AUDIOLOGICAL EVALUATION IN TRAFFIC POLICE OF KURNOOL CITY-2012-2013

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ABSTRACT: BACKGROUND: Exposure to noise beyond prescribed limits of WHO in terms of intensity and duration results in temporary and in a few permanent loss of hearing acuity. The effect of traffic noise in Police personnel of Kurnool city was assessed by questionnaire. **MATERIALS AND METHODS:** Seventy traffic police personnel posted in various traffic junctions of Kurnool City were asked to fill a questionnaire related to their hearing acuity. Ambient noise Levels at important traffic junctions were measured using portable precision digital sound level meter (Lutron – Model SL4010). **RESULTS:** Irritation and problem in hearing in the crowd was the main complaints seen in 27.14% of the study subjects. RTC bus stand recorded the highest value of 109.6dB. **CONCLUSION:** Legal framework should be imposed to maintain the noise levels in traffic within acceptable levels. Health education and personal protection devices should be provided to the traffic police and their correct usage should be explained.

KEYWORDS: Traffic Noise, Hazardous noise level, Kurnool city, NIHL, Ambient Noise level, Health education, Sound level meter.

INTRODUCTION: Robert Koch¹ once told "A day will come; man will have to fight merciless noise as the worst enemy of health". In the modern world, development in technology, commerce, communication and education has enhanced the urban growth both in developed and developing countries. With global urbanization, there are many environmental problems out of which noise has emerged as one of the major urban environmental pollution.²

Noise has a significant impact on the quality of life¹ (WHO, 1980). Noise is becoming an increasing source of discomfort and danger³. Noise has deleterious effects on health and performance including noise induced hearing loss (NIHL).⁴ NIHL is a common occupation related problem, especially where hazardous noise level (more than 85dB) is present.⁴ Traffic police controlling the traffic are exposed to noise and are at the highest risk of acquiring NIHL and other noise related problems like irritability, anxiety neurosis.

Noise pollution should be treated as a top priority in the urban environmental management in order to reduce noise pollution. In comparison to other pollutants, the control of environmental noise has been hampered by insufficient knowledge of its effects on human and dose response relationship as well as a lack of defined criteria.⁵

Keeping in view of the gravity of the traffic noise the present study was undertaken to know the symptoms related to behavioral performance. Earlier the Noise level in various busy traffic junctions of Kurnool city was measured with a sound level meter. The duration of exposure to noise, the total period of service as traffic control personnel were used to relate the results. Suitable remedial measures were advised.

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MATERIALS AND METHODS: Source of data: Seventy of the 77 traffic police of Kurnool city participated in the study.

Study Group: Traffic police working in controlling Kurnool city traffic and exposed to noise at work formed the study group.

Inclusion criteria: All traffic police who work at heavy traffic areas were included in the study.

Exclusion criteria: Traffic police not involved in traffic control and other police personnel not exposed to noise were excluded from the study.

Study was conducted with prior permission from the superintendent of Police of Kurnool city. Traffic police were explained about the study. After obtaining informed consent, questionnaire was given to each traffic police. The questionnaire included details regarding name, age, symptoms after exposed to noise, any other ear complaints, past history of ear symptoms and family history. Clinical examination of the Ear Nose and Throat was conducted.

Recording of environmental noise with sound level meter: Nine traffic points where traffic police are constantly involved at work were selected and sound level was measured at each of these places in the morning, afternoon and evening (Figure 1).

Measurement of noise in traffic: - Sound level meter (Figure 2) was held at a level of 1.2 – 1.5m above the ground and 1m away from the chest where the traffic police is standing (Figure 3). 20 readings of Sound Pressure levels (SPL) were recorded at an interval of 30sec in a period of 10minutes. 20minimum and 20 maximum noise levels reading per area thrice a day was obtained.

Minimum noise level is measured in the absence of any traffic or with the minimum flow of traffic. This relates to the ambient (background) noise level on the site. Maximum noise was measured in the presence of a continuous flow of traffic or as the maximum level during a vehicle pass by. The noise levels were measured with the help of a portable precision digital sound level meter (Lutron – Model SL4010).

This instrument is primarily designed for community noise surveys. A large digital display gives a single value indication of the maximum “A” weighted RMS (Root mean square) sound pressure level measured during previous second. The instrument calibration was achieved using manufacturer provided pistaphone calibrator capable of producing known sound level.

Noise measurements were taken following the prescribed method in the manual of the manufacturer of sound level meter. The results were filled at the spot of measurement in pre designed formats. The measured noise levels were tabulated, basic statistical analysis done. The average minimum and maximum noise levels and corresponding standard deviation at each of the investigated site was obtained.

