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**Research Article**

# ASSESSMENT OF TOTAL SERUM TESTOSTERONE LEVEL IN PETROLEUM STATION WORKERS AT KHARTOUM STATE

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**ABSTRACT**

**Background:** Human exposure to Benzene has been associated with arrange of acute and long –term adverse health effect and disease.
**Methodology:** A population based matched case control that comprises of 45 apparently healthy benzene workers as a cases and 35 non benzene workers analyzed as controls was conducted at Khartoum state –Sudan. Blood samples were drawn from participants and serum testosterone was measured by ELISA technique. Data was analyzed by SPSS v16
**Results:** Serum testosterone levels were showed no significant difference in benzene workers compared to non benzene workers. There is no correlation between serum testosterone level and duration of exposure on benzene workers.
**Conclusion:** It can be concluded that exposure to benzene had no effect in serum testosterone levels on petroleum stations workers.



## INTRODUCTION

Benzene is an aromatic hydrocarbon often used for industrial purposes. It can cause serious, negative health effects in humans depending upon both amount and duration of the exposure. It is a carcinogenic agent[1]. Human exposure to benzene has been associated with a range of acute and long-term adverse health effects and diseases.

Benzene is highly volatile, and exposure occurs mostly through inhalation. Public health actions are needed to reduce the exposure of both workers and the general population to benzene[2]. Various adverse effects for solvents intoxication such as cognitive impairment, behavioral, neuro-patholological, endocrine disrupt, hepatotoxic and nephrotoxic effects have been reported in several studies [3][4][5][6].

Testosterone is steroid hormone from the androgen group secreted primarily by testicles of males. It is plays key role in the development of male reproductive tissue such as testes and prostate and promoting secondary sexual characteristics [7].

Testosterone has major influence on body fat composition and muscle mass in the male. Testosterone deficiency is associated with an increased fat mass; reduce insulin sensitivity, impaired glucose tolerance, elevated triglyceride and cholesterol and low HDL-cholesterol [8].

Several studies reported about the relationship between exposure to petrol products and the reproductive dysfunction. In previous experimental study on rats, benzene vapors cause significant reduction in steroid sex hormones in female rate and increased in sex hormones in male rate models [9]. There are many ways for solvents affect fertility of human [10][11]. Benzene was detected in both blood and semen's of exposed workers and it was suggested that it causes adverse effect on sperm quality[12]. In another experimental study on albino rats, gasoline inhalation lowered all reproductive hormones suggesting interfering of gasoline exposure with reproduction [13] Possible mechanism of benzene on fertility could be arise from the direct effect of the benzene on the testicular functions. This hypothesis could be speculated from the exist of the benzene in the blood and semen of the exposed, suggesting that the solvent permeate blood-testis barrier[12]. This study was designed to study the effect fuel petroleum exposure in benzene station workers on total testosterone level in Khartoum state-Sudan

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## MATERIALS AND METHODS

The study carried out in benzene station workers at Khartoum state during the period from March to May 2016. The study covered 80 individuals randomly selected from whole population with different age. 45 were workers at petroleum stations and directly exposure to benzene (case group) and other 35 was not worker (control group). Both groups were age matched. The workers selected were engaged in petrol filling for 15 days per month (24h/day). Smokers, diabetic, hypertensive, alcohol abuse and endocrine disease individuals were excluded from this study.

The data, including name, age, BMI and social status were collected by using a direct Interviewing questionnaire. After consent formed, five ml of venous blood was drawn from each participant into plain containers, and placed at room temperature for one hour and separating by centrifugal at 3200 rpm for three minutes to obtain sera. Sera obtained were frozen at -20 prior to processing for testosterone analysis using ELISA technique. Quality control sera were measured along with study samples to monitor the precision and accuracy of the procedure. Comparison of quantities variables between two groups was performed using student T. test after checking the normality of the data. Person correlation was used to study associations between variables, the data were analyzed using the statistical software package SPSS.

## RESULTS

In our study we have found no significant difference in the mean serum testosterone levels between petroleum fuel station workers (cases) and non- petroleum fuel station workers (controls), 4.48±1.71 vs 5.05±2.08, respectively (p. value =0.190). (Figure 1)

In petroleum fuel station workers (cases), there was no correlation of serum testosterone with duration (per/years) and age but showed positive correlation with BMI. (Table 2)

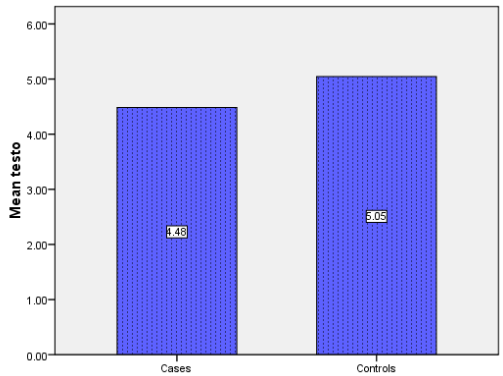


**Figure 1** comparison of testosterone levels between petroleum station workers (cases) and healthy non petroleum station workers (controls).

**Table 1** Correlation of serum testosterone with duration, age and BMI in petroleum station workers.

| | R | P.value |
|---|---|---|
| Duration (per/year) | 0.070 | 0.648 |
| Age (yaer) | 0.019 | 0.901 |
| BMI | 0.300 | 0.045 |

## DISCUSSION

This study was conducted at petroleum station at Khartoum state, during March- May 2016. Eighty non smoker adult males were recruited in this study and categorized into two groups, 45 petrol filling adult males workers(study group) and 35 non petrol filling workers as control.

Findings of this study showed no signs of male reproductive dysfunction in Sudanese fuel service workers. Although testosterone was little reduced in petroleum station workers but this difference was insignificant compared to control group.

The findings of this study in contrast with other studies. In recent study, testosterone was found to be low in petrol fuel service workers [12] [13]. Hashem *et al* [14] and Yilmaz *et al*[15] reported that volatile substances affect testosterone synthesis and secretion by direct action on the leyding cells. The reproductive dysfunction caused by benzene inhalation is reported to be correlated with amount of benzene in blood and semen. [12] . However, it is noticed that benzene is detected in the blood or semen only when its concentration exceeded maximum allowed concentration (MAC) at the environment [12]. There are epidemiological factors such as ventilation may affect concentration of benzene on surrounding area of exposure. In this study, the amount of benzene or gasoline was not measured in the fluids of the participants.

Also there is little number of participants those engaged at petroleum station for long period.

## CONCLUSION

From the finding of the result and above discussion serum testosterone level was not affected by exposure to benzene as well as the year of exposure increase.

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