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Editorial

Noise Exposure: A Continuous Dilemma of the Industrial Environments and Modern World

M Amirabadi

Division of Surgery, NIOC Health Organization, Shiraz, Iran

Noise exposure has long been known to be a risk factor for hearing loss. Noise-induced hearing loss (NIHL) is one of the most common occupational diseases worldwide; 49% of male miners by the age of 50 and 70% of them by the age of 60 have hearing loss.[1] Currently, NIHL is not considered only an occupational disease; the non-occupational forms of the disease are on the rise. Leisure-time noise and exposure to the noise exceeding a certain level can lead to the NIHL. Overstimulation of the outer hair cells (OHCs) increases the risk of NIHL. There are two types of NIHL: "acoustic trauma" that refers to the sudden exposure to a high-intensity sound, *e.g.*, gunfire or explosions, which may lead to permanent cochlear damage; and NIHL secondary to the chronic exposure to loud noises like that mostly happen in industrial and occupational settings.

NIHL generally presents with bilateral high-frequency sensorineural hearing loss that has a characteristic first notch at 4 kHz on the audiogram.[2] Continuation of the exposure will give rise to worsening of the hearing loss and involvement of other frequencies.[3]

Patients with NIHL may have tinnitus—one of the most disturbing and debilitating symptoms. Tinnitus can affects all aspects of the life. In 16% to 21% of adults it occurs at some points in their lifetime.[4] Approximately 2% of people have decreased quality of life due to chronic tinnitus.[5] Tinnitus has no exteriorization; thus, it has no definite classification, nor is there any standard algorithm for its management. The complex and lengthy medical treatment programs for tinnitus that are not successful most of the time, make physicians to often use other therapeutic approaches. And, that is why the management of tinnitus is costly and in most instances, discouraging.

In this issue of *The IJOEM*, Raghunath G, *et al*, show that chronic exposure to noise does affect the vestibular system and can cause minimal elusive symptoms.[6] Therefore, noise not only affect hearing but can also harm the vestibular system. Sound levels ≥100 dB SPL can produce saccular stimulation that in turn results in balance problem.[6] In a study in Taiwan, patients with chronic NIHL also complained of vestibular symptoms.[7]

People are not equally susceptible to the harmful effects of noise. Therefore, identification of susceptible individuals to arrange things so that they are not exposed to loud noise in workplaces as much as possible, is of paramount importance. Audiologists and otolaryngologists should therefore pay more attention to preventing occupational noise exposure.

Correspondence to Mehrdad Amirabadi, MD, Neurotologist, Division of Surgery, NIOC Health Organization, Shiraz, Iran
E-mail: mamirabadi42@yahoo.com

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The temporary threshold shift (TTS) is a transient sensorineural hearing loss for seconds to hours following exposure to a loud noise that recovers almost completely within 24 hours. TTS and its recovery time are useful indices for evaluation of individual's susceptibility to the noise.[8]

Otoacoustic emissions (OAEs) are acoustic signals which are produced by cochlea and specifically its OHCs spontaneously or in response to acoustic stimuli. OAEs are generated by a normal cochlea with a normal hearing function. Any damage to the OHCs results in hearing loss and absence of OAEs. There are two types of evoked OAE—transient evoked OAE (TEOAE) and distortion product OAE (DPOAE). In this issue of the journal, Moussavi-Najarkola, *et al*, show that DPOAE may be a useful screening and diagnostic test for early detection of NIHL in rabbits.[9] The results of the study, however, might not be generalizable to humans as it was an animal study. Furthermore, there are reports in contrary to this finding.[10] TEOAE can measure the extent of injury to the OHCs in those with leisure-time noise exposure even when there is no pure tone hearing loss.[11]

One of the important factors that limit the effectiveness of hearing protection devices (*e.g.*, earmuff and earplugs) is poor compliance with use of these devices. Employers should have particular plans for hearing conservation of their employees. Hearing protection programs should include regular audiometric screening tests, providing information and education about the dangers of exposure to noise and NIHL. NIHL and vestibular damage are treatable neither medically nor surgically, but they are preventable.

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