

Noise Exposure and Noise Induced Hearing Loss Among Kuala Lumpur Traffic Point Duty Personnel

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SUMMARY

Thirty-two points in Kuala Lumpur were selected where traffic personnel were on duty. Sound level readings were taken three times a day. Generally, the traffic noise levels were between 75 dBA to 85 dBA. The maximum sound level recorded was 108.2 dBA. Noise emitted by traffic equipment and vehicles were up to 133 dBA. Results of audiometric tests revealed that out of 30 who were tested, 24 or 80% were positive for noise-induced hearing loss. A questionnaire survey revealed a lack of knowledge on occupational safety and personal protective equipment.

KEY WORDS:

Noise induced hearing loss, Traffic personnel, Kuala Lumpur

INTRODUCTION

It has been shown that people such as the Mabaan tribe of Sudan who live in quiet communities possess far greater hearing abilities than people inhabiting the industrialized world¹. Individual susceptibility to noise induced hearing loss (NIHL) is highly variable. On average, 3% of individuals with long-term exposure to noise levels of 85 dBA for eight hours will have significant hearing loss. The risk increases to 15% with 90 dBA noise². Road traffic noise is an important factor that affects the quality of life. Noise from road traffic is generated from vehicle engines, tires and air movement around the vehicles³. The objectives of this study were to evaluate traffic noise exposure levels and other related sources of noise exposure of traffic police point duty personnel serving at busy parts of Kuala Lumpur and to assess whether they suffered noise induced hearing loss.

MATERIALS AND METHODS

A study of noise exposure on point duty officers in Kuala Lumpur was conducted from April 2002 till March 2003. Thirty-two points were selected where traffic personnel were on duty during the mornings and evenings. The 32 points were divided into four zones. Each zone consists of eight points. The readings from these areas were taken three times a day. Sound level readings were taken using a sound level meter Bruel & Kjaer (Model 2238 Mediator™). The readings were taken three times a day i.e. from 0700 – 1000 hours in the morning, 1600 – 1800 hours in the evening and 2000 – 2200 hours at night. Readings were for a duration of 10 minutes per reading at each point. Sound level measurement

data from the 2238 Mediator™ was analysed using the environmental software CD version 2.4 provided by Bruel & Kjaer. Measurements were taken at the location where traffic personnel are stationed to determine the noise levels they are exposed to. (Fig. 1)

The microphone of the sound level meter was omnidirectional pointing to the source of traffic at a height of about 1.5 meters above ground and 3 meters away from the traffic personnel on duty to avoid interference from the whistle and walkie – talkie. Readings were taken according to requirements of ISO 1996 – 2, acoustics – description and measurement of environmental noise.

Engine noise emission levels from two different motorcycle models (Honda CBX-750 and Modenas), whistle, walkie-talkie, siren, and electronic whistle were recorded using the omnidirectional microphone placed at ear level. As for the motorcycles, readings were taken when the motorcycle was stationary and while moving. As for the others, the readings were taken in standing position.

Out of 130 traffic point duty personnel, 30 were selected at random and sent for audiometric tests conducted at the University Hospital. Thirty were selected to meet sampling size requirement 20 personnel were sent on December 2002. Another ten point duty personnel were sent on March 2003. A pure tone audiogram was done to determine clinically whether they suffered from NIHL. For those who suffered from NIHL, comparison was made in terms of years of exposure and working experience.

One hundred and thirty personnel from point duty were given a questionnaire comprising 22 questions. A total of 130 responded. The questionnaire was designed on working experience, number of years in the police force, number of years in the traffic branch, number of working hours per day, knowledge of occupational safety and health, knowledge and usage of personal protective equipment (PPE), background of residence, visits to entertainment areas and whether any family members suffer from any hearing problems and their hobbies.

RESULTS

Based on the field measurements on 32 points, three times a day, it was noted that dBA level in general was on average 75

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- 85 dBA. Occasionally, it reached 90 dBA. Point 8 of zone 2 recorded the highest of 108.2 dBA due to the heavy traffic volume. (Table I)

For the basic equipment used, 10 readings were taken per equipment. The maximum whistle output was 119.3 dBA, walkie-talkie 87.3 dBA, stationary CBX 750 96.5 dBA, moving CBX 750 at high speed with siren 133 dBA, CBX horn 108.8 dBA, CBX siren 119.5 dBA, Modenas motorcycle stationary 88.5 dBA and Modenas moving 106.3 dBA. The standard walkie-talkie was found to emit the lowest noise which did not exceed 90dBA.

