DOI:10.5958/j.2319-5886.2.4.131

International Journal of Medical Research & Health Sciences

www.ijmrhs.com Volume 2 Issue 4 Oct-Dec Coden: IJMRHS Copyright @2013 ISSN: 2319-5886

Received: 14th Aug 2013 Revised: 8th Sep 2013 Accepted: 19th Sep 2013

Research article

A STUDY ON HEARING THRESHOLD PROFILE IN TRAFFIC POLICE PERSONNEL

*Shelke BN[1], Aundhkar VG[2], Adgaonkar BD[3], Somwanshi SD[4], Gavkare AM[1], Ghuge SH[1]

[1]Assistant Professor, [3] Professor and Head, [4]Associate Professor, Dept of Physiology, MIMSR Medical College, Latur, Maharashtra, India

[2] Professor and Head of Dept, Dept of Physiology, Govt. Medical college, Miraj, Maharashtra, India

* Corresponding author email: bhagwat.shelke@gmail.com, dr.bhagwat@yahoo.co.in

ABSTRACT

Introduction: Noise is one of the causes of preventable sensori-neural loss. The traffic police personnel(TPP) busy in controlling traffic at heavy traffic junctions suffer from the ill effects of noise and air pollution. **Aim and objectives:** The objective of this study was to assess the hearing threshold at various frequencies of the traffic police persons exposed to the vehicular noise and comparison with controls not exposed to noise. **Material and methods:** Thirty TPP and thirty controls were evaluated by clinical methods and subjected to the Pure Tone Audiometry (PTA) in ENT department. Audiogram recorded by using conventional techniques in both ears. **RESULTS:** There was a significant difference in the hearing thresholds at frequency 2000 Hz, 4000 Hz and 8000 Hz of right and left ear between the two groups. **Conclusion:** This study concludes an increased risk of noise induced hearing loss (NIHL) for the environmental noise exposed subjects.

Keywords: Traffic police personnel, TPP, Hearing threshold, NIHL

INTRODUCTION

Automobile vehicles are the major sources of noise in the city, which originates from engines, air turbulence and frictional contact of the vehicle's tiresto the ground. Noise is one of the causes of preventable sensori-neural loss. The attention has to be given towards the problem as no cure is available for noise induced hearing loss because of irreversible damage to the hair cells.[1-4]Studies carried out by various workers showed an average traffic sound in the city is about 60-102 dB.[5,6]The traffic police personnel busy in controlling traffic at heavy traffic junctions suffer from ill effects of noise and air pollution. Irritation of upper respiratory tract provokes them to use a mask to prevent the ill effects of air pollution. However, the insidious nature of the noise induced hearing loss keep the majority of them unaware of the effects of noise pollution. [7,8]

With this background, this study was carried out to evaluate hearing threshold profile of traffic police personnel serving at busy parts of streets in the city.

MATERIAL AND METHODS

After the approval from Secretary of ethical committee this study was conducted in Miraj, city of Maharashtra (India), between July to December 2010 in 30 traffic police personnel (TPP) and 30 normal healthy individuals as a control from the same city and residing in the College campus. Written informed consents were obtained from all the subjects.

Inclusion criteria: Age between 25 to 45 years. Five years of exposure to traffic pollution, with spending average 8 hours in busy traffic areas. The thirty normal healthy individuals (control group) were of the same age and sex. The study and control group belonged to the same ethnic group. All the subjects were males.

Exclusion criteria: A primary screening was done in the medicine and ENT outpatient department by personal history and otoscopic examination. By taking detailed personal history subjects having smoking habits, diabetes mellitus and hypertension were excluded from the study. Subjects having conditions that may affect the hearing like ear drum perforation, acute or chronic suppurative otitis media, wax and suffering from ear diseases were excluded from the study.

Thirty traffic police personnel and thirty controls underwent a pure tone audiometry (PTA). Audiometer used was Elkon EDA-3N3 Giga 3. Audiometric testing was conducted in a dedicated room that met the audiometer manufacturer's specifications, in ENT department. Test was conducted in the morning hours before joining the duty hours to minimize the effect of temporary threshold shift (TTS). Air conduction was assessed by placing ear phones on the ears. Each ear was evaluated separately and the results were reported on the graph known as an audiogram. Audiogram recorded by using conventional techniques in both ears. The test begun at 1000 Hz and then other frequencies were tested in the following order 2000-4000Hz repeated again followed by 500Hz and 250 Hz. The examiner first familiarizes the subject with the tone by delivering the sound at an arbitrarily presumed supra-threshold level oftesting frequency. When the subject hears the tone, the tone is reduced by 10 dB till subject stops hearing or fails to give a response. Once this stage is reached the tone raised by 5 dB. If the subject hears this tone, the sound is again decreased by 10 dB. If he does not hear it, the tone was again raised by 5 dB. In this way by several threshold crossings (between 10-110 dB), the exact hearing threshold was obtained when one gets at least 3 out of five responses correct.

