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ORIGINAL ARTICLE

Frequency of Noise Induced Hearing Loss among Traffic Wardens of Lahore

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ABSTRACT

Background: Noise-induced hearing loss (NIHL) is a major cause of disability throughout the world. It is the most common irreversible job-related hazard in the world with a higher burden in the developing countries. Certain occupations are at high risk for NIHL. Traffic wardens could be considered highly vulnerable group as they are exposed to long hours of traffic noise. The objective of this study was to determine the frequency of noise induced hearing loss among traffic wardens of Lahore city.

Material and Methods: It was a cross-sectional, descriptive study, carried out from 1st December 2018 to 31st May 2019, in which 329 traffic wardens appointed in 34 beats/sectors of Lahore city were included. Data was collected through a structured questionnaire, followed by Pure Tone Audiometry (PTA) of all the subjects.

Results: A total of 329 traffic wardens were selected for this study. Mean age of the traffic wardens was 35.35 ± 1.21 years. NIHL was present in 174 (52.9%) traffic wardens, out of which, 138 (79.3%) had mild, 32 (18.4%) moderate, and 4 (2.3%) had moderately severe degree of hearing loss. Among the 329 traffic wardens, 165 (50.2%) had exposure to noise between 7am to 3pm (morning shift) and 42 (12.8%) had some problem with their hearing. Only 12 (3.6%) had ringing in the ears or tinnitus, 140 (42.6%) wore any hearing protection during duty hours and 42 (12.8%) said they had difficulty in hearing and frequently asked people to repeat themselves.

Conclusion: In this study a high frequency of noise induced hearing loss was reported among traffic wardens of Lahore city with most of them having mild to moderate degree of hearing loss.

Key words: Hearing impaired, Noise-induced hearing loss, Pure tone audiometry, Traffic wardens

Authors' Contribution:
[1,2] Conception, synthesis, planning of research and manuscript writing Interpretation, discussion, [3,4] ,[5]Active participations in data collection, data analysis.

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Introduction

Noise is defined as an unwanted sound which is unpleasant, or disruptive to hearing.[1] Noise-induced hearing loss (NIHL) is a global occupational health hazard in industrialized countries. After presbycusis, it is the second most frequent form of sensorineural hearing loss.[2] Hearing impairment (Audiometric Notch) with a threshold frequency of 4000 Hz is the characteristic feature of onset of NIHL.[3] Generally, NIHL is bilateral and in both ears demonstrates the same pattern.[4]

Noise is associated with many psychological problems that can contribute to stress.[5] The adverse effects of noise are auditory (damage of hearing) and non-auditory such as impulsive behavior, depression, fatigue and poor concentration.[6] NIHL occurs due to repeated and sustained exposure to high levels of sound. Any kind of noise exposure with enough strength and time can cause NIHL.[7]

Outer hair cells (OHCs) of cochlea are main site of hearing impairment, and their damage is irreversible. When two supporting hair cells die, their apical domain expands rapidly leading to compression of hair cell beneath its apical domain.[8] Occupational Safety & Health Association (OSHA) has set 90 decibels as time weighted average (TWA) for eight-hour daily work exposure to sound,[9] while this limit is 85 decibels as per National Institute of Occupational Safety & Health (NIOSH).[10]

The mechanism of damage includes accretion of the reactive oxygen genus and stimulation of the intracellular stress pathway, that leads to cell death.[11] Hearing loss due to cochlear dysfunction also changes the organization of the central auditory pathway.[12] Varying degrees of permanent deafness occurs due to damage to inner ear. Occupational NIHL is a major cause of disability throughout the world.[13] As per WHO, 360 million individuals worldwide have hearing impairment.[14] In America, most common reasons of hearing impairment for adults are noise, ear infection and age.[15]

