, standard and reliable questionnaire to assess hearing handicap in Nepali speaking population. In this study, we found that Nepali HHIA-S have good internal consistency and reliability similar to the result of the studies from other language like Kannada[19], Hindi[15], etc. Our result showed Cronbach's alpha value of 0.94 for normal group and 0.93 for hearing impairment, similar to the Indian -Kannada version of HHIA[19]. This result suggest HHIA-S questionnaire truly reflects what it is supposed to measure.

From the item-total correlation analyses, it is clear that all the value in Nepali version of HHIA-S is within the normal range. The minimum item-total correlation value obtained is 0.59, and the maximum is 0.89. It is stated that the item-total correlation should have a minimum value of 0.3 and a maximum value of 0.8 [20]. Hence, it can be stated that Nepali version of HHIA-S can be used reliably as a screening tool to classify the hearing handicap. The developed questionnaire has various applications. Clinicians could use it for as a screening tool and assessing the impact of hearing impairment on quality of life of a hearing-impaired individual. Also, this questionnaire could be used as an assessment tool to see the efficacy of audiological rehabilitation.

Conclusion

The current study found that Nepali HHIA-S has good psychometric properties for its use in Nepali population. The screening version of HHIA-S is clear, simple and can be easily administered in less than three minutes. This short and simple questionnaire can also be used as a self—reported outcome measure tool for rehabilitation purpose. This study being the first of its kind in the Nepali language, can be used with good reliability for screening hearing handicap in Nepali population. The diagnostic version of the Nepali HHIA is necessary to be developed in future for detailed evaluation with more accuracy. Also, the upcoming researchers could validate this questionnaire with same degree of hearing loss. Finally, looking into its sensitivity and specificity could be one other scope in the future.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s12070-022-03082-5.

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Author contribution SA was involved in study design, stimulus preparation, data collection, analysis of the data, interpretation, and writing the manuscript; BB was involved in stimulus preparation, data collection and writing the manuscript; PP, was involved in concept development, study design, analysis of the results, and writing the manuscript.

Declarations

Conflict of interest The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Ethical Approval Ethical approval was obtained from the All India Institute of Speech and Hearing.

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