Fig. 1: Map of Kurnool city showing 9 areas (A-I) where noise levels were recorded

Fig. 2: Digital sound level meter (Lutron - Model SL4010)

Fig. 3: Investigator recording the noise level with sound level meter

RESULTS: The study group included 70 traffic police of Kurnool city. The mean age of the study subjects was 38.54 ± 10.84 years. The traffic police complained of the following symptoms as seen in table 1 after exposure to noise at work. Majority complained of irritation and problem hearing in the crowd. Only 10% complained of hearing loss as a problem.

Clinical features	Number of traffic police	Percentage (%)
Irritation	19	27.14
Tinnitus	06	8.57
Problem hearing over phone	17	24.29
Problem hearing in crowd	19	27.14
Need increased TV/Radio volume	12	17.14
Speaks loud	03	4.29
Others have to speak loud to hear	02	2.86

Table 1: Distribution of clinical symptoms in the study subjects

Maximum and minimum noise level and the mean noise levels in these nine regions are shown in table 2 and 3 respectively. RTC bus stand recorded the highest value of 109.6dB due to heavy incoming and outgoing buses and autorikshaws and two wheelers in the traffic. The minimum noise level was measured in Birla gate that was 62.7dB. In all selected locations the level of noise was found to be above the prescribed noise standard level of CPCB, India ($<65\text{dB}$).^{2, 3, 6}

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Location	9.30am – 10.30am		1.00pm – 2.00pm		5.30pm – 6.30pm	
	Min dB	Max dB	Min dB	Max dB	Min dB	Max dB
NTR Circle	69	88.9	68	91	69	98.5
RTC bus stand	71.1	106.2	74.6	96.8	71.3	109.6
Ballary chowrastha	71.8	106.6	71.2	100.3	73	107.1
Rajvihar circle	70.0	101.2	71.3	105.1	67	96.2
Vijaya Durga cardiac centre	68.6	97.1	66.8	102.1	67.3	99.6
Kondareddy Burj	63.8	105	68.2	96.1	68.3	93
Railway station road	66.2	91.3	69.2	97.3	65.7	98
Birla gate	66.1	100.6	66.2	103.7	62.7	94.1
C - Camp	65.9	103.4	63	99.2	67.8	97.4

Table 2: Maximum and minimum values in various locations in Kurnool city

Locations	Noise level in morning		Noise level in afternoon		Noise level in evening	
	Min dB	Max dB	Min dB	Max dB	Min dB	Max dB
NTR Circle	71.28±1.6	82.4±4.43	69.98±2.48	83.48±4.49	71.45±1.54	91.08±3.11
RTC bus stand	75.17±2.47	97.92±4.42	76.61±1.04	91.9±2.53	76.5±2.42	97.3±6.09
Ballary chowrastha	75.32±1.82	96.9±4.87	75.02±1.93	92.4±4.05	77.48±1.87	99.55±4.08
Rajvihar Circle	74.61±3.04	92±3.8	74.58±1.43	93.07±4.22	70.1±1.73	89.65±3.29
Vijayadurga cardiac centre	70.61±1.38	89.4±3.62	70.94±1.56	90.44±5.54	69.44±1.22	88.32±4.05
Kondareddy Burj	68.25±1.69	87.87±6.34	71.04±1.83	87.06±4.14	71.34±1.61	86.16±3.9
Railway station road	70.98±2.34	85.45±4.14	71.16±0.97	86.68±4.05	69.79±1.88	90.22±2.9
Birla gate	70.08±2.73	93.99±3.62	68.65±1.24	91.09±5.25	66.46±2.01	84.58±4.51
C - Camp	68.91±1.36	92.62±4.64	68.78±1.87	90.47±3.26	70.61±1.57	91.53±2.93

Table 3: Mean noise level (dB) in various locations of Kurnool city

According to WHO and OSHA⁷ standards a person can be exposed to 85dB for 8hrs/day without any damage to the ear. But 81.67% (441/540) of maximum noise recordings are much above 85dB (Table 4). Based on equal energy principal, the exposure duration should be halved for every 3dB increment in level⁷. But traffic police are exposed to such high noise levels for 8 or more hours per day at their work.

