IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

EFFECT OF TRAFFIC NOISE ON HEARING SENSITIVITY OF TRAFFIC POLICE PERSONNEL IN HYDERABAD

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Abstract: Noise is the new age or generation hazard, which has become the inevitable part of the civilized world. Noise is defined as “unwanted sound”. It has a significant impact on the quality of life, and in that sense, it is a health problem in accordance with the World Health Organization's (WHO). The traffic police people are mostly on the roads for about 8 hours a day getting exposed to the noise which is more than the permissible levels. Thus, this indicates the need to identify the hearing status and other hearing related problems in traffic police people. The present study aims at investigating the effect of traffic noise on hearing ability of traffic police personnel. Identify the early onset of hearing loss among them and bring awareness and prescribe proper ear protective devices. It also aims to measure the noise levels in different locations in Hyderabad city. A total number of 40 traffic police people (80 ears) between 20 and 45 years of age participated in this study. The participants were divided in to three groups. All participants were subjected to an extended audiological test battery containing tests on audiometric thresholds. Before the actual investigation started, all the participants underwent otoscopic examination and Immittance audiometry. The hearing loss in the traffic police people was symmetrical, i.e. their hearing acuity for both was equally affected in both the ears. The Speech Recognition Thresholds were higher in traffic police people. The DP amplitudes were reduced at 3000Hz, 4000Hz and 5000Hz in traffic police people. Thus, it can be conclude that the long standing exposure to noise results in decreased DP amplitudes of OAEs.

Index terms: **NIHL, traffic noise, Traffic police, Pure tone Audiometry, Immittance Audiometry, OAE, SRT.**

I. INTRODUCTION

World Health Organization's (WHO) definition of health, WHO's definition of health includes total physical and mental well-being, as well as the absence of disease. Along these lines, 1971 WHO working group stated: "Noise must be recognized as a major threat to human well-being." (Suess, 1973). Noise can cause irritation and multiple health problems. Major health hazards from noise pollution include loss of hearing, hypertension, annoyance, fatigue and physiological disorders related to cardiac, digestive and nervous system. Noise may be caused by a number of business activities related to community life, industry and transport. The effects of noise are seldom catastrophic and are often only transitory but adverse effects can be cumulative with prolonged or repeated exposure. Although it often causes discomfort and sometimes pain, noise does not cause ears to bleed but the major problem is ‘permanent hearing threshold shift’ which is otherwise called as “NOISE INDUCED HEARING LOSS” that usually takes years to develop. Noise-induced hearing loss can indeed impair the quality of life, through a reduction in the ability to hear important sounds and to communicate with family and friends. Some of the other effects of noise, such as sleep disruption and the inability to enjoy one's property or leisure time. Noise can interfere with the teaching and learning process, disrupt the performance of certain tasks and increase the incidence of antisocial behavior. There is also some evidence that it can adversely affect general health and well-being in the same manner as chronic stress. Hearing loss that is caused by the noise exposure due to recreational or nonoccupational activities is termed socioacusis. Hearing loss due to injurious noise at workplace is referred to as Occupational Noise Induced Hearing Loss (ONIHL). Noise-induced hearing loss (NIHL) is one of the most common types of hearing loss among adults. The World Health Organization estimates that 10% of the world's population is exposed to sound levels that could potentially cause NIHL (Chadha et al., 2021). NIHL is a complex condition with indiscernible mechanisms that result from exposure to loud sounds, and is likely influenced by age, sex, genetics, underlying diseases, personal behaviors, and other physical and chemical hazards (Basner et al., 2014; Wang et al., 2021a). Several studies indicated that even moderate noise exposure could result in hearing difficulties in individuals with normal hearing thresholds, which has been referred to as "hidden hearing loss (HHL)" (Kohrman et al., 2020).

II. REVIEW OF LITURATURE

Noise has been described as sound without agreeable musical quality or as unwanted or un desired sound. Music to one ear may be noise to another. Noise is generally accepted as a sound of any kind which is undersigned by the recipient at a given time and place (Stephens, 1986). The study by Biswas and Kumar found that nearly half the workers engaged in activities involving hammering metal, welding, wood joinery, sawmilling, and grain grinding had audiogram patterns typical of NIHL. The study by Lokhande in Goa observed notched hearing loss in 6% of the exposed workers in a ship-building industry but none in the age-and sex-matched office controls. The study among cotton ginning workers by Dube et al. observed exposure to continuous noise levels of 89–106 dBA, with binaural hearing impairment present in 86% of the workers. Bilateral and symmetrical hearing loss in traffic policemen with chronic noise exposure was reported in the study by Indora et al. The study by Tikriwal et al. among carpet workers observed a high prevalence of both tinnitus and hearing loss, with increasing prevalence associated with the greater severity of hearing loss. Several studies reported a positive correlation between duration of hazardous noise exposure in the workplace and the degree of hearing loss in the workers.Increasing mechanization in all industries created the noise problem and made the noise as number one health hazard of industrial society. Noise induced hearing loss is significant health problem in most industrially advanced nations. Nevertheless it wouldn't be wrong to say, "Noise is the biggest out product of industrialization".

