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TO ASSESS EFFECT OF NOISE ON HEARING ABILITY OF BUS DRIVERS BY AUDIOMETRY

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Abstract : The present study was planned to assess the noise levels to which the drivers from State Transport Sangli Depot., are exposed during their duty hours and to explore the effects of high intensity noise of their hearing ability by audiometric examination.

The study was done both in study and control group. Noise levels were measured in the driver's cabin and in the working place of the controls which ranged from 89 to 106 dB and 50 to 62 dB respectively. Audiometric examinations were performed in the study and control groups. 89% of the drivers and 19% from the control group showed abnormal audiograms.

Key words : noise level audiogram

INTRODUCTION

The term 'Noise Pollution' has been recently coined to signify the plethora of sounds being produced in the modern life, leading to health hazards. In certain occupations, noise may cause gradual impairment of hearing and eventually deafness in susceptible subjects. The onset of noise induced hearing loss is insidious and it first starts at frequencies higher than those of normal conversation. Therefore the initial hearing loss is often not appreciated by the affected individual. Thus a person may be exposed to noise of varying intensity for years and remain unaware of his disability till the hearing loss is detected by audiometric examination.

Noise is defined in terms of it's duration, frequency spectrum and intensity. It may be continuous, intermittent, impulsive or explosive (1). The present study aims at studying noise levels in the driver's cabin at different times and places, and analysing effect of noise on hearing ability of the bus drivers.

METHODS

At the first stage, noise levels in the driver's cabin were measured at the time of starting the engine, raising the engine, putting 1st gear, 2nd gear, 3rd gear, 4th gear, low gear and the reverse gear. Noise levels were studied in seven different buses of State Transport.

Study was done on 200 bus drivers of Sangli Bus Depot. Audiometric examination was performed in the morning session from 10.00 AM to 1.00 PM thrice in a weak at least two days after their weekly off to rule out "Temporary Threshold Shift (TTS)" particularly in bus drivers who had service period less than 5 years.

In control group 100 employees other than drivers were included from the Divisional Controller's Office. Noise levels were studied for three consecutive days in the office at the different working hours.

The subjects selected for the study were those

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who did not have any history or evidence of middle ear disease, diabetes, hypertension or coronary disease. The subjects above the age of 50 years were analysed separately both in the experimental and control group to highlight particularly the combined effect of ageing and noise on hearing.

Noise levels were measured by sound level meter ("IRD Mechanalysis, INC., U.K., Vibration/Sound level meter, model 308M, Approval 2G-2556" dB scale) and audiometry was done using an audiometer calibrated to 1964 ISO Values, Model 10.

RESULTS

The mean noise level to which the drivers were exposed varied from 89 to 106 dB at different times during the 8 hours of duty. The control group was exposed to a mean noise level of 52 to 65 dB during the 7 hours of duty (Table I).

89% of drivers showed abnormal audiograms while in the control group only 19% had abnormal audiograms (Table II). Among the drivers 75.5% had sensorineural type of hearing impairment, while in the control group 16% had sensorineural loss (Table II).

TABLE I : Mean noise levels in working environment.

Bus No.	*Mean noise levels in dB at different stages*								*Mean noise levels in dB from control group*			
	Engine started	*Engine raised*	*1st gear*	*2nd gear*	*3rd gear*	*4th gear*	*low gear*	*reverse gear*	*Day*	*Starting of working hours*	*After-noon*	*End of working hours*
MTB 9519	91.5	99.5	99.5	101.5	102.5	100	99	98	1	65	55	63
MTD 8548	90	98	97.5	98	100	100.5	102	94	2	64	52	64
MTB 1951	90.5	99	98.5	98	99.5	100	98	96	3	63	55	64
MHD 8464	91.5	101.5	103	102	102.5	100	106	93				
MTD 2789	89	98.5	99	100	101.5	99	97.5	95				
MTD 1477	90	98	97.5	101	99.5	100	99	94				
MTD 2918	91.5	100	99.5	99	100.5	100	98.5	95.5				

TABLE II : Audiometric pattern in study and control groups.

Type of Audiogram	*Drivers*		*Controls*		X^2 *Test*	*P Value*
	No.	*Percentage*	*No.*	*Percentage*		
Normal	22	11	81	81	144.8	$P < 0.001$
Abnormal	178	89	19	19		H.S.
Sensori-neural loss						
— Mild	57	28.5	12	12	95.6	$P < 0.001$
— Severe	94	47	4	4		H.S.

H.S. — Highly Significant

TABLE III : Audiograms by period of service in study group.

Service in completed years	*Total No. of drivers*	*No. with abnormal audiograms*	*Percentage*
Less than 5	57	41	71.92
6 - 10	70	65	92.85
11 - 15	31	30	96.77
16 - 20	34	34	100
21 - 25	5	5	100
26 - 30	2	2	100
31 - 35	1	1	100

TABLE IV : Age-wise audiograms in study and control groups.

