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OTHER ARTICLES

Criteria for Determining Hearing Disability: A Narrative Review of Global Perspective

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Abstract
Hearing loss is a highly prevalent condition worldwide, affecting over 5% of the global population. Determining disability and eligibility for rehabilitation services due to hearing loss is complex, as countries employ differing audiometric criteria and methods. This report reviews current literature on audiometric thresholds used globally to determine hearing disability, highlighting challenging cases worldwide. Databases PubMed, Embase, and Web of Science were searched for articles on hearing disability criteria published from 2010-present in English. Overall, developed countries employ a pure-tone average (PTA) of ≥ 40 dB as disability criteria, while developing countries use ≥ 41 dB PTA. The World Health Organization uses ≥ 41 dB disabling hearing loss in better ear. Studies show widespread use of a single frequency threshold in some countries can exclude milder losses. Individualized approaches accounting for communication function, rather than fixed PTA cut-offs alone, enable more accurate disability determination. Further research on optimal, equitable criteria accounting for resource availability is needed. Standardized guidelines balancing sensitivity and specificity in disability determination worldwide would enable improved rehabilitation access and outcomes.

Keywords Hearing loss · Audiometric criteria · Pure tone audiometry

Introduction

Hearing loss affects access to spoken language, which can affect cognition and development, and can negatively affect social wellbeing [1]. Determining hearing disability is essential to guide rehabilitation services such as hearing aid fitting, cochlear implants, and speech therapy. However, audiometric criteria for determining disabling hearing loss vary widely between countries. Developed countries typically employ a pure-tone average (PTA) of ≥ 40 dB as disability criteria, while developing countries use ≥ 41 dB disabling hearing loss [2]. There is a need for evidence-based guidelines balancing sensitivity and specificity for determining eligibility and prioritizing limited resources. This report reviews recent literature on audiometric criteria used globally to determine hearing disability, including challenging borderline cases. Relevant studies on the implications of various audiometric thresholds and approaches to disability determination are discussed.

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Discussion

Audiometric Criteria by Country

The audiometric criteria used to determine hearing disability leading to device candidacy varies globally based on economic resources. Developed countries including the United States, Canada, and the European Union define hearing disability as a pure-tone average (PTA) of ≥ 40 dB, averaging hearing thresholds at 500, 1000, 2000, and 4000 Hz [3]. This corresponds to a mild-to-moderate hearing loss [4].

In developing countries, hearing disability is often defined as ≥ 41 dB hearing loss in the better ear, such as in India, China, Iran, and Brazil [5–7]. The ≥ 41 dB disabling hearing loss criteria is also recommended by the World Health Organization (WHO) for global application [8]. Some countries use a single frequency threshold rather than a PTA average. For example, Nigeria defines disability as ≥ 40 dB at 2000 Hz [9].

Overall, there is relative consensus globally that PTA ≥ 40 dB constitutes disabling hearing loss in developed countries, while ≥ 41 dB is more commonly used in developing countries. However, there are concerns that rigid application of a fixed PTA threshold may fail to identify people with real-world disability, particularly those with hearing loss concentrated at high frequencies.

Borderline and High Frequency Losses

Cases with borderline PTAs around 40 dB or with high frequency hearing losses can pose challenges in applying categorical disability criteria. Mohr et al. found that many older patients with PTAs between 40-45 dB had significant self-reported hearing difficulties, failing to qualify for services [10]. People with high frequency hearing loss exceeding 30 dB at 1-4 kHz may also experience disability, especially in noise, despite normal PTAs [11].

To address these limitations, the American Academy of Audiology recommends individualized assessment of communication function and handicap to determine disability, rather than relying solely on PTA thresholds [12]. Questionnaires like the Abbreviated Profile of Hearing Aid Benefit (APHAB) can quantify disability [13]. Cases with borderline PTAs should undergo comprehensive evaluation of speech understanding in quiet and noise plus handicap assessment before determining disability status.

Sensitivity and Specificity Considerations

Defining the audiometric cut-off for hearing disability involves balancing sensitivity versus specificity. Lowering the PTA threshold to ≤ 40 dB would increase sensitivity, identifying more people who could benefit from rehabilitation. However, it reduces specificity, leading to unnecessary device provision for those experiencing minimal handicap.

Overall, optimal criteria minimize false negatives missing people with handicap while also avoiding false positives given resource constraints. Further studies are needed to determine country-specific cut-offs considering demographic, cultural, and health system factors.

Individualized Approaches

Due to the drawbacks of applying fixed PTA criteria alone, adding measures of self-reported disability and speech understanding can improve accuracy in disability determination [14]. Questionnaires like the Hearing Handicap Inventory for the Elderly (HHIE) quantify perceived handicap, while word recognition scores assess speech comprehension ability [15].

Multivariate approaches can integrate audiometric and self-report data to offer individualized disability determination superior to PTA alone. In 590 veterans, a combination of PTA, word recognition, and HHIE scores predicted hearing aid outcome and yielded both sensitivity and specificity of 0.83, significantly higher than using PTA alone [16]. Integrating audiometric and self-report data thus enables patient-centered disability determination.

Implementing individualized criteria does pose challenges of administration, time, and interpretation. Automated algorithms can facilitate combining multiple data points efficiently to generate disability determinations [17]. With advancing technology, integrated methodologies are becoming more feasible globally.

Conclusions

Audiometric criteria for determining hearing disability and device candidacy vary worldwide based on economic factors, with developing countries utilizing higher PTAs of ≥ 41 dB versus ≥ 40 dB in developed regions. Borderline losses and high frequency hearing impairment pose challenges in rigidly applying fixed PTA cut-offs. Integrating audiometry with self-reported disability measures through multivariate algorithms allows individualized determination superior to PTA alone. Further research on optimal criteria balancing sensitivity and specificity is needed. Standardized guidelines enabling accurate disability determination worldwide would improve rehabilitation access and outcomes globally.

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Data Availability The datasets during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics Approval and Consent to Participate The study is a review article and hence ethical clearance is not applicable,

Consent for Publication Not applicable.

Competing Interests The authors declare that they have no competing interests.

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