2.1 Pathophysiology

Pathophysiological changes on human ear damage by noise studied by McGill and Schuknecht (1976), revealed diffused degeneration of hair cells and nerves in the second quadrant of the basal turn of the cochlea in the 9-13 mm regions-the area sensitive to 3000-6000 Hz sounds. This finding was further supported by Johnson Hawkins, (1976) Sataloff, Menduke, Yerg, Gore, (1984). Out of the population being exposed to loud hazardous noise levels, traffic policemen form a large category of the population who are exposed to continuous loud noise. Temporary Threshold Shift (TTS) and Noise Induced Permanent Threshold Shift (NIPTS) are the types that would be more likely to occur in traffic policemen due to prolonged vehicular noise exposure. A TTS of less than 25dB over 8 hours is generally restored to normal after 16 hours of with no exposure (Jones, 1983) but continued exposure can produce a permanent shift.

2.2 A brief survey of international noise standards

Some information on the noise control standards were found for each of the following countries: Australia, Canada, United Kingdom, United States, European Community, Brazil, Barbados, Trinidad, Dominica, Mauritius, Malaysia, India, Singapore, Hong Kong, Japan, Uganda, Thailand, Taiwan, and Israel.

India: Maximum permissible is 90 dB(A) for an 8 hour work day. Maximum permissible impulse is 140 dB(A). No prolonged exposure permitted for levels in excess of 115 dB9A). Australia: Australia National Occupational Health and Safety Commission suggested that maximum permissible is 85 dB(A) for an 8 hour work day. Maximum permissible impulse is 140 dB(A). Canada: Limits vary slightly throughout the various Provinces of Canada. Ranges are given. Maximum permissible is 85 to 90 dB(A) for an 8 hour work day. Maximum permissible impulse is 135 to 140 dB(A) as recommended by Canadian Centre for Occupational Health and Safety. Singapore: Maximum permissible is 85 dB(A) for an 8 hour work day as suggested by Department of Industrial Health. Thailand: Ministry of Interior recommended that maximum is 80 dB(A) for an 8 hour work day. Maximum permissible is 90 dB(A) for an 8 hour work day. Trinidad: Maximum permissible is 90 dB(A) for an 8 hour work day suggested by Environmental Management Authority. United Kingdom: Noise at Work Regulations recommended that maximum is 85 dB(A) for an 8 hour work day. Maximum permissible is 90 dBA for an 8 hour work day. Maximum permissible impulse is 140 dB(A). United States: Occupational Safety and Health Administration, U.S. Department of Labour recommended that maximum permissible is 90 dB(A) for an 8 hour work day. Maximum permissible impulse is 140 dB(A)

2.3 Pure tone audiometry

Leong and Laortanakul (2003) studied the audiometric measurement of 4000 persons of four different categories of occupational people, i.e., drivers, street vendors, traffic officers and road dwellers were selected. The results of audiometric investigation revealed that hearing capacity of the daily noise exposure groups living in the three urban sites were noticeably poorer than those who were living in suburban site. Among the occupational population who were living in the urban monitoring sites, the driver groups were found to have the highest risk of noise induced hearing loss.

Ingles, et al. (2005) conducted study on Noise exposure and hearing loss among the traffic policemen working at busy streets of Jalgaon urban centre. The study focused on the traffic policemen working for 10-12 hours daily in a noisy environment. Data on self-reported health status was collected by questionnaire and an audiometry was used to determine hearing threshold at high and low frequencies. Among them 84% of the subjects reported hearing loss and defined at least some difficulty of hearing in one or both ears. The prevalence of audiometric hearing impairment defined as a threshold average greater than 25dB (A) hearing level was 80% for binaural low frequency average (250, 500 and 1000Hz), 70% for binaural mid-frequency average (1000, 2000, 3000 and 4000 Hz) and 46% for binaural high frequency average (3000, 4000, 6000 and 8000 Hz) in the traffic policemen.