Thirty men underwent a pure tone audiogram (PTA). External and auroscopic examination of the ears were normal. Twenty one or 70% were found to have NIHL characterized by a dip at 4 kHz on the audiogram. Another three had sensorineural hearing loss involving the low frequencies as well. Findings related to length of service show that among those who served for up to five years in the point duty unit, seven had NIHL while six were normal. Among those who served from six to ten years in point duty, 13 had

NIHL and two were normal. For the one person who served from 11 to 15 years in point duty, hearing was normal. Another one person who served from sixteen to twenty years in point duty was found to have NIHL. Findings related to age show that one of the two aged 25 – 30 was found to have NIHL. Among those aged 31-35, six had NIHL and two had normal hearing. Among those aged 36-40, six had NIHL and two had normal hearing. Among those aged 41-45, eight had NIHL and one had normal hearing. Among those aged 46-50, all three had NIHL. (Table II)

The questionnaire showed 33.1% worked an average of 8 hours a day, 61.5% worked 8 –12 hours a day and 5.4% worked more than 12 hours a day. As for time spent doing point duty, 1.5% spent three hours, 7.7% spent four hours and 90.8% spent more than five hours a day doing point duty. 95.4% find the point duty environment noisy, 0.8% found it quiet and 3.8% were unsure. As for knowledge on occupational safety and health (OSH) only 21.5% had knowledge about it whereas 78.5% had no knowledge whatsoever. As for personal protective equipment (PPE), 18.5% knew about it whereas 81.5% were ignorant. As for the

Table I: Zone 2 Evening dBA readings (Equivalent Continuous Sound Level)

DATE	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8
16/9/2002	80.6	Rain	Rain	Rain	Rain	Rain	Rain	Rain
17/9/2002	76.3	77.6	68.6	77.9	80.1	Rain	Rain	Rain
18/9/2002	83.9	71.9	70.6	77.2	70.7	Rain	Rain	Rain
19/9/2002	72.5	77.4	75.1	78.6	67.8	73.1	90.2	80.5
20/9/2002	73.5	76.2	72.3	77.2	77.6	75.4	74.4	73.4
21/9/2002	74.2	74.5	70.2	75.2	76	72.8	75.1	80.3
22/9/2002	72.4	76.2	72	77.8	79.9	73.7	73.6	105.1

Table II: Results of Audiometric Test on Traffic Personnel December 2002

No	Age	SNHL	Dip At 4kHz			Years in point duty
			Right	Left		
1	27	Nil	Nil	Nil	4	
2	30	Yes	Nil	Nil	2	
3	44	Yes	Yes	Yes	10	
4	47	Yes	Nil	Yes	10	
5	32	Nil	Nil	Nil	2	
6	40	Yes	Yes	Nil	3	
7	33	Yes	Yes	Yes	2	
8	42	Yes	Yes	Yes	8	
9	48	Yes	Yes	Yes	10	
10	34	Yes	Yes	Yes	2	
11	46	Yes	Yes	Yes	20	
12	43	Yes	Yes	Yes	10	
13	41	Yes	Yes	Yes	8	
14	43	Yes	Yes	Nil	9	
15	35	Yes	Yes	Yes	2	
16	40	Nil	Nil	Nil	13	
17	32	Yes	Nil	Yes	9	
18	37	Nil	Nil	Nil	2	
19	42	Yes	Nil	Nil	9	
20	44	Yes	Yes	Yes	7	
21	34	Yes	Nil	Nil	9	
22	38	Yes	Yes	Yes	10	
23	36	Yes	Yes	Yes	1	
24	42	Nil	Nil	Nil	10	
25	38	Yes	Yes	Yes	5	
26	37	Yes	Nil	Yes	5	
27	34	Yes	Yes	Nil	8	
28	36	Yes	Yes	Yes	8	
29	32	Nil	Nil	Nil	4	
30	41	Yes	Nil	Yes	9	

