International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 09-04-2020; Accepted: 11-05-2020; Published: 22-05-2020
www.medicalsciencejournal.com
Volume 6; Issue 5; 2020; Page No. 88-91

Noise induced hearing impairment and its awareness among saw-mill workers in Osogbo, Nigeria

Olukemi Christianah Adedeji[1*], Abdur-Rahman Kolawole Mustapha[2], Rachael Bolanle Ajala[3], Olawale Ogundiran[4], Taiwo Olugbemiga Adedeji[5]

[1] Department of Biology, Osun State College of Education, Ila-Orangun, Nigeria
[2] Department of Zoology, Osun State University, Nigeria
[3] Department of Physical and Health Education, Osun State College of Education, Ila-Orangun, Nigeria
[4, 5] Ear, Nose and Throat Department, Lautech Teaching Hospital, Osogbo Osun State, Nigeria

Abstract
Noise induced hearing loss has become a serious public health issue that needs attention. This study aimed to determine the prevalence of hearing loss among saw-millers in major plank saw mills in Osogbo, Osun state. It is a cross sectional descriptive study using structured questionnaire and pure tone audiometry. A total of 73 subjects and 72 controls with age range from 16 – 71yrs. Majority (77.1%) of the operators have been operating machine for more than 10yrs. Over 18% (subjects) complained of hearing loss compared with 8.2% (control), ($t = 35.476$, $p = 0.000$). Most subjects (71.1%) have no knowledge of hearing/ear protection and only 5.6% of machine operators make use some protective devices. More than 41% (subjects) had hearing loss compared with 16% (controls) ($t = 19.881$, $p < 0.001$). There is a need for public enlightenment on the deleterious effect of noise on the populace.

Keywords: noise; hearing loss; sawmill–workers; awareness

Introduction

Occupational Hearing loss is a malady with millions of employees being affected globally [1, 2]. Noise-induced hearing loss (NIHL) is a long- recognized occupational hazard [3]. The global burden of NIHL approximates 1.06 million in Sub-Saharan Africa [1, 4]. Unfortunately, noise-induced hearing loss (NIHL) is usually preventable at relatively little cost [4, 5].

Although, in highly industrialized nations, the causes of hearing loss are reducing, however, noise-induced hearing loss has remained a challenge (World Health Organization, 1997) [6, 7]. Industrialization, a global index of development, could be a blessing in one hand and on the other hand it could pose a serious threat to public health [7]. Thus, excessive uncontrolled noise following industrialization has been an important factor for hearing loss in the world [8]. In many developing countries like Nigeria, preventable causes like infection, (measles, mump), obstetric factor (asphyxia) are still prevalent [9], but recently noise induced hearing loss has been recognised as a serious problem that needs attention.

In fact the risk of noise induced hearing loss is related to both its sound intensity and duration [10, 11]. However the consequence of noise on family health leisure activities as well as social life of those affected are of concern to the researchers especially in saw mills and among pepper grinders in terms since noise interferes with speech communication, reduces working efficiency, causes physiological changes in heart beat rate, induces blood pressure and psychological distress as well as affect auditory perception [11, 12].

In Nigeria, it is evident that noise has become a leading menace facing some people working in noisy environment [2]. This has necessitated the Federal Government of Nigeria to establish the Federal Environmental Protection Agency [FEPA] to control noise and other environmental pollutants [2].

Noise induced hearing loss can result into sensorineural hearing loss that results from cochlear damaged or other acoustic trauma [8, 13].

The permissible noise exposure level [PELs] are specified by the occupational health and safety Administration {OSHA} and this was adopted in Nigeria by the environmental protection agency [EPA], but how far this is adhered to in Nigeria is a mirage since noise is broadcast into the common air by everybody at ransom not minding the implication for other people health [2].

There is paucity of data on the effects of noise on hearing in Nigeria despite the fact that the country is experiencing rapid industrial growth and a large number of workers are exposed to industrial noise. Thus, this study is aimed at determining the hearing threshold and prevalence of hearing loss among sawmillers in major plank saw mills in Osogbo, Osun state, Nigeria It also aims to raise awareness about effects of noise on hearing of sawmillers in Nigeria.

Methodology

The study was conducted in Osogbo. Osun-State, South western part of Nigeria. Osogbo has a population of 290, 000 according to 2006 Nigerian National population figure.

This study was a cross sectional descriptive study carried out across the major plank markets within the city. The saw millers typically operate electrically powered machines which work on various aspect of wood processing. The working environments of these people during operation of their engines are usually characterized by excessive unregulated noise generated by the machine. The operators and their assistants are usually exposed to the unregulated noise and majority of them usually are without any protective devices for their ears and for prolong periods of

operation. The control group is usually at a location or domain that is characterized by acceptable environmental noise level (consists of small-scale traders/artisan/civil servants).