2.4 Speech audiometry

The Speech Recognition Threshold (SRT) is believed to be related primarily to the Pure Tone Average (PTA) and the steepness of the hearing loss. However, there are indications that it can also be influenced by perceptual or cognitive-linguistic factors, or both, such as meaningfulness of the speech stimuli**.** Moreira and Ferreira (2004) evaluated speech recognition in individuals with Noise Induced Hearing Loss (NIHL). 79 adult were chosen for study and divided in two groups, a control group with 39 individuals with hearing limits up to 25 dB, and a research group with 40 individuals with audiometric configuration and occupational history suggesting NIHL. Speech Recognition Test, dichotic test Staggered Spondaic Word (SSW) and Speech in Noise Test were used with all individuals. Results revealed that the Speech Recognition Test and the SSW were little useful to discriminate between individuals with NIHL and those with normal hearing.

2.5 Impedance audiometry:

Hall, Berry, Olson (1982) activated acoustic stapedial reflex by broadband noise signal for 326 adult subjects. Two groups were formed on the basis of pure-tone audiometry findings. Two hundred and four subjects were normal hearers to mild hearing loss with a pure-tone average (500, 1000, 2000 and 4000Hz) of less than 35 dB HL. One hundred and twenty-two subjects showed serious hearing sensitivity impairment with a Pure-Tone Average of 35 db HL or greater. They concluded that subjects with clinically significant hearing impairment is described is described for intermediate Acoustic Reflex Threshold levels.

Kowalska and colleagues (1995) investigated 112 people exposed to occupational noise by Tympanometry and the stapedius reflex threshold measurements (ART). They comcluded that, the comparison of ART findings, particularly the interval between tonal audiometric threshold and stepedius reflex threshold helped to diagnose cochlear location of hearing impairment in 17 subjects (15.2%) and extra cochlear in 70 (62.5%) out of all the examined subjects.

2.6 Oto acostic emissions

OAE’s can reliably distinguish ears with normal hearing from ears with various degrees of hearing loss, they are not yet able to directly provide a measure of hearing level in an individual ear with sufficient accuracy (Gorga, Neely, Dorn & Hoover, 2003). Marshall, Miller & Heller (2001) concluded Oto Acoustic Emissions (OAE’s) can be used to detect pre-clinical noise-induced hearing loss (NIHL). Noise-exposed people with relatively normal hearing but with low-level or absent OAE’s are at increased risk for future NIHL. Marshall and colleagues (2007) measured Transient-evoked Oto Acoustic Emissions (TEOAE’s), Distortion-Product Oto Acoustic Emissions (DPOAE’s) and pure-tone hearing thresholds in 338 sailors before and after a six-month deployment on an aircraft carrier. Results revealed that hearing thresholds did not shift after deployment but OAE amplitudes decreased indicating sensitivity to noise-induced changes in the inner ear.

2.7 Noise levels at various locations and NIHL in traffic policemen

A study by the Indian Institute of Road Traffic (IRT 1996) reported that Delhi was the noisiest city in India followed by Calcutta and Bombay. The survey examined whether road-traffic noise affected people with respect to annoyance, sleep disturbance, interference with communication and hearing impairment. It showed that 35% of the population in four major cities has bilateral sensory neural hearing loss at noise emission levels above 82dB(A). Shreshta and colleagues (2003) conducted study on effect of vehicular noise pollution on health among traffic police personnel in Katmandu, Nepal. Results revealed that exposure to noise causes a wide range of health effects. Society to Aid the Hearing Impaired (SAHI) in 2006 did survey on effects of noise on traffic policemen in Hyderabad city. Results revealed NIHL among 76% of 45 subjects. Among these, all those who had completed five years in the traffic wing had hearing loss in various degrees.

Tripathi and Tiwari (2006) carried out a questionnaire-based study among 86 traffic policemen randomly selected for an awareness workshop for prevention of noise pollution. Results suggested that only 2.3% of the subjects felt that their hearing ability was below average. 11.6% complained of regular tinnitus, while 62.8% had work-related tinnitus and experienced it during working hours only. Only 4.7% used earplugs and that too, very seldom. The Andhra Pradesh Pollution Control Board (APPCB, 2008) conducted a survey on noise levels at different places in Hyderabad city, shows noise levels peaking to a high of 94 decibels (dB) as against the daytime acceptable limit of 65 dB. These levels were recorded high at Paradise and were followed by 93 dB at Charminar and 92 dB at Punjagutta. The other monitoring station at Abids came up with 93 dB while increasing vehicular movement has also put KBR National Park on the noise map with 81 dB. The recording at Nehru Zoological Park too ended up touching the 80 dB mark.