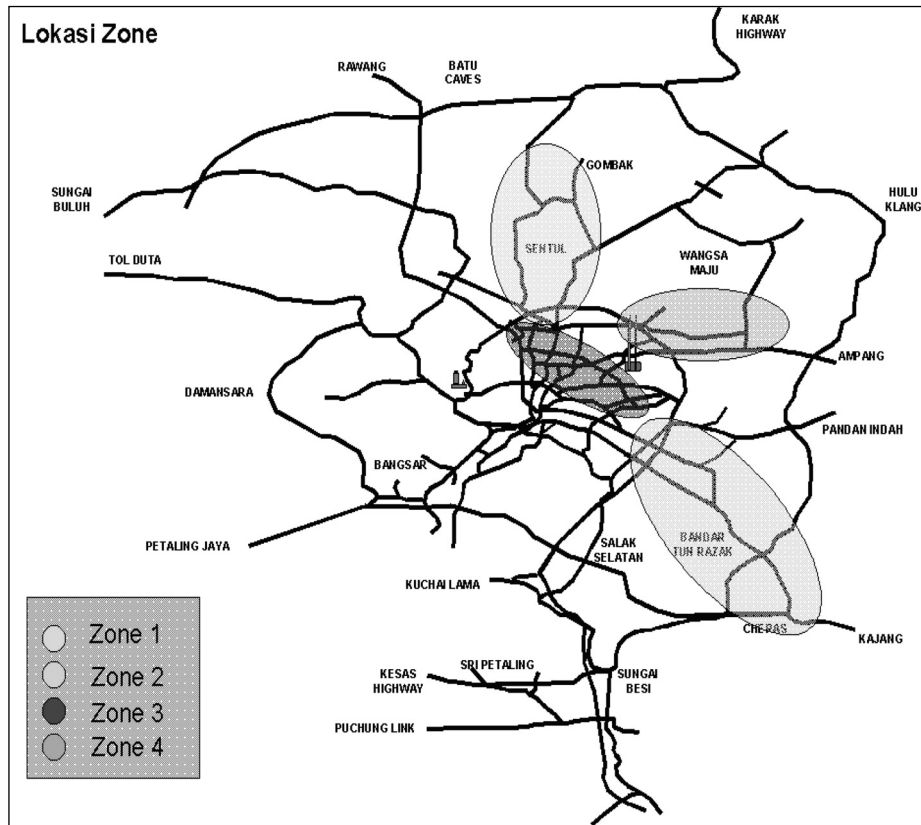


Fig. 1: Zones 1, 2, 3 and 4.

issuance of PPE such as ear plugs, gloves, dust mask and sunglasses, 65.4% said they were issued, 23.1% said they were not issued, and 11.5% did not answer. As for the duration of PPE use, 19.2% used it less than four hours, 0.8% 4 hours a day, 32.3% 4-6 hours, 11.5% 6-8 hours, 23.8% more than eight hours and 12.3% did not answer. 96.2% sensed the importance of PPE, 1.5% found PPE unimportant and 2.3% were unsure. 76.9% found using PPE to be comfortable, 13.8% felt discomfort and 9.2% were unsure. Ten percent found PPE obstructing their duty, 63.1% did not find PPE as an obstruction to their duties and 26.9% were unsure. 21.5% had undergone hearing test, 3.1% did not, 66.2% were not sure and 9.2% did not answer. 9.2% knew the results, 32.3% were not told of their results, 10.8% were not sure and 47.7% did not answer.

Based on the 130 personnel, the average years of service in the police force were 17 years. Out of that, an average of nine years had been spent in the traffic branch.

DISCUSSION

On an average, three million vehicles used the roads in Kuala Lumpur daily during the traffic monitoring survey that was carried out in 2002⁴. In this study, the traffic noise level was between 75 dBA and 85 dBA. Occasionally, it was found to have reached 90 dBA and rarely 100 dBA. In 1998, the DOE (Department of Environment) conducted a traffic noise-monitoring programme in major urban centers throughout Peninsular Malaysia. The recorded noise levels in those

selected urban areas were found to be in the range of 76.4 dB(A) to 83.8 dB(A). Compared to the 1992 values, the noise levels recorded in 1998 showed a significant increase in all the urban centers monitored⁵. The noise levels recorded in 1998 were approximately similar to that of this study.

Noise induced hearing loss is related to the loudness as well as the duration of noise exposed to. The Factories and Machinery Act 1967, Regulation No 5, states that *No employee shall be exposed to noise level exceeding equivalent continuous sound level of 90 dB(A) or exceeding the limit specified in the First schedule or exceeding the daily noise dose of unity*⁶. However more recent studies indicate prolonged noise exposure from 80 dBA is enough to result in NIHL².

Although noise exposure level on traffic personnel in relation to traffic noise conforms to the Factory and Machinery Act, the noise levels emitted by traffic equipment and vehicles can be very high, where even a whistle can emit up to 119.3 dBA and a Honda CBX-750 Siren 119.5 dBA. Eighty percent of the traffic personnel who underwent audiometric evaluation showed SNHL. The incidence was higher among those who served a longer duration. Seven out of the 30 had single-sided SNHL (23%). This is most likely due to noise exposure from the use of fire-arms^{7, 8}.

From the questionnaire, it was found that a high percentage of personnel were not aware of OSH, heard of PPE or knew of the importance of PPE. It was also found that more than 90.8% spent more than five hours a day doing point duty.

Any form of hearing protectors were not provided to traffic personnel. Neither had they been given education on OSH and the Factories and Machinery Act.

Long exposure to traffic noise levels can lead to NIHL. Traffic equipment and vehicles can also lead to NIHL due to their high noise levels. It is highly recommended that traffic personnel on active outdoor duty use suitable hearing protection equipment. Personnel should also not be allowed to work four hours in a stretch. There should be job rotations. Audiometric tests should be held not only for the traffic personnel but for all personnel exposed to noise in some form or another. For example, the marine police, air wing, armoured squadron and general operations force.

CONCLUSIONS

A hearing conservation program should be carried out for all police personnel who are exposed to high noise levels. Other than being sent for yearly audiometric test, readings should be taken from the surroundings and equipment which emit high noise levels. Customized silicon ear plugs which are

comfortable to wear are easily available. Besides this, a duty scheme should be reviewed from time to time in terms of hours of noise exposure.

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