All the participants were made to sign informed consent form after the procedure had been explained to them in the best understood language. The study group and control group had similar socioeconomic characteristics. Exclusion criteria included a history of chronic ear disease, ear trauma or congenital ear deformity.

A structured questionnaire was distributed among the participants to obtain information on their socio-demographic data, knowledge, attitude, practices and effects of noise their hearing and general health. Thorough ear examination was conducted before and after the study.

Noise level was measured with HS5633 Sound Pressure Level M4 Technical specification; HS5633 Digital sound pressure level meter, Stable performance with "A" sound level and "Max. Maintenance", "Sound level set, high and low range", Digital display of overload AC and DC signal output. Suitable for measuring environmental noise, traffic noise, mechanical noise, electric noise acoustic and electro acoustic. It accords with the requirements of IEC61627 (Sound Pressure Level Meter) standard.

Pure tone audiometry was done on each patient using a diagnostic Audiometer (FEEL 01508055 calibrated to ISO standard) made in India, whereas the ambient noise level was measured using TES1350A sound level meter made in China. Pure tone average of the left and right ears was calculated. This is the average hearing threshold level for the pure tone frequencies of 500 Hz, 1000 Hz, 2000 Hz, and 4000 Hz. Pure tone average for each ear was used to determine the level of hearing for that ear. Hearing loss was classified using the commonly used grading system

The information obtained was entered into a spread sheet and analysis was done with statistical package for social sciences version 21.0.

Results

There were a total of 145 respondents consisting of 73 subjects and 72 controls. The age ranges from 16 – 71years among subjects, 20 – 60 among controls. Mean ± SD (subjects = 43.0685 ± 13.27522, controls = 38.6712 ± 10.78973). Majority (48) of the subjects operate machine while others assists during operation or sell planks in the same vicinity. The controls were people age marched that were not working in noisy environment.

The noise level range at the machines site workstation was 110–120 dB while the ambient noise range within the market was 70–85 dB.

Out of 48 machine operators, majority 37 (77.1%) of them have been operating machine for more than 10yrs and only 11 (22.9%) for 5 years or less. Among the subjects 17 (18.9%) complained of some degrees of difficulty with hearing compared with control 6 (8.2%), (t = 35.476, p = 0.000). Majority of the respondents are aware of side effect of excessive noise on hearing (among the subjects 40/73 (54.8%) and 43/72 (59.7%) among the controls). Most respondents in the subjects group 71.1% have no knowledge of hearing/ear protection while 47.9 % respondents among the control group had knowledge of hearing/ear protection in noisy area (table 1). Only 5.6% of machine operators responded they make of use some protective devices while operating.

Pure tone audiometry revealed that 30/73 (41%) on the right and 31/73 (42.47%) on the left had various degrees of hearing loss respectively among the subjects. The findings among the controls are 12/72 (16.67%) on the right and 15.28% on the left respectively had hearing loss (table 2). One sample t-test revealed that this finding is statistically significant $p<0.001$.

Although more than 70% of the people with hearing loss have stayed in the saw-mill for more than 10years, this was however not statistically significant ($X^2 = 4.414$, p = 0.353).

Table 1: Age distributions and hearing status of the respondents (subjects and controls)

Age (yrs)	Subjects (%)	Controls	Total
16 - 30	14	21	35
31- 45	33	33	66
46 - 60	20	18	38
➢ 60	6	-	6
Total	73	72	145
Knowledge of protective device in noisy environment			
Yes	7 (10%)	34 (47.9%)	41 (28.3%)
No	52 (71.1%)	27 (36.9%)	79 (54.5%)
No response	14 (18.9%)	11 (15.2%)	25 (17.2%)
Total	73 (100%)	72 (100%)	145 (100%)

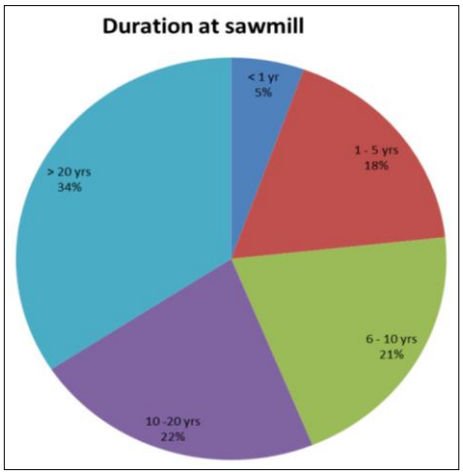

Fig 1: Duration /period subjects have been at saw-mill N = 73 (X^2 = 4.414, p = 0.353)