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dB	1		2		3		4		5		6		7		8		9	
	m	ma	m	ma	m	ma	m	ma	m	ma	m	ma	m	ma	m	ma	m	ma
61.1-64	-	-	-	-	-	-	-	-	-	-	01	-	-	-	04	-	01	-
64.1-67	-	-	-	-	-	-	01	-	-	-	03	-	03	-	09	-	02	-
67.1-70	26	-	-	-	-	-	12	-	28	-	26	-	16	-	38	-	37	-
70.1-73	28	-	07	-	07	-	13	-	30	-	22	-	38	-	08	-	19	-
73.1-76	05	05	22	-	24	-	28	-	02	-	08	-	02	-	-	-	01	-
76.1-79	01	03	27	-	26	-	05	-	-	-	-	01	01	01	-	01	-	-
79.1-82	-	07	04	-	03	-	-	01	-	02	-	08	-	07	01	05	-	-
82.1-85	-	13	-	-	-	01	-	02	-	08	-	16	-	09	-	08	-	01
85.1-88	-	10	-	01	-	02	-	05	-	14	-	08	-	14	-	08	-	06
88.1-91	-	16	-	15	-	04	-	25	-	16	-	18	-	19	-	11	-	23
91.1-94	-	03	-	10	-	17	-	14	-	12	-	05	-	08	-	13	-	19
94.1-97	-	01	-	12	-	10	-	08	-	04	-	02	-	-	-	05	-	06
97.1-100	-	02	-	07	-	12	-	03	-	03	-	01	-	02	-	07	-	02
100.1-103	-	-	-	08	-	08	-	01	-	01	-	-	-	-	-	01	-	02
103.1-106	-	-	-	05	-	03	-	01	-	-	-	-	-	-	-	01	-	01
106.1-109	-	-	-	01	-	03	-	-	-	-	-	-	-	-	-	-	-	-
109.1-112	-	-	-	01	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 4: Distribution of the recordings (in various areas of Kurnool city) in various frequency range

M – minimum ma – maximum

None of the traffic police used any personal protective devices.

DISCUSSION: Traffic can be considered as the major source of noise pollution in large cities.^{2,3} Noise causes significant health problems of which hearing will be irreversibly damaged. Traffic policemen standing in the midst of this environmental pollution are constantly exposed to this occupational hazard.⁸

Cause of noise in traffic includes traffic factor,⁹ road factors, vehicular factors⁵ and human factors.¹⁰ In the present study seventy traffic police who were exposed to noise at work were given a questionnaire and details on personal, occupational and symptoms was obtained. Noise level was recorded from 9 busy traffic areas of Kurnool city where traffic police were constantly involved in work.

The most common complaints of the present study subjects were difficulty to converse in the crowd (27.14%) and miss conversation over phone (24.29%). This is consistent with study by Venkatappa KG¹¹ et al. (2012). Deafness is a complaint in only 10% as it is low in all the studies.^{7, 11-16}

This may be because NIHL involves 8 & 4 kHz frequencies earlier to lower frequencies like 0.5, 1, 2 kHz. Hence problem of hearing is obvious only when conversing in crowd and on phone. Tinnitus being a common complaint in other studies^{12, 15, 16} it is not so in our as it is seen in only 8.57% of the study subjects.

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In the present study sound level measured was in the mean range of 68.25 – 99.55dB. Many of the studies from cities of India or other cities of the world show a much higher level of readings than the standard values advised by WHO, which is 65dB in all traffic and commercial areas. Deka¹⁷ et al reported 83dB mean noise level in Guwahati, Chauhan A¹ et al and Sharma V¹⁸ et al reported 82.6 – 94.6dB of mean noise level in Dehradun and Haridwar respectively.

In Bangalore city, study by Venkatappa KG¹¹ et al has reported their mean noise level recording as 71.2 – 91dB. Studies in Nepal by Joshi SK¹⁹ et al, Murthy VK²⁰ et al and Thomas N²¹ et al have reported noise level of >75dB, 63.9 – 110.2dB and 75–85dB respectively. Study in Sweden by Ingle¹⁵ et al has reported mean noise level of 100dB.

In Karachi Noise level of 80dB is reported by Jawed I²² et al. A maximum value obtained was 109.6dB at RTC bus stand where there is constant in and out flow of heavy traffic. 109dB exposure is sufficient to cause hearing loss by rupture of tympanic membrane or exposure for 2minutes can cause total deafness. There is a definite need to control noise level in the city.

CONCLUSION: The minimum noise level recorded in our study is well above the 55dB as in the guidelines of the central pollution control board, India and 65dB as by WHO. The traffic police engaged in controlling traffic at heavy traffic junctions are the high risk group affected by health hazards of noise. All the subjects having hearing problems belong to the economically productive age group.

Awareness should be created among the traffic police about the harmful effects of noise on hearing and other body systems by implementing education and training program and they should be educated regarding use of personal protective devices right during their appointment. Legal framework should be imposed to maintain the noise levels in traffic within acceptable levels and strict punishment imposed for the rule breakers in the traffic.

