



(RESEARCH ARTICLE)



The relationship between Hearing Handicap Inventory for The Elderly – Screening Version (HHIE-S) Questionnaire Scores and Hearing Loss in The Elderly in Sukawati Village, Gianyar Regency

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Abstract

Background: Age-related hearing loss, or presbycusis, significantly impacts communication, social interaction, and cognitive function. This study examined the relationship between Hearing Handicap Inventory for the Elderly – Screening Version (HHIE-S) scores and hearing loss severity among the elderly in Sukawati Village, Gianyar.

Methods: A cross-sectional study of 50 elderly participants aged 60 years and older was conducted. Data were collected using the HHIE-S questionnaire and pure-tone audiometry, and analyzed using Pearson's correlation.

Results: A strong positive correlation was found between HHIE-S scores and hearing loss severity ($r = 0.896$, $p < 0.001$), indicating that higher scores correspond to more severe hearing impairment.

Conclusion: The HHIE-S questionnaire is an effective tool for early detection of hearing loss in the elderly and is recommended for use in primary healthcare settings to enhance timely management and improve quality of life.

Keywords: Presbycusis; Elderly Screening; HHIE-S; Hearing Loss; Audiometry

1. Introduction

Age-related hearing loss, or presbycusis, is a significant public health issue, impacting communication, social interaction, and cognitive function. The World Health Organization (WHO) estimates that 278 million people globally suffer from hearing loss, with 75 to 140 million cases in Southeast Asia. In Indonesia, a national survey reported a prevalence of deafness at 0.4% and hearing impairment at 16.8%, with presbycusis contributing to 2.6% of these cases.[1] Hearing impairment increases with age due to degenerative changes in auditory organs, affecting daily activities and social participation.[2]

To identify hearing loss in the elderly, various tools have been developed, including the Hearing Handicap Inventory for the Elderly Screening Version (HHIE-S).[3] The HHIE-S is valuable for assessing the severity of hearing impairment and its impact on communication and social interactions. This study investigates the relationship between HHIE-S scores and hearing loss among the elderly in Sukawati Village, Gianyar, to evaluate its effectiveness as a screening tool in primary healthcare settings.

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2. Materials and methods

This study employed an analytical design with a cross-sectional approach. The research was conducted on April 1, 2023, in Sukawati Village, Gianyar, Bali, targeting individuals aged 60 years and older with bilateral hearing loss. Participants were selected using consecutive sampling from those attending a health service event in April 2023.

Inclusion criteria were individuals aged 60 years and older who experienced hearing loss, completed the HHIE-S questionnaire, underwent pure-tone audiometry, and consented to participate. Exclusion criteria included a history of middle ear surgery, chronic ear infections, acute ear, nose, or throat inflammation, and unwillingness to participate. The sample size was determined using a standard formula for correlation studies.

The dependent variable was the HHIE-S questionnaire score, and the independent variable was the pure-tone audiometry value. Hearing loss was defined as sensorineural hearing loss due to degenerative changes in the auditory organs, occurring in both ears progressively, without other underlying conditions. Elderly individuals were those aged 60 years or older, and gender was categorized based on functional differences. The HHIE-S questionnaire assessed the impact of hearing loss on emotional and social functioning, with scores ranging from 0 to 40. Hearing loss severity was classified according to ISO criteria, from normal to profound hearing loss.

Primary data were collected through interviews and audiometric testing during the health service event. Data were analyzed using SPSS version 26.0, with descriptive statistics used to summarize the study variables. Normality was assessed using the Kolmogorov-Smirnov test, and Pearson's correlation was used to analyze the relationship between HHIE-S scores and audiometry results.

3. Results

A total of 50 elderly participants from Sukawati Village, Gianyar, were included in this study. The characteristics of the subjects are presented in Table 1.

Table 1 Characteristics of Study Subjects

Characteristics	n	%
Gender		
Male	20	40
Female	30	60
Age (years)		
60–64	15	30
65–69	15	30
70–74	9	18
≥75	11	22
Total	50	100

Among the participants, 60% were female, and 40% were male. The majority of subjects were aged between 60–69 years, accounting for 60% of the sample, while those aged 70 years and above constituted 40%.

The HHIE-S assessment revealed that 18% of participants had no reported handicap, 64% experienced mild to moderate handicap, and 18% reported severe handicap due to hearing impairment that illustrates at Table 2.

Table 2 HHIE-S Questionnaire Scores

HHIE-S Score Category	n	%
No handicap (0–8)	9	18
Mild to moderate handicap (10–22)	32	64
Severe handicap (24–40)	9	18
Total	50	100

The audiometric evaluation indicated that the highest proportion of participants (36%) had moderate hearing loss, followed by mild hearing loss (22%), normal hearing (18%), and both moderately severe and severe hearing loss each at 12%. No cases of profound hearing loss were observed. Pure-tone audiometry results are summarized in Table 3.

Table 3 Pure-Tone Audiometry Results

Hearing Threshold	n	%
Normal (0–25 dB)	9	18
Mild hearing loss (>25–40 dB)	11	22
Moderate hearing loss (>40–55 dB)	18	36
Moderately severe hearing loss (>55–70 dB)	6	12
Severe hearing loss (>70–90 dB)	6	12
Profound hearing loss (>90 dB)	0	0
Total	50	100

The data indicate that all participants with normal hearing thresholds (18%) reported no handicap. Among those with mild hearing loss, all (22%) experienced mild to moderate handicap. Participants with moderate hearing loss predominantly reported mild to moderate handicap (36%), while those with moderately severe and severe hearing loss mainly reported severe handicap, accounting for 8% and 10% respectively. Table 4 demonstrates the distribution of HHIE-S scores in relation to the corresponding hearing thresholds obtained from pure-tone audiometry.

