

## Thyroid and its regulatory hormone variations in workers of automobile workshops and petrol filling stations

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ARTICLE INFORMATION	ABSTRACT
Received: 02-07-2019 Received in revised form: 09-03-2020 Accepted: 20-06-2020	Serum thyroid hormone and TSH levels were determined in the worker of automobile workshops and petrol filling stations workers through ELISA. A total of 44 exposed individuals (25 automobile workshop and 19 petrol filling station workers) having an age range of 24-45 were recruited from Lahore city. Twenty one (21) healthy controls of the same age range were recruited from University of the Punjab, Lahore. A significant decline ( $P \leq 0.05$ ) of $T_3$ was seen in automobile workers as compared with controls. Both, automobiles workshop workers and petrol station workers demonstrated a significant decline of $T_4$ as compared to controls. Mild elevation of TSH was present in both Automobiles and Petrol filling Station workers as compared to controls. Reduced levels of $T_3$ and $T_4$ and elevated TSH may lead to hypothyroidism in the workers exposed to these environments.
<b>*Corresponding Author:</b>  Muhammad Amir Iqbal: <a href="mailto:amir87zoologist@gmail.com">amir87zoologist@gmail.com</a>	<b>Keywords:</b> Serum, $T_3$ , $T_4$ , TSH, ELISA
<b>Short Communication</b>	

### INTRODUCTION

Human health is directly or indirectly associated to environmentally and occupationally exposed chemicals. Occupational environments are the huge source of different toxicants in developing countries including Pakistan. Shortage of resources, absence of proficient practices, insufficient medical facilities, unawareness among the labor force regarding exposure to hazardous chemicals, low adaptability of safety measurements and low literacy rate among workforces in Pakistan are the prominent contributors of occupational health hazards (Abbas, 2015).

Petroleum is considered as toxic due to its constituents and byproducts exposure. Petroleum products vary from low toxicity level to high toxicity level according to their complexity and boiling point. Aromatic components of petroleum products contain PAHs and developmental and mutagenic and health related effects (Gray *et al.*, 2013; Akpoveta & Osakwe, 2014).

Thyroid gland plays a vital role to regulate the human body functions including homeostasis, heart functioning, maintaining nervous system and normal growth. Impairment in functioning of thyroid gland can cause significant effects on human physiology.

Thyroid pathogenicity is attributed to with petroleum products containing low aromatic contents, aliphatic hydrocarbons, olefin, naphthenic and most of their distillates. A case study on occupationally exposed workers to petroleum products showed a substantial increase in thyroid pathogenicity ultimately leading to thyroid cancer. This indicates the change in thyroid hormone patterns due to petroleum products or occupationally handling of petroleum or petroleum products (Fowles *et al.*, 2016). The present study was designed to estimate the thyroid hormones in occupationally exposed workers of petrol filling station workers and automobiles workshop as compared to the controls.

### MATERIALS AND METHODS

#### Sample collection

In this case-control study, a total of forty four blood samples of automobiles (25) and petrol station workers (19) were collected from Lahore region. Twenty one samples of healthy individuals as controls were also collected from Lahore. Fasting (8-12 hours) blood samples (5 mL) were taken under proper aseptic conditions. History of individuals like subjects name, age, gender, contact, occupation, working tenure, hepatitis history, smoking history, food intake, height, weight,

systolic, diastolic and pulse rate were recorded in Proforma. Serum was separated and stored at -80°C for analysis.

Concentrations of  $T_4$  (Thyroxine),  $T_3$  (Tri-iodothyronine) and TSH (Thyroid Stimulating Hormone) were determined by using ELISA Kit of HIGHTOP, Catalogue Number: H324, H323 and H325 for  $T_4$ ,  $T_3$  and TSH, respectively, in the Physiology/ Endocrinology Laboratory, PU, Lahore.

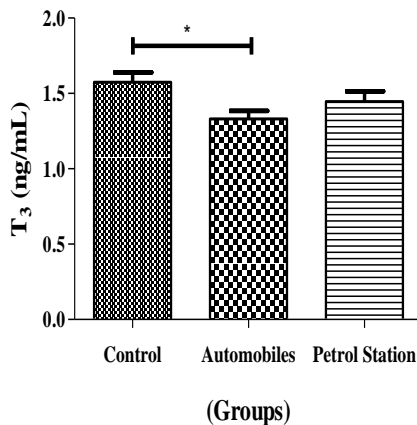
### Statistical analysis

One way ANOVA using Graph Pad Prism version 6 was used for statistical analysis. Post-hoc Newman-Keuls Test was used for further analysis.