REFERENCES:

1. Chauhan A, Pande K K. Study of noise level in different zones in Dehradun city, Uttarakand. Report and opinion. 2010; 2 (7): 65-8.
2. Gayathri K, Jaisheeba A A, Sornaraj R. Assessment of noise pollution in Thoothukudi city. Int J Pharm Tech Res 2012; 4 (3): 1345-50.
3. Pramendra D, Vartika S. Environmental noise pollution monitoring and impacts on human health in Dehradun city, Uttarakand, India. Civil and Environmental research 2011; 1 (1): 32-9.
4. Mehrparvar A H, Mirmohammadi S J, Ghoreyshi A, Mollasadeghi A, Loukzadeh. High frequency audiometry: A means for early diagnosis of noise induced hearing loss. Noise & Health 2011; 13 (55): 402-6.
5. WHO document on guidelines for community noise, London, UK in April 1999. www.who.int/docstore/peh/noise/guidelines2.html
6. Ministry of Environment and Forests Govt of India; Noise pollution norms-Joint Secretary (CP); Paryawaran Bhawan, CGO Complex; Lodi Road, NEW DELHI. 110 003 INDIA. E-Mail: secy@envfor.delhi.nic.in
7. Shrestha I, Shrestha B L, Pokharel M, Amatya R C M, Karki D R. Prevalence of Noise induced hearing loss among Traffic police personnel of Kathmandu Metropolitan city. Kathmandu Univ Med J 2011; 9 (4): 274-8.

ORIGINAL ARTICLE

8. Singh V K, Mehta A K. Prevalence of occupational noise induced hearing loss amongst traffic police personnel. *Indian J Otolaryngol Head Neck Surg* 1999; 51 (2): 23-6.
9. Agarwal S, Swami B L. Noise annoyance under interrupted traffic flow condition for Jaipur city. *Int J Appl Sci Eng* 2009; 7 (2): 159-67.
10. Mangalekar S B, Jadhav A S, Raut R D. Study of noise pollution in Kolhapur city, Maharashtra, India. *Universal journal of Environmental research and technology* 2012; 2 (1): 65-9.
11. Venkatappa K G, Shankar V M S, Annamalai N. Assessment of knowledge, attitude and practices of traffic policemen regarding the auditory effects of noise. *Indian J Physiol Pharmacol* 2012; 56 (1): 69-73.
12. Abel S M. (2005) Noise induced hearing loss in Canadian military personnel. In *New Directions for improving audio effectiveness* (pp. 2-1-2-24). Meeting proceedings RTO-MP-HFM-123, paper 2. Nevilly-sur-Seine, France: RTO. Available from <http://www.rto.nato.int/abstracts.aps>.
13. Tripathi S R, Tiwari R R. Self-reported hearing quality of traffic policemen: A questionnaire based study. *Indian J Occup Environ Med* 2006; 10 (2): 82-4.
14. Sharif A, Taous A, Siddique BH, Dutta PG. Prevalence of noise induced hearing loss among traffic police in Dhaka metropolitan city. *Mymensingh Med J* 2009; 18 (1): 24-8.
15. Omidvari M, Nouri J. Effects of noise pollution on Traffic policeman. *Int J Environ Res* 2009; 3 (4): 645-52.
16. Guida H L, Diniz T H, Chagas P S C, Kinoshita S K. Audiology profile in the Military police state of Sao Paulo. *Intl Arch Otorhinolaryngol, Sao Paulo Brazil* 2010; 14(4):426-32.
17. Deka S. Study on noise pollution in different areas of Guwahati city, Assam, India. *Indian J Environ and Ecoplan* 2000; 3(3):633-6.
18. Sharma V, Saini P, Kaushik S, Joshi BD. Assessment of noise level in different zones of Haridwar city of Uttarakhand state, India. *New York Science Journal* 2010; 3(4):109-11.
19. Joshi S K, Devkota S, Chamling S, Shrestha S. Environmental noise induced hearing loss in Nepal. *Kathmandu Univ Med J* 2003; 1(3):177-83.
20. Murthy V K, Majumder A K, Khanal S N, Subedi D P. Assessment of traffic noise pollution in Banepa, A semi urban town of Nepal. *Kathmandu University Journal of Science, Engineering and technology* 2007; 1(4):1-9.
21. Thomas N, Mariah AN, Faud A, ME, Kuljit S, Philip R, Med M. Noise exposure and noise induced hearing loss among Kuala Lumpur traffic point duty personnel. *Med J Malaysia* 2007; 62 (2): 152-5.
22. Jawed I, Musani A, Mohamood R, Wadood, Khambaty Y, Asim M. The effect of traffic noise on the hearing level of people on Karachi streets. *J Pak Med Assoc* 2010; 60 (10): 813-6.

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