ARE YOUNG BUS DRIVERS AT A RISK OF DEVELOPING NIHL?? A PRELIMINARY STUDY

RASHMI PAI

Assist. Prof. Dr. Kasturba Medical College Manipal University, India
E-mail: dessairashmi@gmail.com

Abstract- Noise can damage hearing and is associated with a number of psychological problems that can contribute to stress and also depression related symptoms. In heavy motor vehicles, as noise is usually experienced simultaneously with vibration there is a combined assault from both sources. This is particularly for bus and lorry drivers who already experience elevated stress levels from the traffic environment and time pressures of the work. This deterioration is the result of traffic congestion and its associated air and noise pollution along with the pressure of maintaining a demanding schedule in circumstances making the task more difficult (Corrêa et al, 2002).

Keywords- Heavy Motor Vehicle, Developing NIHL, Traffic Environment and Time Pressures.

I. INTRODUCTION

Noise-induced hearing loss (NIHL) is the most prevalent irreversible industrial disease, and noise is the biggest compensable occupational hazard'. Long term exposure to noise can result in permanent damage to the auditory nerve and/or its sensory components (NIOSH, 1996). This irreversible damage makes it difficult to hear and understand speech. According to NIOSH (1996), NIHL is the most common occupational disease in the United States today, with approximately 30 million workers exposed to excessive noise levels or to toxic agents that are potentially hazardous to their hearing. Melnick et al. (1994) in their study discovered sensory-neural hearing loss in all the subjects exposed to high intensities of noises. It is an increasingly prevalent disorder that results from long term exposure to high-intensity sound which is preventable and affects people of all ages.

Noise can damage hearing and is associated with a number of psychological problems that can contribute to stress and also depression related symptoms. In heavy motor vehicles, as noise is usually experienced simultaneously with vibration there is a combined assault from both sources. This is particularly for bus and lorry drivers who already experience elevated stress levels from the traffic environment and time pressures of the work. This deterioration is the result of traffic congestion and its associated air and noise pollution along with the pressure of maintaining a demanding schedule in circumstances making the task more difficult (Corrêa et al, 2002).

According to G. Mohammadi (2009), traffic noise is a major source of environmental pollution in developed and developing nations. Susceptibility of developing NIHL is very high among professional drivers who are exposed to high intensity noise levels for long duration. Other physiological and psychological effects, including sleep disturbance, fatigue and increased heart rate and blood pressure are commonly seen among this group. As stated in the Federal Register (1999), OSHA(29 CFR 1910.134)allows human ear to be exposed to short duration sound in excess of 120 dB without permanent damage although it may cause pain and discomfort; but long term exposure to sound levels over 80 dB can cause permanent hearing loss. The new regulations allow the permissible exposure level (PEL) of 85dB (A) TWA8 (time weighted average – 8 hours).

According to the Third European survey on working conditions (2000), about 20 % of European workers are exposed to very loud noise which makes them raise their voice to while communication. Noise can cause hearing impairment, interfere with communication, disturb sleep, cause cardiovascular and psycho-physiological effects, reduce performance, and provoke annoyance response and changes in social behavior Factsheet 258, 'Occupational and community noise', World Health Organization, revised (2001).

Cordeiro et al., (1994) studied the relationship between NIHL and the time duration of the job as a driver of urban public vehicles and diastolic blood pressure and aging among drivers and conductors in Brazil. Their results showed a positive association of hearing loss and the accumulated working time. Bus drivers are known to be a high risk group. According to Richter P et al (1998) the bus drivers during work, deal with the pressure of time, the responsibility of the passengers' welfare and safety, as well along with other demands.