III. NEED OF THE STUDY

NIHL of industrial workers and construction workers has long been recognized. Collectively, results of such studies have been used to derive models of NIHL that estimate the distribution of hearing levels in population exposed to continuous noise by noise intensity, duration of exposure and age. Not much investigation is done on the effects of traffic noise on hearing of traffic police persons especially in Indian scenario. Daily average collated from these monitoring stations suggested the city to be subjected to a noise level of 87 dB whereas the locations such as Paradise, Punjagutta and Charminar consistently remained above 90 dB. So there is a need to assess the noise levels in the busy traffic roads of Hyderabad along with the detailed audiological evaluation of traffic personal.

IV AIM AND OBJECTIVES OF THE STUDY

Present study aims is to investigate whether traffic police personnel should be treated as a special group to understand the effect of noise exposure on hearing sensitivity and is the duration of exposure is responsible for different patterns of hearing damage. Assess whether the Speech Recognition Thresholds and Speech Discrimination Scores differs across the groups. To assess the hearing of traffic police personnel using Distortion Product Oto Acoustic Emissions (DPOAEs) which is suggested to be more sensitive, more specific, and more predictive in measuring Noise Induced Hearing Loss and to determine the sound levels at different locations in Hyderabad city.

V. HYPOTHESIS

The following null hypothesis or alternate hypothesis has been formulated according to fulfill the objectives of the study.

1. There will be significant difference in hearing thresholds between the traffic police personnel and the normal population.
2. There will be symmetrical hearing loss in traffic police personnel.
3. There will be significant difference between hearing thresholds of traffic police personnel based on exposure to noise.
4. There will be significant difference in speech recognition scores between the traffic police personnel and non exposed population.
5. There will be significant effect across the groups in DPOAE responses.

VI. METHODOLOGY

The participants were divided in to three groups. A total number of 30 traffic police people (60 ears) between 20 and 45 years of age participated in this study. The participants were subjected to detailed case history, otoscopic examination and Immittance audiometry. Group 1: The participants between 20 and 45 years of age with a minimum of 5 years experience (<10 years) as traffic polices were considered. Group 2: The participants, between 20 and 45 years of age with a minimum of 1 year experience (<5years) as traffic polices were considered. Group 3: Subjects with no noise exposure above the permissible range (85 dB (A) for 8 hours) were selected for the study.

6.1 Test environment

Testing was carried out in a sound treated room where the ambient noise level was within the specified limits.

6.2 Instrumentation

The following instruments were used for the study. Otoscope: This was used to examine the ear canal and tympanic membrane of both the groups. Pure Tone Audiometer: ALPS AD 2100 clinical diagnostic audiometer with TDH 39P (Telephonics) circumaural headphones and B-71 (Radio Ear) bone vibrator was used to estimate the hearing sensitivity for both the groups. Immittance Audiometer: Madson Maico immittance audiometer with the probe tone of 256 Hz was used to evaluate the middle ear function in both the groups. Oto Acoustic emission Screener**:** DP-Oto Acoustic emissions were noted by using inter acoustic OAE screener at various frequencies. Sound level meter (SLM): Quest precision digital sound level meter was used to measure the noise levels.

6.3 Procedure

All participants were subjected to an extended audiological test battery containing tests on audiometric thresholds. Before the actual investigation started, all the participants underwent otoscopic examination and immittance audiometry. A Questionnaire was administered to all subjects with the aim of evaluating previous ontological pathologies or predisposing conditions to reconstruct the employment history and to exclude possible non occupational noise exposure. A calibrated integrating Sound Level Meter (SLM;

Quest technologies 1900, Precision integrating SLM) with half inch microphone was used for used to measure the noise levels across the different sites. .The sound levels were measured for the whole of 210 minutes measured in 3 sites around the city centre of each about 80 minutes. In each site the measurements were done 4 times (20 minutes of duration) during the normal working hours, i.e. at 9:00AM, 11:00 AM, 2:00 PM and 5:00 PM. The sound level meter was set to measure parameter dB SPL. A-weighting network was selected in order to suppress the responses of the high and low frequencies. The response time was set to "Slow" to reduce the likelihood of an overestimation of sound levels and to smooth out the noise fluctuations. The dynamic range of the SLM was set to 50-130 dB (A).

