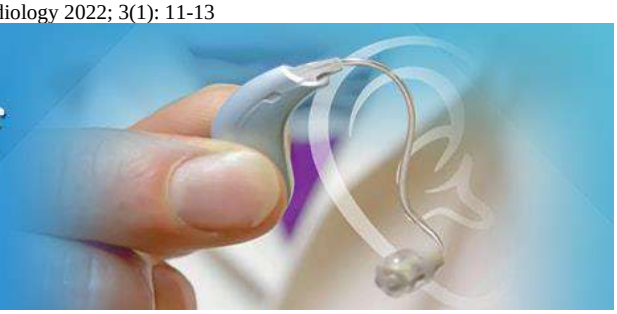
International Journal of Speech and Audiology



E-ISSN: 2710-3854
P-ISSN: 2710-3846
IJSA 2022; 3(1): 11-13

www.rehabilitationjournals.com
Received: 24-10-2021
Accepted: 10-12-2021

Owolawi Victor Ifeoluwa
Decibel Hearing Consultants
No.4, Salvation Road, Off Opebi Road, Opebi-Ikeja, Lagos, Nigeria

Wahab Oyedele Owolawi
Decibel Hearing Consultants
No.4, Salvation Road, Off Opebi Road, Opebi-Ikeja, Lagos, Nigeria

Correspondence
Owolawi Victor Ifeoluwa
Decibel Hearing Consultants
No.4, Salvation Road, Off Opebi Road, Opebi-Ikeja, Lagos, Nigeria

Dangers of noise in our society

Owolawi Victor Ifeoluwa and Wahab Oyedele Owolawi

Abstract
Audition is the ability to perceive sounds, sound is often detected through the ears by vibrations of sound waves. Noise is seen as an unwanted sound in a given environment where in occupational noise is quickly becoming a rising hazard in our society, so this paper looks at the effects of noise (Occupational) on workers and the society and preventive measures to be put in place in societies.

Keywords: vibrations, Occupational, hazard

Introduction
Hearing occurs when acoustic signals travel up the auditory pathway through the outer ear, middle ear, inner ear to the auditory cortex and afferent auditory related cranial nerves to the brain for processing.

When relating to noise or noise induced hearing loss we take a closer look at the inner ear especially the cochlea, the cochlea is made of different parts which carry out different activities but, in this case, we will be looking at the cochlea outer hair cells. These hair cells are sensory-effector cells that both detect and influence mechanical interactions between the tympanic membrane (TM) and the reticular lamina (RL) of the organ of Corti in the cochlea (Russell, 2008) [14]. Noise intensity and duration determine the extent of the damage to these hair cells, excessive sound exerts a shearing force on the stereocilia of the hair cells lining the basilar membrane of the cochlea., this force leads to cellular metabolic overload, cell damage and cell atrophy which could be a unilateral or bilateral impairment, this can be seen in any audiometric finding as a decline in the high frequency with a noise notch at 3, 4 or 6KHz.

Excessive noise can cause a temporary threshold shift from short-term exposure to high noise levels, with normal hearing returning after a period of rest or a permanent threshold shift after prolonged exposure to high noise levels, which can cause physiological fatigue, tinnitus, a ringing or buzzing in the ears or head, increased blood pressure and stress, inability to sleep, fatigue and other sleep problems, a sense of isolation and interference with general workplace communications, and inability to hear warnings of imminent safety hazards due to excessive noise exposure. However, if noise is too prolonged in time, hearing will become permanently impaired.

Noise induced hearing loss
Noise induced hearing loss can either be acute or chronic. The acute type can be caused by "acoustic shocks" from things like fireworks or small gun fire, while the chronic type follows a prolonged exposure to high intensity level of noise usually found in manufacturing industries or aircraft stations. Four phases can be distinguished in the chronic form of noise-induced hearing loss, the first phase being ringing in the ears and a sensation of fullness of the ears in approximately the first 20 days of exposure, sometimes accompanied by slight headache and dizziness. The second phase occurs after a few months, where the person experiences intermittent ringing in the ears. The third phase starts when the person notices hard of hearing, difficulty in hearing the ticking of the clock, difficulty in understanding components of conversation and increasing the volume of television to understand what is being said. The fourth phase starts when the feeling of hearing insufficiency is manifest, this is when any type of communication using acoustic signals is impossible or very difficult to understand.

Occupational noise-induced hearing loss is a type of hearing loss that develops slowly over a long period of time (several years) as the result of exposure to excessive noise at work.