Table 2: Pure tone audiogram (dB) and one sample t- test among the subject and the controls

Threshold	Right ear		Left ear	
(DB)	Test	Control	Test	Control
0 - 25	43 (58.9)	61 (84.72)	42 (57.53)	62 (86.11)
26 - 40	23 (31.5)	7 (9.72)	21 (28.77)	7 (9.72)
41 - 55	5 (6.85)	3 (4.17)	8 (10.96)	2 (2.78)
56- 70	2 (2.74)	-	2 (2.74)	-
71 -90	-	1 (1.39)	-	1 (1.39)
Total	73 (100)	72 (100)	73 100)	72 (100)
T- test				
T	19.881	16.089	19.157	14.089
p-value	0.000	0.000	0.000	0.000

Discussion

Workers in sawmills especially those operating machines are exposed to hazards and risk of development of noise induced hearing loss (NIHL) [1, 7]. Most of the subjects in our study were exposed to noise in excess of 110 dB. This has been shown to be a serious risk to the development of hearing loss. The recommended noise level should not

exceed 85–90 dB in industrial areas [13, 14]. This risk of NIHL increases with time especially when exposure time per day is more than 8 hours [3]. This could be responsible for higher prevalence of NIHL in the present study. Our study showed that more than 70% of saw mill machine operator have been operating for more than 10 years and over 40% of them have been operating for more than 20 year. A long term exposure to loud noise as shown by this study usually produces permanent hearing loss that is usually not reversible unlike many injuries or illnesses. Therefore attention should be paid to the menace of noise induced hearing loss most especially in our environment.

Our study revealed 41% (right) and 42% (left) prevalence of hearing lose respectively compared with 16.67% (right) and 15.28% (Left) prevalence among the control group. This finding is slightly higher than 36.7% prevalence reported by Chadambuka *et al.* [15] in Zimbabwe, but there is a similarity in the patterns of hearing loss with preponderance of mild degree hearing loss in both studies followed by moderate degree and the least was of severe variety. A study by Mgbe *et al.* [3] however revealed a higher prevalence of more than 60 % of noise induced hearing loss among factory workers in Calabar, Nigeria. Various other studies in Nigeria, had reported the general trends of increasing prevalence of noise induced hearing loss among factory or wood workers in Nigeria [1, 3, 4, 15]. Although, there were no baseline audiometry or hearing assessment before these people got exposed to noise, our finding of higher degrees of hearing loss among subjects compared with the control group was statistically significant (p<0.001) and hence it gives a strong indication that noise is actually strong factor responsible for the hearing loss among the subjects. Other factor that might be responsible for high prevalence of NIHL among wood workers may be related to the type of machine in use as most of the saw millers were still using old generation varieties which produces noise of higher intensity. A similar study in Nigeria also reported similar findings with More than 80% of the saw millers that participated in their study were using the old model machine.

In contrast to reports from previous researchers in which direct relationship exist between the duration of exposure and degree of hearing loss [1, 15]. Our study did not show direct association between these factors, this might be due to the fact that most of our subjects had been in the business of saw milling for a longer period of time and majority have actually developed permanent sensorineural hearing loss. In fact, this might also be a factor to higher prevalence of SNHL reported in the present study.

In many developed countries and some African countries, it is regulated that, no person should be exposed to noise levels exceeding the limits, 90dBA, unless such person has been supplied with ear protectors [3, 15]. Previous literature showed that in factories like mines, quarries, sawmills and many others work with machines that produce noise much higher than the tolerated levels exposed workers to potential hearing loss [16-19]. In the large coal industry, about 76% are exposed to hazardous noise [17, 20]. This has been reported to cause about 25% of severe hearing problem.

Another factor that determine prevalence or severity of hearing loss is whether those exposed to noise wear hearing protective device or not. Our findings revealed that although, majority of the respondents are aware of side effect of excessive noise on hearing, more than 70% of those that work at the saw mill did not have knowledge / awareness about any ear protective device. Our findings corroborated report of previous researcher who reported that 40% of the participants in their study never heard about ear protection devices [15]. Abubarkar *et al.* in Nigeria reported only 7.5% of their study group use cell phone earpiece as against earmuff or any form of protective devices. This earpiece is not an approved hearing protective device; however, they use it ignorantly thinking that it prevents development of hearing loss.

Although majority of the workers could identify noise and its negative effects especially hearing loss, knowledge of its use and function and its availability was generally poor among the workers. In Zimbabwe where it was reported that up to 82.8 % of workers claimed they use protective device, other factors preclude 100% compliance. These were attributed to attitudes and forgetfulness.