RESULTS

The age, height, body weight and BMI were compared between the control and study group using two tailed un-paired Student's t test in Microsoft Excel 2007. It was found that there was no significant difference between two groups for age in years , height in centimeters, weight in kg BMI in kg/m2 (Table1).

The audiometry data was calculated in an excel spreadsheet which was then exported R 3.0.1 version for analysis. The collected audiometry data was analyzed by using two tailed un-paired Student's t-test and the values were expressed as mean ± SD of observed value.A *P-value* of less than 0.05 was taken as significant (Table II).

Table.1: Anthropometric parameters of control and study groups

	Control group (n=30)	**Study group (n=30)**	**(p Value)**
Age (years)	34.57±7.47	35.03±8.13	> 0.05
Height (cm)	171.9±5.55	172.63±4.71	> 0.05
Weight (kg)	71.6±8.66	75.53±7.96	> 0.05
BMI (kg/m2)	24.24± 2.88	25.1± 2.67	> 0.05

Table II - Average hearing threshold at different frequencies in study and control groups

Hearing Thresholds Frequencies in Hertz		Study group(n=30)	Control group(n=30)	*p* value
250	**R**	23.83±5.52	25.5±7.11	>0.05
	L	25.83±5.26	24.83±6.08	>0.05
500	**R**	23.5±5.11	23.16±6.88	>0.05
	L	24.33±4.49	25±5.41	>0.05
1000	**R**	21.66±5.14	21.66±5.62	>0.05
	L	23.5±4.38	24.16±5.09	>0.05
2000	**R**	17.83±4.29	21±4.43	<0.05*
	L	17.16±3.86	21.33±5.07	<0.05*
4000	**R**	17.33±4.86	33.83±15.57	<0.05*
	L	17.50±4.50	33.83±17.89	<0.05*
8000	**R**	15.5±5.62	23.33±10.61	<0.05*
	L	14.5±8.02	22.16±12.77	<0.05*

***** Significant R- right ear L- left ear

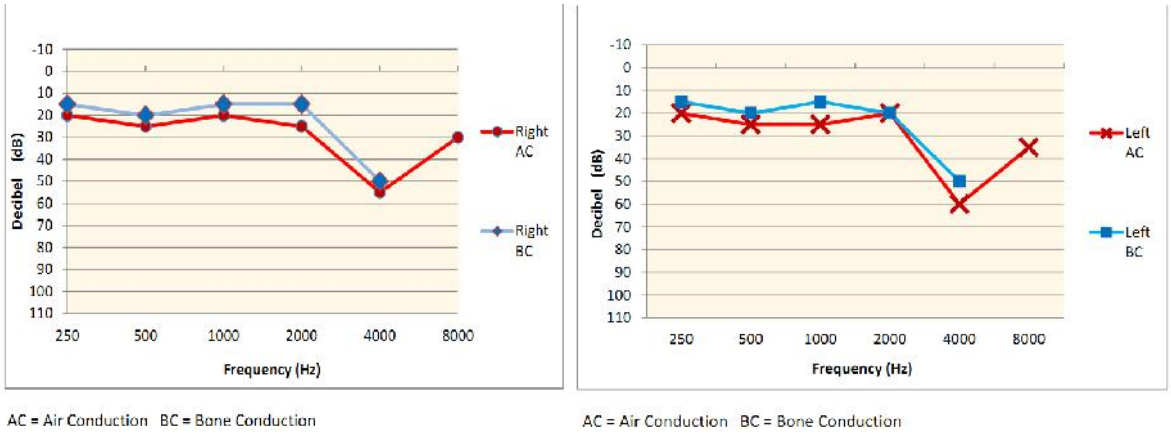

Fig.1: Study group subject's audiogram (Right & Left)

DISCUSSION

In the present study tested for the hearing threshold audiometrically in right and left ear separately. Mean hearing level at each tested frequency was compared between noise exposed TPP and non exposed groups using un-paired Student t tests. There was a significant difference in the hearing threshold at frequency 2000 Hz, 4000 Hz and 8000 Hz of right and left ear between the two groups.This is in agreement with the finding of Jayesh et al who showed an increased hearing threshold mainly affected higher frequencies concentrated at 4000Hz in textile workers exposed to industrial noise in Gujrat[9]. Frequency specific analysis by McBride et al[10]andFrancois-Xavier Lesage et al [11]showed notches at 4 kHz in electrical transmission workers and France Motorcycle police officers respectively who had the expected associations with exposure to noise. Similar raised hearing thresholds at higher frequency were recorded in Liquefied Petroleum Gas (LPG) Cylinder Infusion Workers exposed to noise in Taiwan[12]. Our study confirmed the presence of 4000Hz notch[5] which is the classic sign of NIHL. Since most significantly affected frequency was 4000 Hz for both right and left ears, paired t test was conducted to evaluate whether there was any significant difference for hearing loss between right and left ears of study subjects. This showed no significant difference of hearing loss between right and left ears of study subjects. This finding was similar with studies conducted on workers of chromite mines[13]. In the early stages of NIHL, the speech frequencies are less affected and the patients have a very few symptoms and hence