Construction and manufacturing plants are two of the industries that show very high rates of noise exposure. These industries have processes which emit high noise levels exceeding 85dB (A) and 90dB (A), levels which are considered excessive. In most countries, noise-induced hearing loss is the second common cause of sensorineural hearing loss right after presbycusis (Ekwekwe & Owolawi, 2012) [6].

Determining excessive noise

Sound/noise levels are measured in units as decibels (dB). To determine the sound pressure level (SPL) in the atmosphere or a given space sound meters are used. A scale of reasoning has been set in place to make the public aware of the dangers of noise at different sound pressure levels and duration. At 20-50dB we find a sound like whispers, at 50-70dB we find normal conversations, at 70-80dB we find traffic sound, at 80-90dB we find lawnmower sound, at 90 to 100dB we find power tools sound, at 100-120dB we find sound like disco clubs and chain saws, at 120–140dB we experience a sound like gunshot and jet takeoffs (NIOSH, 1970) [9]. Excessive noise is essentially a form of energy having a sound pressure level of 85dB or higher. This energy is transmitted through the air as pressure waves and the use of specialist equipment like sound meters are required when calculating average noise level exposures in given environments.

Objective

The objective of this article is to make the public aware of the dangers of noise and how best to deal with noise in a society as a whole. It is commonly believed that any form of hearing protection device alone will be sufficient in reducing the noise exposure to the user but its adequate hearing protection that reduces exposure to noise because hearing protective devices only reduce the level of noise entering the ears and does not cancel the noise from the environment. What are hearing protective devices? A hearing protective device is an ear protection device worn in or over the ears while exposed to hazardous noise to help prevent noise-induced hearing loss. Every ear protective device has an average level of hearing protection (noise) it cuts out for the user if used properly (Otis, 2018) [11]. The Noise Reduction Rating (NRR) is a number measured in decibels. It is intended to help the user compare the amount of noise being reduced by the hearing protection device(s). The higher the NRR, the more noise is being prevented from entering the ear. Hearing protective devices come in different forms like ear muffs, ear plugs, electronic hearing protection device, semi insert device canal cap, etc. (Rawool, 2011) [13].

The issue of occupational noise can be associated with high-level impulsive sound which can be generated from different machineries, some workers claim hearing protection is for when they know that they are going to be exposed to a lot of noise. The nature of impulsive noise contributes to their decision to operate such equipment without hearing protection. The

U.S. Environmental Protection Agency (EPA) proposed an impulse noise reduction rating (NRR) for hearing protection devices based upon the impulse peak insertion loss (IPIL) methods in the ANSI S12.42-2010 standard, the study tests the ANSI S12.42 methods with a range of different hearing protection devices measured in field conditions. Where five samples of each protector were fitted on the ear canal five times for each impulse level 130–134, 148– 152, and 166–170dB peak SPL, the average IPILs increased with peak pressure and ranged between 20dB and 38dB (EPA, 2009) [7]. For some protectors, significant differences were observed across them. The importance of proper hearing protection or adequate hearing protection is necessary to curb occupational noise. Most industrial workers are unaware of the uses and benefits of hearing protection device as a helpful tool to avoid the harmful effect of noise to the auditory system.

Discussion

A few of industrial studies in Nigeria shows a high prevalence of occupational hearing deficiencies and its negative impact on the auditory system. Some studies showed auditory problems being detrimental to workers mental or physical health and productivity. It is evident that most studies generated in industries, mostly in developing countries such as Nigeria with minimal conservation programs are capable of impacting auditory sensitivity (Miller, 1971; Burns, 1973; Bakare, 1978; Owolawi, 1991) [8, 4, 2, 12].

The level of noise pollution majorly in mega cities in the country is quite alarming, For example in the city of Calabar, in one of the numerous market places it was reportedly found to have a noise level of 105dBA where people are busy trading every day (Bisong, 2004) [3] or the study of engine grinders and aviation staff in the northern part of the county where the aviation staff are exposed to noise levels of 150dBA daily, and engine grinders were found to be exposed to over 85dBA, where the standard limit shouldn't be above 85dBA without any form of hearing protection (Tende *et al*. 2014) [15].

Also, the study of noise induced hearing loss among the printing press industrial workers in Lagos where printing press workers were exposed to noise levels above 85dB (Ekekwe and Owolawi, 2012) [6].

In a study in South Africa, gold miners were found not to be making use of hearing protective devices as a show of bravery (Kahan and Ross, 1994). In another study in South Africa platinum miners were found to be exposed to noise level of 91- 105dBA without adequate hearing protective devices where occupational noise induced hearing loss was found in most of the employees especially in those who have been working in the factory for ten years and beyond (Ntlhakana *et al*., 2020) [10]. Chidambuka *et al*., (2013) [5] reported in a study conducted in a Zimbabwe mine where workers are exposed to noise level of up to 103dBA yet no hearing conservation program has ever been conducted at the mine.