Table 4 Distribution of HHIE-S Scores Based on Hearing Thresholds

HIE-S Score Category	Normal (0–25 dB)	Mild (>25–40 dB)	Moderate (>40–55 dB)	Moderately Severe (>55–70 dB)	Severe (>70–90 dB)	Profound (>90 dB)	Total
No handicap (0–8)	9 (18%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	9 (18%)
Mild to moderate handicap (10–22)	0 (0%)	11 (22%)	18 (36%)	2 (4%)	1 (2%)	0 (0%)	32 (64%)
Severe handicap (24–40)	0 (0%)	0 (0%)	0 (0%)	4 (8%)	5 (10%)	0 (0%)	9 (18%)
Total	9 (18%)	11 (22%)	18 (36%)	6 (12%)	6 (12%)	0 (0%)	50 (100%)

Normality testing using the One-Sample Kolmogorov-Smirnov test demonstrated that both HHIE-S scores and audiometry results were normally distributed. Consequently, Pearson's correlation test was utilized for further analysis. The results of this correlation analysis are presented in Table 5.

Table 5 Correlation Between HHIE-S Scores and Hearing Thresholds

Variable	Mean (SD)	r	p-value
HHIE-S Score	11.60 (9.22)	0.896	<0.001
Hearing Threshold (dB)	44.35 (17.73)		

The Pearson correlation analysis revealed a strong positive correlation between HHIE-S scores and hearing thresholds ($r = 0.896$, $p < 0.001$). This indicates that higher HHIE-S scores are significantly associated with greater degrees of hearing loss as measured by pure-tone audiometry.

4. Discussion

Presbycusis, a type of hearing loss caused by degenerative processes, is a common issue in the elderly population. Early screening for hearing loss is crucial, and while audiometry remains the gold standard, the development of the Hearing Handicap Inventory for the Elderly-Screening (HHIE-S) questionnaire has provided an additional tool for hearing loss screening in the elderly.[2]

In this study, the demographic characteristics showed that the sample consisted of 20 males (40%) and 30 females (60%), with a higher proportion of females. The majority of participants were aged between 65–69 years (30%) and 60–64 years (30%). This is consistent with findings by Ventry and Weinstein, who reported a nearly equal distribution of male and female participants.[4] However, the age distribution in this study differs from that reported by Hayat and Djelantik, who found the highest prevalence in those aged 65 and above, and from a study in Taiwan, which found a 15.9% prevalence in the 70–74 age group.[5]

The distribution of HHIE-S scores in this study showed that the majority of participants (64%) fell into the mild to moderate handicap category (10–22 points). This aligns with findings by Fitrih, who also reported a majority of participants with mild to moderate handicap.[6] However, these results differ from those reported by Jupiter and Distasio, who found that most participants had no handicap.[7]

The audiometry results in this study revealed that the most common degree of hearing loss was moderate (>40–55 dB) in 36% of participants, followed by mild hearing loss (>25–40 dB) in 22%. This differs from Wibowo et al., who found the highest prevalence of moderately severe hearing loss (37.5%) and a smaller percentage of severe hearing loss (8.3%).[2] Similarly, Fitrih reported a majority of participants with moderate hearing loss (26%).[6] These variations in sample distribution across studies may be attributed to differences in criteria for classifying hearing loss severity, examination techniques, and study populations.

The participants in this study with HHIE-S scores of 0–8 (18%) had normal hearing thresholds. Those with HHIE-S scores of 10–22 (64%) predominantly had moderate hearing loss (32%). Among participants with HHIE-S scores of 24–40 (18%), the majority (10%) had severe hearing loss. These findings suggest a strong positive correlation between HHIE-S scores and hearing thresholds, with a Pearson correlation coefficient (r) of 0.896 ($p < 0.001$). This indicates that higher HHIE-S scores are associated with greater degrees of hearing loss. The results are consistent with those of Wibowo et al., who also reported a high correlation between hearing thresholds and HHIE-S scores ($r = 0.937$, $p < 0.001$).[2] Similarly, Demers found that higher HHIE-S scores were associated with greater disability due to hearing loss.[8]

Given these findings, individuals with HHIE-S scores greater than 8 should be referred for further audiometric evaluation at a hospital. This study supports the use of the HHIE-S questionnaire as a viable screening tool for early detection of presbycusis in the elderly. It is cost-effective, quick, easy to administer, and can be performed in various settings, thereby aiding in the timely management of hearing loss and improving the quality of life for the elderly.

5. Conclusion

This study found a strong correlation between HHIE-S scores and hearing loss severity in the elderly of Sukawati Village, with a correlation coefficient (r) of 0.896. Higher HHIE-S scores indicate more severe hearing loss. Future research with a larger sample size is recommended to better represent the broader population and validate these findings.

Compliance with ethical standards

Disclosure of conflict of interest

All authors declare that they have no conflicts of interest or competing interests related to the publication of this manuscript. Specifically, Ni Luh Putu Yustina Dewi and Komang Andi Dwi Saputra, affirm that there are no financial, personal, or professional conflicts that could be perceived as influencing the work reported in this manuscript.

Statement of ethical approval

The present research does not contain any studies performed on animals or human subjects by any of the authors. However, informed consent was obtained from all individual participants included in the study.

Statement of informed consent

The participants were fully informed about the purpose, procedures, and potential risks of the study, and their voluntary consent was documented prior to their participation.

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