

URINE PHENOL LEVELS AMONG THAI POLICE, IMPLICATIONS FOR OCCUPATIONAL HEALTH

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Abstract. In this study, we study an at-risk occupation, the police. Forty-five urine samples were obtained from 45 Thai police working close to traffic in an urban area, for analysis of urine phenol levels. The average (mean \pm SD) urine phenol level in these police was 16.94 \pm 11.72 mg/g-Cr. Significantly higher urine phenol levels were found among police who had worked for longer durations ($p < 0.05$).

INTRODUCTION

Benzene is of particular concern because recent research indicates that benzene exposure can result in chronic toxicity (Chocheo, 2000). At present, work with benzene is subject to the Control of Substances Hazardous to Health (COSHH) Regulations 1999. Monitoring for benzene exposure among at-risk workers is recommended via several biomarkers. Urine phenol is a standard biomarker for benzene exposure (Scherer *et al*, 1998).

Benzene exposure is of particular concern for thousands of workers in industrial plants. There has been a study (Suwansaksri and Wiwanitkit, 2000) regarding the monitoring of benzene exposure among at-risk industrial workers in Thailand. Apart from industrial workers, there are other occupations with high risk for benzene exposure. One of these occupations is traffic police. Traffic police are at considerable risk for benzene exposure due to daily exposure to the exhaust of automobiles.

In this study, we evaluate this at-risk occupation. This study aimed at evaluating phenol levels among a sample of Thai police working close to traffic in an urban area.

MATERIALS AND METHODS

Forty-five healthy volunteer male police

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were included in this study. These police, worked daily as traffic police, out of two police stations, Pathum Wan and Lumpini. All the subjects in this study had similar eating and drinking habits. All the subjects were healthy adults.

All the subjects gave informed consent. The Faculty of Medicine and Faculty of Allied Health Science, Chulalongkorn University, approved the study. Each subject provided a urine sample for laboratory analysis. The urine phenol level was performed by the extracted colorimetric method at a reference laboratory (Special Laboratory, Bangkok).

The data from all the laboratory examinations in this study was systematically collected for further statistical analysis. Statistical analysis of the results was carried by the SPSS 7.0 for Windows program. Independent sample *t*-test was used for comparison. A statistically significant difference was accepted as a *p*-value ≤ 0.05 .

RESULTS

A total of 45 police (all males) were included in this study. The average (mean \pm SD) urine phenol level in these police was 16.94 \pm 11.72 mg/gCr. When classified by duration of work, the police who worked more than five years had higher urine phenol levels than those who worked less ($p = 0.047$; Table 1).

DISCUSSION

Benzene is a common toxic volatile substance found in many industrial processes

Table 1
Urine phenol level traffic among police.

Duration of work	Number of subjects	Urine ttMA (mg/gCr)		
		Mean	SD	95% CI
>5 years	21	23.64	13.76	20.64-26.64
≤ 5 years	24	15.07	7.66	13.51-16.63

(Chocheo, 2000). It is classified as a carcinogen and can cause serious health problems. The immediate effects of high dose inhaled exposure can include headache, tiredness, nausea, and dizziness. Unconsciousness may occur if the level of exposure is very high. For exposure and risk evaluation, the monitoring of benzene by a peripheral biomarker has several advantages over assessment of exposure. Urine phenol is accepted as a useful monitoring tool for the early diagnosis of dangerous exposure.

The work environment is, in many countries, strictly regulated with regard to the air concentration of benzene. In some occupations, such as traffic policeman, control of the work environment is very difficult. We detected high urine phenol levels in our subjects, implying high levels of benzene exposure. These levels were higher than in those reported in healthy controls (4.2 mg/gCr) (Premel-Cabic *et al*, 1988). However, they were not higher than upper acceptable limits (20 mg/gCr). Our results agree with those of previous reports from some countries (Crebelli *et al*, 2001; Verma *et al*, 2003). In addition, we found that the longer the duration of work, the higher the urine phenol levels detected.

Working in an urban area can be a health hazard for the police. Exposure to benzene from automobile exhaust (Muttamara *et al*, 1999) can be an important occupational problem for these police. Although the protective devices were distributed to these police, high urine phenol levels were observed. None of the subjects reported a previous evaluation for benzene exposure. Benzene exposure prevention methods should be explored for traffic police.

Some limitations of this study should be noted. First, the sample size in this study was relatively small, since it was a pilot study. Second, al-

though we tried to control confounding factors, some factors may have effected the questionnaire screening. We have plans for future studies in this area. Further studies, focusing on the effects of benzene exposure on the body, such as hematotoxicity and genotoxicity, are recommended.

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