Another factor which is often over looked is the aspect of excessive noise affecting the vestibular system, in the city of Jordan a noise exposure study was made to discover the effect of noise on the vestibular systems of dental technicians who have been working in the laboratories for years. These set of workers are said to be exposed to noise levels of 85dB or greater. In the study, some participants were said to have experienced some form of vestibular impairment, including benign paroxysmal positional vertigo (BPPV), endolymphatic hydrops (Meniere disease), or a

combination of both, the study drew the conclusion that exposure to loud/ excessive noise in dental laboratories severely impacts the functioning of the vestibular system of the inner ear more than the cochlea (Alqudah, 2019) [1].

Conclusion

In conclusion, studies have revealed that the constant exposure to noise (occupational) causes a reduced hearing perception as shown by the increasing hearing threshold in exposed people. Therefore, there is a need for both individuals and government appointed bodies to try to curb or put together a means of reducing the risk associated with noise, especially at workplaces, because as shown in studies, it harms the employees and reduces productivity of the workers which in turn will reduce industrial productivity in the society. The very first step will be to educate the workers/ employees on the dangers and drawbacks of excessive noise on the auditory and related systems, while individuals should equally make a concerted effort to reduce their daily exposure to noise or to excessive sound. Meanwhile, adequate hearing protective devices should be used properly in places with a high or extreme noise levels, manufacturing industries should inculcate hearing monitoring and hearing conservation programs at regular intervals (pre-employment, annual and at exit) this is quite important to avoid medico-legal cases on claims of work-related disabilities due to exposure to excessive noise without adequate measures in place for its workers, While the government can help by enforcing laws to regulate the environmental noise levels in the industries and to take up the task of informing the public on the dangers of excessive noise on the auditory system or related systems, they can also embark on tasks such as constant monitoring of mega cities and regular noise level checks/ verification, as well as conduct regular hearing assessments or hearing screening for those who work or reside close to noisy environments.

References

1. Alqudah S. The effect of noise exposure on the vestibular systems of dental technicians, 2019. from https://doi.org/10.4103/nah.NAH_51_19
2. Bakare CA. Noise pollution in Nigeria. Nigerian journal of speech and hearing disorder. 1978;1(1):100-101
3. Bisong SA. Noise. Nigerian journal of neurosciences. 2004;19:20-27.
4. Burns W. Noise and man. Journal of speech and hearing disorders. 1973;1:10-12.
5. Chadambuka A, Mususa F, Mutati S. Prevalence of noise induced hearing loss among employees at a mining industry in Zimbabwe, 2013. from https://pubmed.ncbi.nlm.nih.gov/24940310/
6. Ekekwe O, Owolawi W. Noise induced hearing loss among Nigeria printing industrial workers, 2012. From http://www.onlineresearchjournals.org/JMMSR
7. EPA. Hearing protection devices; proposed rule, 2009. from https://www.epa.gov/interstate-air-pollution-transport/virtual-public-hearing- transcript-otc-184c-recommendation
8. Miller. Effects of noise on people. Technical report prepared for environmental protection agency. 1971, 15-33.
9. NIOSH. Current research on noise and hearing loss, 1970. from www.cdc.gov/niosh/topics/noise/research/noiseandchem/noiseandchem.html
10. Ntlhakana L, Nelson G, Khoza-Shangase K. Estimating miners at risk for occupational noise-induced hearing loss: A review of data from a South African platinum mine. The South African journal of communication disorders. 2020;67(2):e1–e8.
11. Otis. What is NRR and What Kind of Hearing Protection Do I Need, 2018. from https://otistec.com/blog/what-is-nrr-and-what-kind-of-hearing-protection-do-i-need/
12. Owolawi W. Noise a problem in Nigeria. Nigerian journal of speech and hearing. 1991;1(2):109-110.
13. Rawool VW. Hearing Protection and Enhancement Devices". Hearing Conservation: In Occupational, Recreational, Educational, and Home Settings. 2011;1:136-173.
14. Russell IJ. Cochlear Receptor Potentials The Senses: A Comprehensive Reference, 2008.
15. Tende A, Mohammed A, Eze E, Tende Y, Daikwo O, Onaadepo O *et al*. The effects of occupational noise on sound perception of engine grinders and airport staff in Northern Nigeria. 2014;3:319-358. From http://sjournals.com/index.php/sjes/article/view/1253 from https://www.sciencedirect.com/science/article/pii/B9780123708800900030X