6.4 Statistical analysis

All statistical analyses were performed using *Statistical Package for Social Sciences* (SPSS 17.0). Data on hearing thresholds, speech audiometry and otoacoustic emissions have been obtained per ear. As these data passed the normality test, parametric analyses such as GLM repeated measures analysis and post-hoc Tukey's honestly significant difference (HSD) comparisons were performed.

VII. RESULTS AND DISCUSSION

Pure tone audiometry: For the purpose of the study 60 traffic policemen were selected and divided into two groups depending on their number of year of exposure to noise. The pure tone thresholds of group I, group II and group III were compared initially. The mean pure tone audiometric thresholds of group I was much higher than that of group II and group III at all test frequencies. The mean values of group II was higher than that of group III at all test frequencies. A (General Linear Model) GLM repeated measures analysis was conducted on the average hearing thresholds of both ears at all frequencies. Results showed a significant difference between group I, group II and group III.

Source	df	SS	MS	*F*	*P*
Ear	1	160	160	3.784	0.74
Ears * Groups	2	1.354	0.677	0.16	0.974
Error (Ear)	87	3688.646	42.398		
Group	2	67701.29	33850.6	69.592	<0.001
Error	87	42318.44	486.419		

Table 1.1: Results of two way ANOVA on mean hearing thresholds values with ears and frequencies as two factors.

A statistically significant difference (F (2, 87) = 69.592, p < 0.001) between three groups were noted at all frequencies confirming the presence of elevated auditory thresholds in group I and group II than group III (controls). There was no significant difference between the right and left ears (F (2, 87) = 3688.646, p > 0.05) and also there is no significant interaction effect between the ears and groups (F (2, 87) = 0.16, p > 0.05). This indicated that the participants have a symmetrical hearing loss (table 1.1). Results indicate that hearing loss depends on duration of exposure. More intense and longer duration of noise exposure tends to cause greater levels of hearing loss (National Institute of Health, 1990).

Speech Audiometry Results: The speech recognition scores of group I, group II and group III were compared, SRT values are decreasing from group I to group III respectively. Mean Speech Discrimination Scores (SDS) values for all groups were same as 100% and SD for SDS was 0. The group means and standard deviation values of Speech Recognition Scores of all three groups. It can be seen that the mean Speech Recognition Thresholds of both right and left ears in group I was much higher than that of group II & III (table 4.9). Higher Speech Recognition Scores obtained in group I with average scores of both right and left ear was 27.85 dB. Lowest speech recognition scores obtained in group I with average scores of both right and left ear was 14.08 dB. When comparing group II and group III mean speech recognition scores of group II was higher than that of group III.

Source	df	SS	MS	*F*	*p*
Ears	1	0.139	0.139	0.013	0.911
Ears * Groups	2	21.111	10.556	0.95	0.391
Error (Ears)	87	966.25	11.106		
Groups	2	6947.778	3473.89	145.099	<0.001
Error	87	2082.917	23.942		

Table 1.2: Results of GLM repeated measurements on speech recognition scores with ears and groups as two factors.

On GLM repeated measurement analysis, a significant difference was seen between group I, group II and group II (F (2, 87) = 145.099, $p < 0.001$).There was no significant difference between the right and left ears (F (2, 87) = 0.013, $p > 0.05$) and also there was no significant interaction effect between the ears and groups (F (2, 87) = 0.95, $p > 0.05$) (Table 1.2). All the subjects in this study have scored 100% in Speech Discrimination test. Phillips, Rappaport and Gulliver (1994) were indicated that mild noise induced hearing loss persons have difficulty in understanding speech in noisy settings.

OAE Results: The DP amplitudes of group I, group II and group III were compared initially.The DP amplitudes of group I is lower than that of group II and group III. Minimum amplitudes were noted in group I and group II respectively. The mean of DP amplitude values obtained in group I are less than that of group II and group III. A GLM repeated measures analysis was conducted on the average DP amplitudes of both the ears at all frequencies and results showed a significant difference between group I, group II and group III.

