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Simplified cochlear frequency selectivity measure for sensorineural hearing loss screening: comparison with digit triplet test (DTT) and shortened speech, spatial and qualities of hearing scale (SSQ) questionnaire

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Abstract

Purpose: Pure-tone audiometry (PTA) is the gold standard for screening and diagnosis of hearing loss but is not always accessible. This study evaluated a simplified cochlear frequency selectivity (FS) measure as an alternative option to screen for early frequency-specific sensorineural hearing loss

(SNHL). Methods: FS measures at 1 and 4 kHz center frequencies were obtained using a custom-made software in normal-hearing (NH), slight SNHL and mild-to-moderate SNHL subjects. For comparison, subjects were also assessed with the Malay Digit Triplet Test (DTT) and the shortened Malay Speech, Spatial and Qualities of Hearing Scale (SSQ) questionnaire. Results: Compared to DTT and SSQ, the FS measure at 4 kHz was able to distinguish NH from slight and mild-to-moderate SNHL subjects, and was strongly correlated with their thresholds in quiet determined separately in 1-dB step sizes at the similar test frequency. Further analysis with receiver operating characteristic (ROC) curves indicated area under the curve (AUC) of 0.77 and 0.83 for the FS measure at 4 kHz when PTA thresholds of NH subjects were taken as ≤ 15 dB HL and ≤ 20 dB HL, respectively. At the optimal FS cut-off point for 4 kHz, the FS measure had 77.8% sensitivity and 86.7% specificity to detect 20 dB HL hearing loss. Conclusion: FS measure was superior to DTT and SSQ questionnaire in detecting early frequency-specific threshold shifts in SNHL subjects, particularly at 4 kHz. This method could be used for screening subjects at risk of noise-induced hearing loss. © 2023, The Author(s), under exclusive licence to Springer-Verlag GmbH Germany, part of Springer Nature.

Author keywords

Affordable hearing test; Frequency selectivity; Hearing screening; Sensorineural hearing loss

Indexed keywords

MeSH

Audiometry, Pure-Tone; Auditory Threshold; Hearing; Hearing Loss, Noise-Induced; Hearing Loss, Sensorineural; Humans; Speech; Surveys and Questionnaires

EMTREE medical terms

adult; aged; Article; auditory screening; auditory threshold; controlled study; digit triplet test; disease severity; ENT examination; female; frequency analysis; human; major clinical study; male; middle aged; noise injury; perception deafness; receiver operating characteristic; risk assessment; sensitivity and specificity; software; speech spatial and qualities of hearing scale; hearing; noise injury; procedures; pure tone audiometry; questionnaire; speech

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Malay DTT		
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Universiti Malaya See opportunities by UM ↗	GPF005A-2020	UM

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