RESEARCH NOTE

HIGH SISTER CHROMATID EXCHANGE AMONG A SAMPLE OF TRAFFIC POLICEMEN IN BANGKOK,THAILAND

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Abstract. There are several volatile substances from the traffic, including benzene, toluene, carbon monoxide, lead and formaldehyde. Most of these substances are considered carcinogens. Police are at occupational risk for toxic fume exposure. This study compared sister chromatid exchange (SCE), a marker for genotoxicity, among a sample of Thai traffic policemen in Bangkok with healthy control subjects. Thirty police officers (all male) and 20 controls were included in this study. The average (mean±SD) SCE for policemen and controls were 4.40±0.93/cell and 0.24±0.12/cell, respectively. A significantly higher SCE among the policemen was observed. Concern for and prevention of toxic substance exposure in traffic police officers should be made a national goal.

INTRODUCTION

Apart from industrial workers, there are other occupations with high risk for volatile toxic vapor exposure. Being a police officer is another occupation at risk for toxic vapor exposure. Crebelli and others (2007) studied police in Rome and found that exposure to traffic fumes during working activities gave a greater contribution to general personal exposure than indoor sources. According to a recent study by Wiwanitkit *et al* (2003). Thai police are highly exposed to traffic benzene vapor. Wiwanitkit *et al* (2004) also noted possible leukemogenesis from exposure to volatile hydrocarbon vapor in police.

There are several volatile substances in traffic, including benzene, toluene, carbon monoxide, lead and formaldehyde. All these are carcinogens (Airport noise, 2005). In this study, the author evaluated sister chromatid exchange (SCE) as a marker for genotoxicity among Thai traffic policemen in Bangkok and in healthy control subjects.

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MATERIALS AND METHODS

Thirty volunteer policemen were included in this study. These policemen worked daily as traffic police in an urban area of Bangkok. We also evaluated 20 healthy male subjects, a group of students studying at Chulalongkorn University, who served as controls. These students were living in the same area, Pathumwan District, but in a dormitory of the University, about 0.5 km away from roads. All the subjects in this study had similar eating and drinking habits and were basically healthy. Before the study, all were interviewed for possible exposure to volatile toxic vapor, especially smoking and volatile substance abuse. An exclusion was set for history of possible exposure to benzene. Overall, 50 subjects were included in this study. All gave informed consent. The Faculty of Medicine and Faculty of Allied Health Sciences, Chulalongkorn University, approved this study. Apart from blood samples, all provided urine samples for laboratory analysis.

Table 1
SCE in police officers and controls.

Group	Number of subjects	SCE/cell			
		Mean	SD	Maximum	Minimum
Police	30	4.40	0.93	3.0	6.3
Control	20	0.24	0.12	0.1	0.5

Determination of SCE

A heparinized blood sample from each subject was collected for determination of SCE. Laboratory analysis was performed using a modified Woff method (Sripanidkulchal and Tattawasart, 1994). All laboratory analysis was performed at the department of Clinical Microscopy, Faculty of Allied Health Sciences, using standard laboratory methods.

Statistical analysis

Statistic analysis of the results was carried out by SPSS 7.0 for Windows. For comparison of SCE values between police and controls the unpaired *t*- test was used. Statistical significance was set at p-value ≤0.05.

RESULTS

A total of 30 police officers (all male) and 20 controls were included in this study. The average (mean ± SD) SCE in the policeman and controls were 4.40 ± 0.93 / cell and 0.24 ± 0.12/ cell, respectively (Table 1). A significantly higher SCE in policeman was observed ($p<0.05$).

DISCUSSION

Large exposure to volatile toxic substances in police officers working in traffic was noted by Leong and Laortanakul (2003). The study by Verma *et al* (2003) in Indian police also gave similar results. Therefore, working in air pollution in an urban area can be a health hazard for police officers. Exposure to benzene from automobile exhaust can be an important occupational problem for these police officers (Priante *et al,* 1996) and this exposure can lead to consequent carcinomas. There was a previous report of SCE in police officers in Italy by Carere *et al* (2002); they noted the high SCE related to the toxic environment from traffic and can lead to the future carcinomas.

Our study assessed SCE among Thai traffic police officers in Bangkok compared to control. The average SCE of the police officers was significantly higher than the average SCE in controls. This implies high chromosomal aberration rate among these police officers, which may be due to exposure to toxic volatile substance. Concern for and prevention of this substances should be promulgated as a national strategy before the situation much worsens.

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REFERENCES

Airport noise – Estimation of cancer risk. [Cited 2005 Apr 10]. Available from URL: www.nonoise.org/resource/trans/air/cancer/cancer.htm

Crebelli R, Tomei F, Zijno A, *et al.* Exposure to benzene in urban workers: environmental and biological monitoring of traffic police. *Occup Environ Med* 2001; 58: 165-71.

Carere A, Andreoli C, Galati R, *et al.* Biomonitoring of exposure to urban air pollutants: analysis of sister chromatid exchanges and DNA lesions in peripheral lymphocytes of traffic policemen. *Mutat Res* 2002; 518: 215-24.

Leong ST, Laortanakul P. Indicators of benzene emissions and exposure in Bangkok street. *Environ Res* 2003; 92: 173-81.

Priante E, Schiavon I, Boschi G, *et al.* Urban air pollutant exposure among traffic policemen. *Med Lay* 1996; 87: 314-22.

Sripanidkulchal B, Tattawasart U. Chromosome aberration assay in Khon Kean University. The 3rd Southeast Asean workshop on Environmental Mutagens and Carcinogen. Khon Kaen: Khon Kaen University Press, 1994: 66-76.

Verma Y, Kurma A, Rana SV. Biological monitoring of exposure to benzene in traffic policemen of north India. *Ind Health* 2003; 41: 260-4.

Wiwanitkit V, Suwansaksri J, Soogarun S. A note on urine trans, trans muconic acid level among a sample of Thai police: implication for an occupational health issue. *Yale J Biol Med* 2003; 76: 103-8.

Wiwanitkit V, Soogarun S, Suwansaksri J. Urine phenol and myeloperoxidase index: an observation in benzene exposed subjects. *Leu Lymphoma* 2004; 45: 1643-5.