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Source	df	SS	MS	*F*	*p*
Ears	1	38.735	38.735	1.066	0.305
Ears * Groups	2	148.114	74.072	2.038	0.136
Error (Ears)	87	3162.496	36.354		
Groups	2	12222.011	6111.006	71.260	.000
Error	87	7460.829	85.757		

Table 1.3: Results of GLM repeated measures analysis on the DP amplitudes with ears and groups as two factors

There was significant difference between three groups (F (2, 87) = 71.260, $p < 0.05$) confirming the presence of higher amplitude of DP gram in group III then followed by group II and group I. There was no significant difference between the right and left ears (F (2, 87) = 3162.496, $p > 0.05$) and also there was no significant interaction effect between the ears and groups (F (2, 87) = 2.038, $p > 0.05$). This indicated that the participants have a symmetrical hearing loss (table 1.3). The results of the study are in accordance with Miller & Marshall (2007) who found that people regularly exposed to hazardous noise levels tend to have lower OAEs than normal hearing people without such exposure.

Noise measurement: A calibrated integrating Sound Level Meter (SLM; Quest technologies 1900, Precision integrating SLM) with half inch microphone was used to measure the noise levels at different sites. The sound levels were measured for complete 210 minutes measured at 3 sites around the city centre (Upkaar junction, Patny, Thirmalagiri), each for about 80 minutes. The noise measurements were carried out to determine the minimum and maximum levels of traffic noise. Usually, the minimum noise level is measured in the absence of any traffic or with the minimum flow of traffic. The maximum traffic noise level is measured in the presence of a continuous flow of traffic or as the maximum level during a vehicle pass-by. Minimum and maximum, mean dB SPL values and standard deviation of noise levels at different sites are shown in table 1.4.

Location	Upkaar junction				Patny				Thirmalagiri			
	Min	Max	Mea	SD	Min	Max	Mean	SD	Min	Max	Mean	SD
9:00 AM	66	121	93.5	20.2	70	118	94.0	28.5	60	119	89.5	27.8
11:00 AM	65	109	87.0	11.9	60	109	84.5	21.1	66	110	88.0	25.6
2:00 PM	65	107	86.0	22.9	62	105	83.5	19.9	59	107	83.0	22.2
5:00 PM	68	118	93.0	27.9	68	110	89.0	21.9	63	120	91.5	19.6

Table 1.4: Group mean, standard deviation, minimum and maximum values noise measurement at different sites and at different time.

The dB (A) SPL ranged from minimum of 59.0 dB (A) SPL to maximum of 121 dB (A) SPL. The noise levels at all the sites were high at 9:00 AM and followed by 5:00 PM, 11:00 AM and 2:00 PM (minimum level) respectively. These results are in accordance with the dB SPL found by the Andhra Pradesh Pollution Control Board (APPCB, 2008) at Hyderabad, which were the 94 dB at Paradise and was followed by 93 dB at Charminar and 92 dB at Punjagutta. The other monitoring station at Abids came up with 93 dB while increasing vehicular movement has also put KBR National Park on the noise map with 81 dB and at Nehru Zoological Park it is 80 dB marks.

VIII. CONCLUSION

The traffic police people are mostly on the roads for about 8 hours a day getting exposed to the noise which is more than the permissible levels. Various tests have been administered in these subjects to investigate the presence of noise induced hearing loss. The present study was aimed to investigate the effect of traffic noise on traffic police people's hearing acuity and to identify the relation between the duration of exposure and hearing loss as well as to bring awareness about NIHL and its prevention among them. A sample of 60 traffic police people were selected divided in to 2 groups based on their experience (who had the history of traffic noise exposure for more than 5 years and less than 5 years) and 30 healthy non noise exposed adults were also taken as the control group for the study. Three groups had subjects within age range between 25years to 45years. A questionnaire was administered on them to identify any previous otological pathologies or predisposing conditions and to gather the information regarding the employment history. Tympanometry was done to identify the presence of any conductive pathology only subjects with healthy outer and middle ear which was indicated by 'A' type tympanogram were included for the study. The 4 KHz notch is significantly prominent in group I than group II. The findings indicated that there was no asymmetry present between the both ears of the same groups i.e. their hearing was affected equally in both the ears. The Speech Recognition Thresholds were higher in persons having more than 5 years of experience than persons with below 5 years of experience. The DP amplitude at 4000Hz in both experimental groups was found to be reduced compared to that of controls. When comparing DP amplitudes at 3000Hz, 4000Hz and 5000Hz in both experimental groups there was reduced amplitudes found in group I (>5yrs) than group II (<5yrs).

IX. IMPLICATION OF THE STUDY

- It highlights the importance of early identification of individuals exposed to noise who are at high risk of developing Noise Induced Hearing Loss.
- All the traffic police men who are exposed to work place noise must undergo regular audiological follow-up.
- They should be provided with proper Ear protective devices.
- Attempts must be made to minimize the occupational noise level.

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