## RESULTS

### Tri-iodothyronine ( $T_3$ )

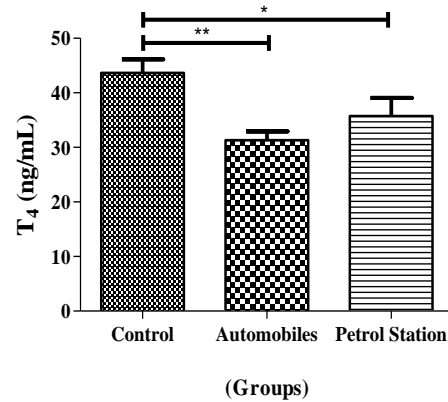
A significant decrease of 11.33% ( $P < 0.05$ ) in  $T_3$  level in automobile workshop workers as compared with control was observed. Petrol station workers did not show any significant change in  $T_3$  titers (Figure I).



**Fig. 1:** Comparison of Serum  $T_3$  (ng/mL) among comparable groups. Value are in Mean  $\pm$  SEM \*Indicates significance at  $P < 0.05$

### Tetra-iodothyronine ( $T_4$ )

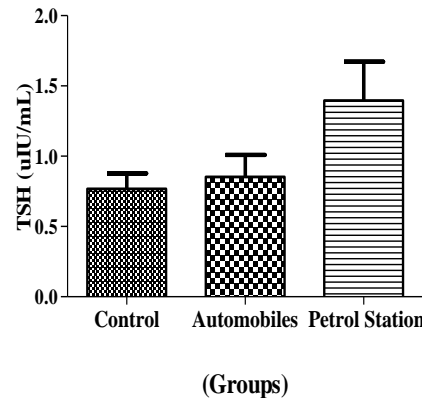
A pronounced decrease ( $P < 0.01$ ) of 28.29% in serum  $T_4$  level in automobile workers as compared with controls was present. A 18.19% decrease ( $P < 0.05$ ) was also seen in petrol station workers as compared to controls. Mild increase of 14.08% in  $T_4$  levels in petrol station workers as compared to automobiles workers was evidenced (Figure II).



**Fig. 2:** Comparison of Serum of  $T_4$  (ng/mL) among comparable groups. Value are Mean  $\pm$  SEM\*, \*\*Indicates significance at  $P < 0.05$  and  $P < 0.01$ , respectively.

### Thyroid Stimulating Hormone (TSH)

A non-significant increase in serum TSH (82.89%) was seen in workers of automobiles and petrol station as compared with controls (Figure III).



**Fig. 3:** Comparison of Serum TSH (uIU/mL) among comparable groups. Value have been represented in form of Mean  $\pm$  SEM

## DISCUSSION

In our findings there was a significant reduction in  $T_3$  and  $T_4$  level in automobile workshop workers as compared to controls. Both experimental groups i.e., petrol filling station workers and automobile workshop workers exhibited a non-significant increasing trend of TSH as compared to controls. This increased trend of TSH points towards the hypothyroid conditions in these subjects. (Chakera *et al.*, 2012; Xu *et al.*, 2012; Akinsete *et al.*, 2019).

Petrochemicals include Polycyclic aromatic hydrocarbons (PAHs), benzo (k) fluoran-thene, benzo (e) pyrene, Dibenzo (a, h) anthracene and their derivatives and may contain heavy metals like lead etc. Toxic effects of these compounds are known.

Hypothyroidism often leads to obesity at different levels of severity. Elevated level of thyroid stimulating hormone (TSH) is associated with the less energy consumption rate. Tubby bipartite transcription factor (Tub) is a gene which is related to obesity and its mutation leads to insulin resistance. Thyroid hormones regulate the obesity gene 'Tub' functioning. Extreme obesity conditions include the dysfunction in thyroid pituitary axis which results in increases level of Thyroid stimulating hormone (TSH) in serum (Verma *et al.*, 2008; Sanyal & Raychaudhuri, 2016).

Decrease levels of Thyroid hormones and elevated level of TSH hormone is found to be associated with cardiovascular risk associated with hypertension in arteries, cardiac impairment, atherosclerosis, dyslipidemia or diabetes mellitus. It is recommended that a detailed study be conducted in petroleum workshop workers and they should be instructed have regular checkups for their health records and wellbeing.

### ACKNOWLEDGEMENT

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