

Smartphone Application-Based Assessment of Prevalence of Hearing Impairment in Adult Population of an Urbanized Village of Delhi

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Abstract:

Background: Hearing impairment is an important but often underdiagnosed public health problem, particularly in resource-limited community settings where conventional audiometry may not be easily accessible. The present study aimed to determine the prevalence of hearing impairment using a smartphone-based application and to assess its associated risk factors among adults in an urbanized village of Delhi.

Methods: A community-based cross-sectional study was conducted among 345 adults aged 18–90 years residing in Aliganj, an urbanized village in South Delhi. Households were selected by simple random sampling (random digits table), and one adult from each selected household was chosen using the Kish grid method. Data were collected using a pre-structured questionnaire. Hearing assessment was done using the validated “Hearing Test™” smartphone audiometric application with calibrated Sennheiser HD 450BT headphones. Pure-tone thresholds were assessed at 250, 500, 1000, 2000, 4000, 6000, and 8000 Hz for each ear, and hearing impairment was graded according to WHO criteria. Data were analyzed using SPSS version 21.0, and appropriate statistical tests including Chi-square and Fisher’s exact test were applied to assess associations.

Results: The overall prevalence of hearing loss was 38.26%. Based on WHO grading using the better ear, 61.74% had normal hearing, 29.57% had slight impairment, 8.12% had moderate impairment, and 0.58% had severe impairment; no participant had profound hearing loss. Hearing loss increased significantly with age, from 22.27% among young adults to more than 80% among older adults (Fisher’s exact test, $p < 0.001$). Significant associations were observed with educational status ($\chi^2 = 53.767$, $p < 0.001$), employment status ($\chi^2 = 47.624$, $p < 0.001$), presence of non-communicable diseases ($\chi^2 = 34.174$, $p < 0.001$), and headphone/earphone usage ($\chi^2 = 19.648$, $p < 0.001$). History of head trauma was also significantly associated with hearing loss (Fisher’s exact test, $p = 0.009$). However, gender was not significantly associated with hearing loss ($\chi^2 = 2.724$, $p = 0.099$). Only 18.55% of participants reported hearing difficulty, indicating a substantial gap between self-reported symptoms and objective audiometric findings.

Conclusion: The study revealed a high burden of hearing loss among adults in an urbanized village of Delhi. Smartphone-based audiometry was found to be a feasible, accessible, and field-friendly



screening tool for community-based hearing assessment. The findings highlight the need for early detection, community awareness, noise-control measures, integration of hearing screening into primary healthcare, and targeted interventions for high-risk groups.

Keywords:

Hearing impairment, Hearing loss, Smartphone-based audiometry, Hearing Test™ application, Community-based, Adult population, Urbanized village, Delhi, Pure-tone audiometry.