Age (years)	*Drivers*			*Controls*			X_2 *Test*	*P Value*
	Total	*No. having abnormal audiogram*	*Percentage*	*Total*	*No. having abnormal audiogram*	*Percentage*		
20 - 25	5	3	60	3	–	0	0.88	P > 0.001 N.S.
26 - 30	40	30	75	19	–	0	26	P < 0.001 H.S.
31 - 35	43	37	86.04	38	7	18.42	37.17	P < 0.001 H.S.
36 - 40	41	40	97.56	27	3	11.1	48.68	P < 0.001 H.S.
41 - 45	30	28	93.33	5	2	40	6.06	P < 0.05 S
46 - 50	19	18	94.74	2	1	50	0.64	P > 0.001 N.S.
51 - 55	15	15	100	4	4	100	—	—
56 - 58	7	7	100	2	2	100	—	—
TOTAL	200	178	89	100	19	19	—	—

N.S.: Not Significant H.S. Highly Significant S: Significant

It is found that the percentage of abnormal audiograms increase with the service period in the study group. With the service experience of 16 years and above 100% of the drivers had abnormal audiograms. With service experience of less than 5 years, abnormal audiograms were observed in 72% of the drivers (Table III).

Tabale IV shows results of age wise audiometric study in drivers and control group.

DISCUSSION

In 1970, Occupation Safety and Health Act established occupational noise exposure standards limiting the noise exposure an employee may receive in a working day (2). According to the standard, 90 dB is the maximum permissible noise level of exposure for 8 hours per day. The drivers in the study are exposed to the noise levels ranging from 89 to 106 dB during their 8 hours of duty period

(Table I) which is fairly higher than the standards laid down. The control group is exposed to 52 to 65 dB noise level during their 7 hours of duty period which is much below permission level.

89% of drivers had abnormal audiograms (Table II). In the study conducted by Natu and Salunkhe (3) 95.5% of drivers were affected because they had selected only those bus drivers who had experience of driving for more than 5 years, while in this study even new recruits having less experience were included (Table III).

Percentage of abnormal audiogram increase with the service period (Table III). This finding is consistent with the observation of Coles & Knight (4) who conducted a series of audiometric surveys on personnel working in British Submarines. Their study revealed that with increasing duration of exposure to deisel engine noise the notch in the audiogram grows deeper and wider. Similarly, Natu et al (3) observed, in their study on effects of noise on Bus Drivers, that as the period of service increased there was a rise in the prevalence of hearing loss.

When the effect of age on hearing ability was studied it was found that 60% and 75% of drivers showed abnormal audiograms in the age groups of 20-25 and 26-30 years respectively. None from the control group showed abnormal audiograms in the corresponding age groups (Table IV).

86% and 98% of the drivers had abnormal audiograms in the age groups of 31-35 and 36-40 respectively, while in corresponding age groups, 18% and 11% of the controls had abnormal audiograms. X^2 test shows that the observed difference is highly significant and could be due to the exposure of drivers to high noise levels in the driver's cabin (Table IV).

In the age group 41-45 years observed difference is significant and could be again due to exposing of the drivers to high noise levels (Table IV).

In th age group 46-50 the observed difference between study and control groups is not significant which might be due to small sample size in the control group or due to the effects of age. In the successive age groups, 100% drivers and also controls are showing abnormal audiograms. The latter findings highlights the combined effect of ageing and noise on hearing loss.

Ballantyne, (1) also quoted that hearing loss due to presbyacusis is approximately half a decibel per year after the age of 50 years. Hearing loss from noise and presbyacusis is, in general, believed to be additive. Cohen & Jones (5) also stated that hearing sensitivity became poorer with increasing age.

In our study 75.5% of audiograms are of sensorineural type (Table II). This has been observed mainly in drivers who have got long period of service. Similar observations were reported by Rai et at (6). In their audiometric study of naval gunnery crew, degree of hearing loss increased and was quite conspicuous in subjects with more than 10 years of sevice. The nature of audiogram depicted sensori-neural loss in these subjects.

REFERENCES

1. Ballantyne, Groves J. Editor Scott-Brown's diseases of ear nose and throat. edn 4 Vol II London: *Butterworths Ltd.* 1979; 551-662.

2. Diserns AH. Personal noise dosimetry in refinery and chemical plants. *J occup Med April* 1974; Vol. 16 No. 4: 255-57.

3. Natu Maya, Salunkhe SR. Noise survey and effects on S.T.Bus drivers. *Ind J Occupl Health* 1977; 20: 195-200.

4. Coles RN, Knight. The problem of noise in Royal Navy and Royal Marines. *J. Laryngol otol* 1965; 79: 131-47.

5. Cohen A, Joseph R, Jones H. Noise induced hearing loss, exposure to steady state Noise. *Arch Environmental Health* 1970· 20: 614-23.

6. Rai RM, Chaturvedi RC, Malhotra MS. Audiometric study of Indian Naval Gunneny Crew. *Ind J otolaryngol* 1974; 26: 143-52.