



ASSESSMENT OF SERUM TSH LEVEL IN PETROLEUM STATION WORKERS AT KHARTOUM STATE

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ABSTRACT

Background: Exposure to petroleum products Including benzene and gasoline may lead to leukemia, anemia, excessive bleeding and impaired functions to immune and reproductive system. Methodology: This population based matched case control study was conducted at petroleum stations at Khartoum state, during period from March to May 2016. Blood samples were drawn from apparently healthy 45 benzene station workers (Cases) and 35 non benzene station workers (Controls), then serum TSH was measured using ELISA technique. Data was analyzed using SPSS v 16. Results: Serum TSH was insignificantly different in petroleum station workers as compared to controls. In petroleum station worker (cases), there were no correlation of serum TSH level with duration of work (per/year) and age Whereas there was negative correlation between TSH and BMI. Conclusion: It can be concluded that exposure to benzene have no effect on thyroid function.

KEYWORDS: Benzene, TSH (Thyroid Stimulating Hormone), petroleum station workers.

INTRODUCTION

Benzene, also known as benzol, is a colourless, flammable liquid with sweet odour. It is a part of natural part of crude oil and gasoline as well as cigarette smoke.^[1]

Benzene can enter human body through lungs, gastrointestinal tract, and across the skin and then enters blood stream. Once in the bloodstream, it travels throughout the body and can be temporarily stored in the bone marrow and fat. Benzene is converted to products, called metabolites, in the liver and bone marrow. Some of the harmful effects of benzene exposure are caused by these metabolites. Most of the metabolites of benzene leave the body in the urine within 48 hours after exposure.^[1]

Exposure to chemicals, including benzene, in petroleum fuels can result in rapid widespread internal exposure, reaching all organs in the body.^[2] Benzene, as main organic compound, has several affects on human health. It causes problems in the blood, when it breathes for long periods may cause anemia and excessive bleeding. Also may lead to leukemia, impaired immune system function and may be harmful to the reproductive system.^[1]

Thyroid-stimulating hormone (TSH) is a trophic hormone released from pituitary that stimulates the

thyroid gland to produce thyroxine (T4) and then triiodothyronine (T3) which stimulate metabolism of almost every tissue in the body.^[3] A TSH assay is recommended as screening tool for thyroid disorder.^[3]

Environmental agents interfere with thyroid function at multiple sites, including thyroid hormone synthesis, thyroid hormone metabolism and excretion, and thyroid hormone action.^[4,5,6,7] Polycyclic hydrocarbon and other specific chemicals have a direct effect on thyroid gland resulting in genetic damage that leads to cell transformation and tumor formation.^[8] There are few studies on effect of long exposure to benzene on thyroid function among petroleum station workers. This study was designed to study the effect of benzene exposure on serum TSH level in Sudanese petroleum station workers and to find correlation between TSH level and duration of exposure to benzene.

MATERIALS AND METHODS

This is a population matched case-control based study carried out among petroleum station's workers at Khartoum state during the period from March 2016 to May 2016. The study included a total of 45 apparently healthy males working at different petroleum stations at Khartoum state for different duration of time up to 28 years while the control includes a total of 35 healthy

male individual. Both groups were age matched. All participants were non-smokers aged 20-51 years.

Individuals with liver disease, diabetes, hypertension, thyroid disorders and alcohol abuse individuals were excluded. A coded enrollment number was given for each enrolled subject. A direct interviewing questionnaire was used to collect data regarding demographic, medical, lifestyle and occupational questions. Blood samples were taken from the venous into plain containers and placed at room temperature for one hour and separated by centrifugal at 3200 rpm for three minutes to obtain sera. Sera were frozen at -20 C° prior to analyzing. Sera were analyzed for TSH using ELISA technique. Quality control sera were measured along with study samples to monitor the precision and accuracy of the procedure. Quantities variables between

two groups were compared 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 v16.

RESULTS

In our study we have found that the mean serum TSH was insignificantly differing in case group as compared to control. The mean of serum TSH in case group was 1.21 ± 0.95 and was 1.33 ± 0.81 in control group (P value > 0.05) (Table 1).

There was no correlation of TSH level with duration of work (per/year) and age. (P value > 0.05) (Table 2).

There was correlation of serum TSH level with BMI (P value < 0.05) (Table 2).

Table 1: Comparison of TSH level between study group and contro

Parameter	Petroleum stations workers N=45	Non-petroleum station workers N=35	P value
TSH	1.21 ± 0.95	1.33 ± 0.81	0.538

Table 2: Correlation of TSH level with duration of work, age and BMI

	R	P value
Duration of work	-0.086	0.574
Age	-0.100	0.512
BMI	-0.305	0.042

DISCUSSION

The results of the present study showed insignificant differences in the serum levels of TSH between petroleum station workers group and non petroleum station workers group (p.value = 0.538).

The findings of this study in contrast with other studies. Nazia Uzma et al found that TSH level was decrease when compared to the control subjects and their level were further decreased as the year of exposure are increased.^[9]

There are epidemiological factors, such as, ventilation may affect concentration of benzene on surrounding area of exposure. Also the volume of fuel dispensed as well as ambient temperature contributes significantly to the increased emission of volatile hydrocarbon. Also there is little number of participants those engaged at petroleum station for long period.

In our study thyroid hormones (T3 and T4) were not measured. Also the method used is less sensitive than method used by Nazia U zma et al.

We recommended to measure benzene concentration on surrounding area of exposure. Measuring of benzene on blood also may be measure, but have limiting value, because benzene rapidly disappears in the blood. Also benzene metabolites may be measure on urine.

CONCLUSION

The findings of this study showed that the Serum TSH level was not affected by exposure to benzene as well as the year of exposure increase.

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