Patwardhan, Kolate and More (1996) carried out a study assessing the loudness levels and the effects of noise among the bus drivers in their cabin and compared it to the controls who were exposed to the noise level of 50-62dB.It was found that, the intensity of noise in the drivers cabins ranged from 89 to 106 dB and 89% of the drivers showed abnormal

audiograms whereas the percentage of affected audiograms among the controls was only 19%.
A study by Seshagiri B. (1998) revealed the drivers are exposed to noise ranging from 78 to 89 dB(A), with a mean of 82.7 dB(A). Operating the radio increased the mean by 2.8 dB, driving with the side window open increased the mean exposure by 1.3 dB, and driving with the window open and operating the radio resulted in an increase of 3.9 dB Paulo (2002) stated that the risk of noise-induced hearing loss was greater for drivers in job for more than 6 years, even after controlling for age related factors.

A. Kumar et. al (2005) in their study compared the hearing status of tractor driving farmers and non-tractor driving farmers matched for age, gender and related factors. The noise levels observed on tractors in different operations were in the range of 90–110 dBA. The study revealed a higher prevalence of abnormalities in tractor drivers compared to non-tractor drivers.

M. Janghorbani, A. Sheikhi and S. Pourabdian (2009) reported that the prevalence rates of bilateral NIHL were higher in left ear when compared to right ear on the drivers of Ishfahan, Iran. According to J. Majumder, C.R. Mehta, D. Sen (2009), the range exceeded to 25 dBA for professional drivers with both less than and more than 10 years of noise exposure. The hearing damage of professional drivers was found to occur faster at 3 and 4 kHz frequencies than losses at lower frequencies. They concluded that the occupational hazards of professional driving were significantly higher than the office workers.

According to research presented at the AAO-HNSF Annual Meeting (2009) Drivers are consistently exposed noise levels between 88 to 99dBA. Long or repeated exposure to sounds over 85dB can cause permanent hearing loss. Road surface, traffic congestion, wind noise, and driving speed were stated to be the contributing factors.

Dawid and Francois (2010) in their study investigating the extent of noise exposure among the truck drivers using the trucks of two different brands manufactured with identical engines found no significant differences between the two. They also stated that this noise exposure is potentially hazardous to their hearing. Mukherjee et al. (2010) studied some of the harmful occupational agents like, noise, heat, dust and volatile organic compounds among bus drivers in Kolkata (India) and indicated that the drivers undertaking three consecutive trips within the city traffic routes in special buses are exposed to higher noise levels than the recommended standard.

T. Sen et.al, (2011) carried out a study assessing the effect of noise exposure among auto rickshaw drivers in in Kolkata India. Results revealed that hearing loss caused due this noise exposure, can interfere with the safety of driver daily life since working in such places noise dose exceeded 89 dBA. A prospective study in 2009, of the convertible-driving experience measured noise levels at speeds of 50, 60, and 70 miles per hour (mph), and indicated that drivers are consistently exposed to noise between 88 and 90 dBA, with a high of 99 dB. Abdelmoneim (2013) reported a higher prevalence of hearing impairment as well as hypertension among long distance bus drivers than their counterparts operating in the city.
High intensity noise exposure is hazardous to human ears. In view of the existing knowledge, comparing hearing in young bus drivers with varied driving experience would be of great interest. The present study focuses on the same. To investigate the prevalence of Noise Induced hearing loss in young adult drivers in the age range of 25 to 40 years with varied driving experience and also to compare the noise induced threshold shift in young Drivers with varied duration of driving experience as well as to compare the noise induced threshold shift in left and right ear.

II. MATERIALS AND METHODS

138 bus Drivers in the age range of 25 to 40 years with varied driving experience were considered for the study. Informed consent form was obtained from each subject before conducting the study. The study was carried out at Kasturba Medical College, Manipal University. Subjects fulfilling the following criteria were considered for the study.

- Subjects with driving experience of minimum 1 year and maximum of 15 years.
- No history or presence of any conductive pathology.
- No history or presence of neurological symptoms, vertigo or giddiness.