they are usually unaware of the deleterious effects of sound. Frequency area 4000-6000 Hz is usually affected first with maximum at 4000 Hz. Any level of NIHL may muffle high-frequency sounds such as whistles or buzzers and may result in difficulty discriminating speech consonant sounds such as those in the words fish and fist, particularly in noisy environments with background noise, many voices, or room reverberation[6,9]. The observed hearing impairment was most probably related to the prolonged exposure to road traffic noise. Daily noise exposure, over long period affects the hearing ability. The mechanism involved in noise inducing hearing loss includes mechanical damage to cochlear structure and metabolic overload due to excessive stimulation. The severity of hair cell damage depends on sound intensity. Exposure to noise at sub-traumatic level exhibit a temporary threshold shift in hearing, reversible with time away from the hazardous exposure. Higher level of sound leads to collapse of stereocilia and eventual permanent damage to hair cell. Non-functioning of outer hair cells raise the threshold sensitivity of inner hair cell and greater stimulation is required to initiate an impulse; which perceived as a hearing loss[5,13].

Limitations: Some technical limitations could not be avoided in this study. First, the timing of the audiometry assessment in relation to when subjects were last exposed to noise could not be controlled. The French norm recommends testing hearing 3 days after the last noise exposure, but it was not possible to achieve this in this study. Therefore, it is possible that the effect of temporary threshold shift has led to an overestimate of the real risk of NIHL.

The second limitation of the present study was the small sample size of subjects, which was not ideal for cross-sectional analysis and thus the statistical significance of the results should be interpreted with caution. We were constrained by the inability to find adequate number of subjects as per criteria of study by excluding smokers, females and exposure < 5 years within limited number of TPP in the study area. So, it is important to replicate and extend our observations to large population. We also fail to quantify the noise level at the traffic junctions.

CONCLUSION

This study concludes traffic police personnel working on busy traffic junctions are at risk of noise induced hearing loss. They have to make aware of the ill effects of noise and motivate to use personal protective devices like ear plugs and ear muffs.

REFERENCES

1. Thomas A, Nor Mariah A, Fuad S, Kuljit R Philip. Noise Exposure and Noise Induced Hearing Loss Among Kuala Lumpur Traffic Point Duty Personnel. Med J Malaysia.2007;62(2):152-55.
2. Omidvari M., Nouri, J. Effects of noise pollution on traffic policemen. Int. J. Environ. 2009; 3(4):645-52.
3. Abdel-Aziz Kamal M, SamiaEldamati E, Ricky Paris. Hearing threshold of Cairo traffic policemen. International Archives of Occupational And Environmental Health 2004; 62:543–45
4. Itrat Jawed, AyubMusani, RaanaMahmood, Wadood, YousufKhambaty, MohamadAsim. The effect of traffic noise on the hearing level of people on Karachi streets. J Pak Med Assoc. 2010; 60(10): 813-816.
5. Nandi SS, Dhatrak SV. Occupational noise induced hearing loss in India. Indian journal of occupational and environmental medicine. 2008.12(2):53-56
6. Shrestha I, Shrestha BL, Pokharel M, Amatya RCM, Karki DR. Prevalnace of Noise Induced Hearing Loss among Traffic Police Personnel of Kathmandu Metropolitan City. Kathmandu Univ Med J. 2011;36(4):274-78

7. Tripathi SR, Tiwari RR. Self-reported hearing quality of traffic policemen: a questionnaire-based study. Indian journal of occupational and environmental Medicine. August 2006; 10(2): 82-84.
8. Kavana G, Venkatappa, Vinutha Shankar MS, NachalAnnamalai. Assessment of knowledge, attitude and practices of traffic policemen regarding the auditory effects of noise. Indian J PhysiolPharmacol 2012;56(1):69–73
9. Solanki JD, Mehta HB, Shah CJ, Gokhale PA. Occupational noise induced hearing loss and Hearing threshold profile at high frequencies. Indian journal of Otology. 2012;18(3):125-28.
10. D I McBride, S Williams. Audiometric notch as a sign of noise induced hearing loss. Occup Environ Med 2001; 58: 46–51
11. Francois-Xavier Lesage, Nicolas Jovenin, Frederic Deschamps, Samuel Vincent. Noise-induced hearing loss in French police officers. Occupational Medicine 2009; 59:483–486.
12. Shu-Ju Chang, Chin-Kuo Chang. Prevalence and Risk Factors of Noise-induced Hearing Loss among Liquefied Petroleum Gas (LPG) Cylinder Infusion Workers in Taiwan. Industrial Health 2009; 47: 603–610
13. SunamaniKarketta, RajendraGartia,SomanathBagh. Occupational hearing loss of the workmen of an open cast chromite mines. Indian journal of occupational and environmental medicine. 2012;16(1) :18-21