In conclusion, this study has revealed that, here is a high prevalence of noise induced hearing loss among saw- mill workers in our environment. Therefore, there is a need for enforcement of specified permissible noise exposure level (adopted by environmental protection agency) in Nigeria. This will help to curb excessive noise generation/exposure. The government, and public health workers should facilitate the development of standard hearing conservation programme (available and accessible ear protective device, routine audiometry, limiting duration of exposure etc) along with public enlightenment / awareness for the populace and more importantly for the workers in noise producing factories with high risk to noise induced hearing loss.

References

1. Abubakar TS, Labaran AS, Mohammed GM, Kirfi AM, Nwaorgu OG. Hearing threshold of sawmillers in Kaduna, Nigeria. Indian J Otol. 2016; 22:152-156.
2. Ogah SA. The Prevalence of Sensorineural Hearing Loss (SNHL) In the Elderly, Lokoja, Nigeria: A Five-Year Review. Journal of Dental and Medical Sciences. 2014; 13(9):66-68.
3. Mgbe RB, Aniefon N Umana, Adekanye AG, Offiong ME. Prevalence and awareness of noise induced hearing loss in two factories in Calabar, Cross River State, Nigeria. Global Journal of Pure and Applied Sciences, 2017, 23(2).
4. Brink LL, Talbott EO, Burks JA, Palmer CV. Changes over time in audiometric thresholds in a group of automobile stamping and assembly workers with a hearing conservation program. AIHA J (Fairfax, Va). 2002; 63:482-487.
5. Shuaibu IY, Chitumu D, Mohammed IB, Shofoluwe NA, Usman MA, Bakari A, *et al.* Pattern of hearing loss in a tertiary hospital in the North Western Nigeria. Sahel Med J. 2018; 21:208-312.
6. Lutman ME. What is the risk of noise-induced hearing loss at 80, 85, 90 dB(A) and above? Occup Med (Lond). 2000; 50:274-5.
7. Kerr MJ, McCullagh M, Savik K, *et al.* Perceived and measured hearing ability in construction labourers and farmers. Am J Ind Med. 2003; 44:431–7.
8. Dement J, Ringen K, Welch L, *et al.* Surveillance of hearing loss among older construction and trade workers at Department of Energy nuclear sites. Am J Ind Med. 2005; 48:348–58.
9. Hong O. Hearing loss among operating engineers in American construction industry.Int Arch Occup

Environ Health. 2005; 78:565–74.
10. Lonsbury-Martin B, McCoy M, Whitehead M, *et al.* Otoacoustic emissions: future directions for research and clinical applications. Hear J. 1992; 45:47–52.
11. Lapsley Miller J, Marshall L, Heller L, *et al.* Low-level otoacoustic emissions may predict susceptibility to noise-induced hearing loss. J AcoustSoc Am. 2006; 120:280–96.
12. Marshall L, Lapsley Miller J, Heller L, *et al.* Detecting incipient inner-ear damage from impulse noise with otoacoustic emissions. J AcoustSoc Am. 2009; 125:995–1013.
13. Amedofu GK. "Hearing-impairment among workers in a surface gold mining company in Ghana," African Journal of Health Sciences. 2002; 9(1-2):91–97.
14. Wu TN, Liou SH, Shen CY, *et al.* Surveillance of noise-induced hearing loss in Taiwan, ROC: a report of PRESS-NIHL results. Prev Med. 1998; 27:65–9.
15. Chadambuka A, Mususa F, Muteti S. Prevalence of noise induced hearing loss among employees at a mining industry in Zimbabwe. Afr Health Sci. 2013; 13(4):899–906.
16. Ahmed HO, Dennis JH, Badran O, Ismail M, Ballal SG, Ashoor A, *et al.* Occupational noise exposure and hearing loss of workers in two plants in Eastern Saudi Arabia. Ann Occup Hyg. 2001; 45:371-80.
17. Ferrite S, Santana V. Joint effects of smoking, noise exposure and age on hearing loss," Occupational Medicine. 2005; 55(1):48–53.
18. Johnson DL. Field studies: industrial exposures. J Acoust Soc Am. 1991; 90:170–174.
19. Seixas N, Neitzel R, Sheppard L, *et al.* Alternative metrics for noise exposure among construction workers. Ann Occup Hyg. 2005; 49:493–502.
20. Suter AH. Construction noise: exposure, effects and the potential for remediation; a review and analysis. AIHA J (Fairfax, Va). 2002; 63:768–89.