A detailed case history was obtained for all the subjects to collect information about auditory history and related factors mainly stressing upon the type, duration/day, loudness and the driving experience.
Pure tone thresholds were obtained using the modified Hughson and Westlake procedure (Carhart & Jerger, 1959) through calibrated 'Orbitor 922' Audiometer.for the frequency range of 250-8000Hz and 250-4000Hz through air conduction and bone conduction mode respectively. Pure tone average of 500Hz, 1000Hz and 2000Hz (PTA1) and 1000Hz, 2000Hz and 4000Hz (PTA 2) was calculated.
Subjects were mainly divided into 3 groups, based on years of exposure/experience as,

- Group I: Less than 5 years of noise exposure/ driving experience.
- Group II: 5 to 10 years of noise exposure/ driving experience.

- Group III: More than 10 years of noise exposure/ driving experience.

The values observed in the studied variables were stored in Microsoft Excel. PTA 1 and PTA 2 were compared across all the three groups for right and left ear separately through SPSS 15 software. Also, the Incidence of NIHL was checked by calculating the percentage of affected ears in all the three groups. Repeated measure ANOVA was used to see the interaction between the 3 groups and the ears.

III. RESULTS AND DISCUSSION

Pure tone average of more than 25dB was considered as affected. Group II and III with higher duration of exposure/ driving experience showed a significantly higher prevalence of Noise Induced Hearing Loss which is in agreement with a study done by Patwardhan, Kolate and More (1996) whereas the Group I with less than 5 years of noise exposure showed no abnormal thresholds. Percentage of affected years in Group III was 13.33% for right ear and 20% for left ear when compared to Group II with percentage of 9.52% for right ear and 6.66% for left ear as shown in figure 1. The overall prevalence among all the groups was 9.23% in the right ear and 7.69% in the left ear. Which was lesser as compared to that stated by Lopes et. Al (2012) as 22.36% in the developed countries.

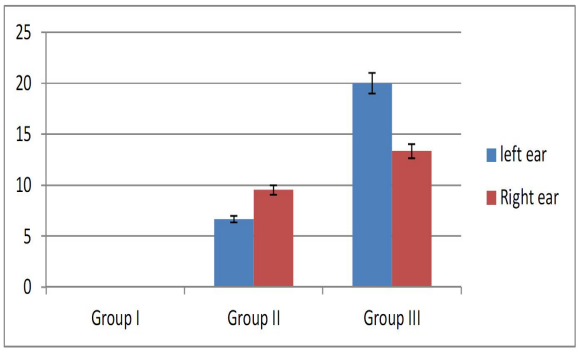

Figure 1: Comparison of Percentage of affected ears among the three groups.

Pure tone Average 1 and 2 were compared using the repeated measure ANOVA through SPSS 15 software. All the three groups showed Significant difference between R PTA 1 (Mean Rt: 19.25, Lt: 19.71) and PTA2 (Mean Rt: 19.57, Lt: 20.22) with p=0.00. Comparison of means of the right and left ear also showed significant difference with p: 0.00. Results of the present study reveal that the risk of NIHL increases with increase in the years of noise exposure.

Hence appropriate health measures like surveillance packages, periodic audiological evaluations (Karimi et.al 2010) and hearing conservation programs, should be encouraged and emphasized among the heavy vehicle drivers so as to prevent NIHL.

IV. SUMMARY AND CONCLUSION

The percentage of prevalence of NIHL among young bus drivers in the developing countries like India is found to be as high as 8.46%. And this prevalence is found to increases with the increase in the exposure duration.

Hence, it is suggested from the present study that hearing conservation programs should be implemented as a mandatory act for all the occupational setups involving noise exposure.

A baseline as well as periodic audiometry should be more emphasized s to track any changes in the auditory system due to noise exposure. This would lead to adoption of appropriate ear protection measures which would in turn drastically reduce the incidence and prevalence of occupational hearing loss.

The present study reveals that the risk of NIHL increases with increase in the years of noise exposure. The percentage of affected ears in developing countries like India is much higher than the developed countries.