NIHL is one of the most common problems seen among the individuals working in noisy environment. It is a sensorineural hearing loss (SHL), which may be occupational or non-occupational.[16] Vehicle noise is a main contributor.[17] The rapid growth of many cities in developing countries like Pakistan increases the use and ownership of motor vehicles[18], thereby increasing the level of noise pollution.[19] It is a notable problem of urban areas of the country, including the populous city of Lahore.[20] People residing in Lahore remain under constant threat of noise pollution. As per a survey report, on any given day in Karachi, Lahore, Peshawar, Rawalpindi and Quetta, the noise produced by vehicles is about 95dB $\pm$ 5dB, with auto rickshaw producing a noise up to 100-110dB.[21]

Among professionals, the traffic wardens are the ones who are under a constant threat of becoming hearing impaired due to heavy traffic noise in the city.[23] Most of them are unaware of effects of noise on their hearing capability because it takes quite long to become overt.[23] In Lahore, there are almost 3000 traffic wardens, working in three shifts of eight hours. [24]

The city of Lahore is divided into 34 Beats/Areas for traffic management. Two senior traffic wardens are appointed in every Beat/Sector, one in morning shift and one in evening shift. This study can be beneficial in creating awareness among traffic wardens about NIHL and necessity of precautionary measures to avoid it.

Material and Methods

It was a cross-sectional, descriptive study in which 329 traffic wardens appointed in 34 beats/sectors of Lahore city were included. Ethical approval was taken from the Institutional Review Board of University of Lahore. Written informed consent was taken from all the traffic wardens included in the study. Non probability purposive sampling technique was used. The sample size was calculated with WHO sample size calculator, taking the expected prevalence of NIHL in Pakistan at 69%[25], confidence interval at 95% and absolute precision at 5%. The study was carried out from 1st December 2018 to 31st May 2019. Only male traffic wardens aged between 22 to 40 years working in this profession for at least 10 years were included. While traffic wardens having any middle ear disease like otitis media were excluded from the study. Data was collected through a structured pre-tested questionnaire, followed by Pure Tone Audiometry (PTA) of all the 329 traffic wardens and entered into computer using SPSS version 24.0. Frequencies and percentages were calculated and data was presented in tables and figures.

Results

Among 329 traffic wardens, 194 (59%) were up to 35 years old while 135 (41%) were more than 35 years old. The mean age of traffic wardens included in the study was 35.35 $\pm$ 1.21 years. About 165 (50.2%) traffic wardens had exposure to noise between 7am to 3pm (morning shift), 163 (49.5%) between 3pm to 11pm (evening shift) and only 1(0.3%) traffic warden had exposure to noise between 11pm to 7am (night shift) (Figure 1).

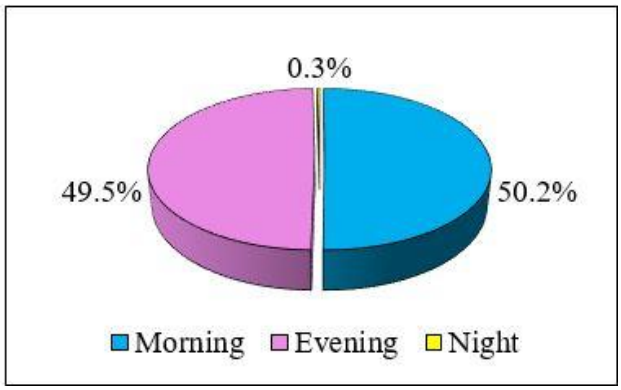

Figure 1: Distribution of traffic wardens in different shifts to noise exposure

Table I: Epidemiological and clinical characteristics of traffic wardens (n=329)		
	Frequency	**Percentage**
Age Groups		
≤35 years	194	59.0
>35 years	135	41.0
Total	329	100.0
Mean ± SD	35.35 ± 1.21	
Use of hearing protection during duty hours		
Yes	140	42.6
No	189	57.4
Total	329	100.0
NIHL according to PTA		
Yes	174	52.9
No	155	47.1
Total	329	100.0
Degree of hearing loss (*n* = 174)		
Mild	138	79.3
Moderate	32	18.4
Moderately severe	4	2.3
Total	174	100.0

