Prevalence of Hearing Difficulty and Tinnitus with Normal Hearing Thresholds

Summary by John A. Coverstone, AuD

Clinicians long have been aware that people may have tinnitus and/or hearing difficulties even with hearing levels (thresholds) that are completely normal. Causes may include head and neck trauma, subclinical changes in hearing that do not reach the level of clinical hearing loss, or unknown etiologies. However, the prevalence of hearing difficulty and tinnitus in people with normal hearing thresholds is largely undefined. Some studies attempting to answer this question have been small, while others have used differing criteria for data such as normal vs. abnormal hearing thresholds.

A group of researchers from the University of Mississippi Medical Center sought to answer this question by drawing on large-scale data from the National Health and Nutrition Examination Survey (NHANES), which is a survey of various health topics conducted by the Centers for Disease Control and Prevention. The researchers, who published their findings in 2018, were able to gather pertinent data from 3,853 survey participants from the 1999–2000 and 2001–2002 survey cycles.

The chosen participants had completed survey data on hearing loss and tinnitus topics and also had audiometric data available from clinical hearing examination. Hearing difficulty was identified as a self-perceived problem, and persistent tinnitus was identified by those indicating hearing tinnitus-like sound “almost always” or “at least once a day” on the questionnaires. Participants were excluded based on incomplete data, evidence of non-cochlear (non-sensory) hearing loss, or other medical etiology. The researchers finally limited data to those participants with a 4-frequency (0.5, 1, 2, and 4 kHz) average that was better than or equal to 25 dB. Ultimately, 2,015 participants were identified with normal hearing thresholds and complete data.

Tinnitus was reported by 20 percent of the researchers’ sample group and persistent tinnitus was identified in 10.6 percent of people with normal hearing. Of those who reported hearing difficulties, 41.7 percent reported tinnitus in the past year and 27.1 percent met the criteria for persistent tinnitus. Of those who did not report hearing difficulties, 16.4 percent reported tinnitus in the past year, and 7.7 percent reported persistent tinnitus. Conversely, 40.1 percent of people reporting tinnitus also reported hearing difficulties. Only 12.5 percent of participants without persistent tinnitus reported hearing difficulties. These numbers indicate that there is a strong relationship between tinnitus and perceived hearing difficulty in people who would not be considered to have hearing loss.

The researchers also looked at other data in the health survey that
might serve as predictors for hearing difficulty and tinnitus. These include factors such as diabetes, arthritis, and other health conditions; a history of smoking; exposure to loud noise; and both over-the-counter and prescription drug use. None of these demonstrated a significant relationship with hearing difficulties when adjusted for age, gender, and low- and high-frequency hearing thresholds. Persistent tinnitus was the best predictor, with participants having persistent tinnitus reporting hearing difficulties at nearly four times the rate of those without persistent tinnitus. Persistent tinnitus was reported significantly more often from participants who indicated confusion or memory issues, previous hearing tests, balance problems, noise exposure, diabetes, arthritis, symptoms of neuropathy, vision difficulties, alcohol use (5+ per day), and analgesic use.

The authors also altered the criteria for normal hearing to assess whether prevalence of hearing difficulty and tinnitus changed, as was indicated by some prior studies. They found that prevalence of hearing difficulty and tinnitus each increased as criteria were expanded (e.g., “normal hearing” was defined as greater than 25 dB average hearing thresholds). However, there were no significant changes in prevalence as criteria for normal hearing were made stricter.


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