Study of a similar kind can be carried out in future by using more detailed diagnostic tools like Oto Acoustic Emissions, Auditory Brain Stem Evoked Audiometry and Vestibular Evoked Myogenic Potentials.

Also, appropriate measurement of noise levels would provide more information in this regard. Therefore, hearing conservation programs and periodic audio logical evaluations with administrative and engineering controls like, employee training, alteration in number of working hours per day, better maintenance of roads and reducing vehicle noise due to emission should be taken to control NIHL in bus drivers.

REFERENCES

[1]. American Academy of Otolaryngology-Head and Neck Surgery (2009, October7). Drivers Of Convertibles May Be At Risk For Noise-induced Hearing Loss. Science Daily

[2]. Abdelmoneim, I. (2013). Hearing impairment and hypertension among long distance bus drivers, IP: 122.179.47.57

[3]. Janghorbani, .M., Sheikh, .A., Pourabdian, .S. (2009) the Prevalence and Correlates of Hearing Loss in Drivers in Isfahan, Arch Iranian Medicine 12 (2),128-134

[4]. Javed, .M..A., Azeem, .M.A., Batool, .A. (2008 January) Effect of noise pollution on hearing of public transport drivers in Lahore city Pakistan Journal of Medical Science 24(1), 142-146

[5]. Karimi, A., Naisiri, S., Kazerooni, F. K., & Oliaei, M. (2010). Noise induced hearing loss risk assessment in truck

drivers. Noise Helath, 12(46), 49-55. DOI: 10.4103/1463-1741.59999

[6]. Kumar .A., Mathur .N.N., Varghese .M., Mohan .D., Singh .J.K., Mahajan .P. (2005 Apr) Effect of tractor driving on hearing loss in farmers in India. American Journal of Industrial Medicine, 47(4),341-348.

[7]. Lopes .A.C., Otowiz .V.G., Lopes .P.M.B., Lauris .J.R.P., Santos. Prevalence of noise-induced hearing loss in drivers, International Archives of Otorhinolaryngology.16(4) Oct./Dec. 2012.

[8]. Majumder .J., Mehta .C.R., Sen .D. (January 2009) Excess risk estimates of hearingimpairment of Indian professional drivers International Journal of Industrial Ergonomics 39(1), 234-238.

[9]. Osha.gov; deir.qld.gov.au Noise on the School Bus: Dangerous on Many Levels.

[10]. Patwardhan .M.S., Kolate .M.M., More .T.A. (1991), To assess effect of noise on hearing ability of bus drivers by audiometry. Indian Journal of Physiology and Pharmacology 35(1), 35-38.

[11]. Santos .A.S., Castro Júnior .N.D. (2009, Sep-Oct).Brainstem evoked response in bus drivers with noise-induced hearing loss. Brazilian Journal Otorhinolaryngology. 75(5), 753-9.

[12]. Seshagiri .B.(1998 Mar) Occupational noise exposure of operators of heavy trucks American Industrial Hygiene Association 59(3), 205-213.

[13]. Vlajkovic .S.M., Lee .K.H., Wong .A.C.Y., Guo .C.X., Gupta .R., Housley .G.D., Thorne.P.R. (2010) Adenosine amine congener mitigates noise-induced cochlear injury. Purinergic Signalling, DOI: 10.1007/s11302-010-9188-5.

[14]. Sen .T., Bhattacharjee .P.K., Banerjee .D., Sarkar .B. (2011 October) Noise Exposure Parameters of Auto Rickshaws Compare by Statistical Regression Technique International Journal of Environmental Science and Development, 2(5).

[15]. University of New South Wales (2013, April 15). Concert cacophony: Short-term hearing loss can be protective, not damaging, researchers find. Science Daily.

[16]. World Health Organization, (1994). Association of hearing loss induced by noise with the accumulated working time between drivers and collectors, 10(2).

[17]. World Health Organization, revised (2001) Occupational and community noise.

★★★