NIHL-Noise Induced Hearing Loss, PTA- Pure Tone Audiometry

Regarding hearing impairment, 42 (12.8%) traffic wardens had problem with their hearing, including visit to a doctor/audiologist while majority 287 (87.2%) said they did not have any problem. Only 12 wardens (3.6%) had ringing in the ears or tinnitus, while majority (n=317; 96.4%) never faced this problem. About 140 traffic wardens (42.6%) wore hearing protection during duty hours. NIHL was not present in any of the 140 traffic wardens who wore hearing protection. Of those wardens with impaired hearing, 42 (12.8%) said they frequently asked people to repeat themselves while 287 (87.2%) wardens did not have such difficulty. Pure Tone Audiometry test revealed that more than half (n=174; 52.9%) of the traffic wardens had noise induced hearing loss while 155 (47.1%) had no NIHL. Out of those 174 traffic wardens who had noise induced hearing loss, 138 (79.3%) had mild, 32 (18.4%) had moderate while only 4 (2.3%) traffic wardens had moderately severe hearing loss (Table I).

Discussion

The current study was conducted to know the frequency of noise induced hearing loss among traffic wardens of Lahore city. Regarding hearing impairment, only 12.8% traffic wardens had problem with their hearing especially those in the morning or evening shifts. However, Pure Tone Audiometry test revealed that more than half (n=174; 52.9%) of the traffic wardens had noise induced hearing loss with about 20% suffering from moderate to moderately severe degree of hearing loss.

Most of the traffic wardens (59%) were up to 35 years old with a mean age of 35.35 ± 1.21 years. The findings of a study carried out in Ambala city (India) by Singh and coworkers (2015) were different from our study as majority of traffic wardens (78%) were more than 35 years old.[17] Similarly, another study by Venkatappa and colleagues (2018) reported that mean age of the traffic wardens was 42.46 ± 6.78 years.[23]

Constant exposure to heavy noise is dangerous for traffic wardens especially those who work eight hours daily during morning and evening shifts, when noise level is too high. The results of this study also confirmed that almost all the traffic wardens (99.7%) had high level of noise exposure because they were working in morning and evening shift and only one traffic warden was working in night shift when exposure to noise is low.

Only a few of the traffic wardens included in this study had problem with their hearing and visited a doctor/audiologist, with only 3.6% traffic wardens complaining of ringing in the ears or tinnitus. The results of our study exhibited a better scenario than a study carried out by Sreenivasulu who reported 40% of traffic wardens with complaint of ringing in the ears or tinnitus.[26] Use of hearing protection tools during duty hours, for example, ear muffs and ear plugs prevent traffic wardens from hearing loss. It is significant to mention that 42.6% traffic wardens used hearing protection devices but such

protective measures should be followed by all traffic wardens. Contrasting results have been reported by different researchers in this aspect. The results of a study undertaken by Singh and coworkers in Ambala India, reported only 2% traffic wardens using hearing protective equipments.[17]

In our study only 12.8% traffic wardens "frequently asked people to repeat themselves" due to hearing loss, while Gupta et al. found that 35.5% traffic wardens "asked people to talk loudly" in their study.[19] When noise induced hearing loss was evaluated using pure tone audiometry, NIHL was found prevalent among more than half of the traffic wardens (n=174; 52.9%) with 79.3% having mild, 18.4% moderate and 2.3% moderately severe degree of hearing loss. In contrast, Venkatappa et al. reported only 26.7% traffic wardens with noise induced hearing loss in which 62.5% had mild and 37.5% had severe degrees of hearing loss.[23] Another study carried out by Sreenivasulu showed the frequency of NIHL at 38.3% among traffic wardens, with 43.5% having mild, 21.7% moderate and 34.8% moderately severe degree of hearing loss.[26]

The limitation of the study is that many traffic wardens refused to participate in this study, therefore, it may not be representative of the general traffic warden community. Also, there may be information errors, as traffic wardens may falsely report on good habits such as use of ear protection during duty hours, and they may be mis-reporting on certain unacceptable habits, such as double duty shifts

Conclusion

There was a high frequency of noise induced hearing loss among traffic wardens of Lahore city with most of them having mild to moderate degree of hearing loss. Further studies should be conducted on a large scale to assess the frequency of noise induced hearing loss among traffic wardens and devise preventive strategies that are effective in the long run.

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