

Biochemical Changes in Renal Function and Plasma Protein Profile of Petrol Station Attendants in Basrah

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Abstract

The current study is aimed to evaluate the possible biochemical variation in renal functions and proteins of plasma due to exposure of petrol vapor. Thirty-six station attendant assessed in Basrah, Iraq. A corresponding (20), healthy persons were used as controls group. The results of our study have been shown a significant increase in the level of blood urea, blood creatinine and in the level of plasma protein for those workers from (6-10) years, when compared the results with the control group. The results refer to that exposure to petroleum products is cause imbalance in renal function. These results, from our study, may be directly related to the time of exposure.

Keywords: Renal function; Plasma proteins; Petrol station

التغيرات الكيميائية الحياتية في وظيفة الكلى ومستوى البروتين للعاملين في محطات تعبئة الوقود في البصرة

الخلاصة

تضمنت الدراسة الحالية التحري عن التغيرات البيولوجية الحياتية المحتملة لوظيفة الكلى ومستوى بروتينات بلازما الدم نتيجة للتعرض واستنشاق مشتقات البترول. الدراسة الحالية شملت (36) شخص من العاملين في محطات البترول في محافظة البصرة وشملت ايضا (20) شخص سليم غير معرض لتلك المشتقات النفطية. أظهرت نتائج الدراسة وجود ارتفاع معنوي ملحوظ في تركيز يوريا الدم والكرياتنين وبروتينات الدم في مجموعة المرضى العاملين في المحطات للفترة الزمنية من (6-10) سنوات عند مقارنة النتائج بمجموعة السيطرة. هذه التغيرات في مستوى اليوريا والكرياتنين وكذلك بروتينات بلازما الدم ترتبط ارتباطاً مباشراً بالفترة الزمنية للتعرض للمشتقات النفطية ويمكن اعتمادها مستقبلاً عند الدراسات الاقتصادية والبيئية في العراق.

الكلمات المرشدة: الوظائف الكلوية، بروتينات بلازمية، محطات نفط.

INTRODUCTION

Petroleum products are widely used for energy and home heating system they covered by the Oil Spill Law. Petroleum products are chemical complex mixtures derived from oil and most of them with similar physical, and chemical properties. They contain huge numbers of chemicals in varying proportions, and a variety of additives [1]. Gasoline has chemicals complexes components such as benzene and methyl tertiary butyl ether [2]. Most of peoples have a higher risk of exposure to petroleum products vapors; these include fuel -station workers, people how attendants to service station, drivers of petrol trucks [3]. The nature of chemical products of petrol makes them readily available in the atmosphere any time it is dispensed, especially at petrol fuel stations. People who are exposed to petrol fumes during fuelling and refueling at gas stations, but the people who are working at filling station are more risky by virtue of their occupational exposure [4]. The cytotoxic effects of petroleum products are exerted on most of body organs of humans and animals such as the lungs, liver and kidney [5]. The present study aimed to evaluate and investigates the variation in proteins of plasma and kidney function. Gasoline-filling workers showed marked no changes in proteins of plasma, and a big change in renal function biochemical tests, which were directly correlated with the time of exposure.

Materials and methods

Samples collection

A total of 56 human were used for the study. Thirty six workers at petrol station in Basrah. All the workers are exposed to petrol products during their duties. 20 healthy people were recruited as negative controls for the study. Blood samples (5) ml was taken from a peripheral vein are transferred to plain tube for preparing serum. Serum samples were separated 1 hr after of blood collection by centrifugation at 5000 RPM for 10 min and stored in a refrigerator.

Renal function assay

Biochemical analyses on the serum samples were done 24 hr after sample collection. Biochemical analyses were carried out for the Blood urea and creatinine and plasma protein. In this study We used kit reagents (Randox laboratory Ltd, UK) were used for all biochemical analyses according to manufacture protocol and then, the optical density were read using a UV-Vis spectrophotometer (DREL 3000 HACH) at 520(nm).

Statistical analysis

Statistical data of our results was analyzed with student's *t*-test. $P \leq 0.05$ was considered statistically significant.

Results and Discussion

The level of serum urea and creatinine of the Iraqi and International workers, which are exposed to petroleum products such as kerosene and gasoline compared with non-exposed subjects are shown in Table 1. Our results are time exposure

dependent manner. The level of urea and creatinine were shown significant increases with time exposure to kerosene and gasoline. For Iraqi workers, we can see elevated in the level of blood urea after (3-6) years of petroleum exposure, while increase in the blood urea for the international workers after (6-10) years (Figure 1), the same results shown for blood creatinine (Figure 2).

Table (1). Changes in renal functions parameters of workers exposed to petrol vapor and control group

Groups	Blood urea (mg/dl) Mean±SEM	Creatinine (mg/dl) Mean±SEM
Normal control	33.83±2.414	0.5333±0.05578
Iraqi workers		
Exposure time 1-3 years	35.17±3.842	0.5500±0.05627
Exposure time 3-6 years	48.50±1.408	0.7000±0.03651
Exposure time 6-10 years	57.50±2.754	1.3330±0.08433
International workers		
Exposure time 1-3 years	32.00±2.414	0.4667±0.03333
Exposure time 3-6 years	32.67±3.685	0.5833±0.06009
Exposure time 6-10 years	44.64±2.108	0.9667±0.08433

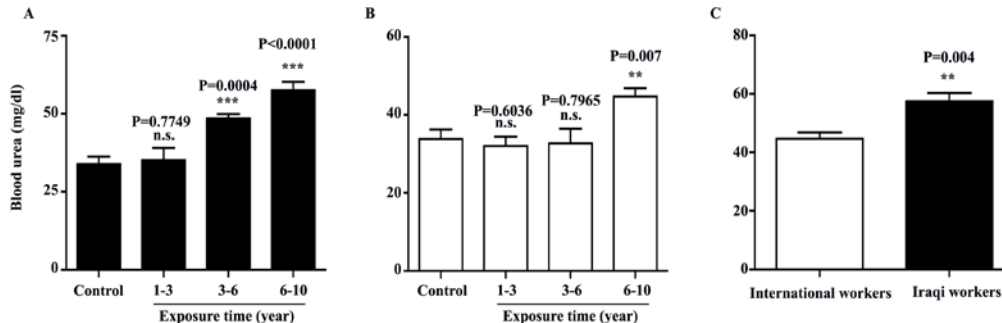


Figure (1). Blood urea level in petrol station workers compared with non-exposed Subjects. (A) Iraqi workers, (B) International workers and (C) comparison between Iraqi and international workers after (6-10) years) exposure time. Asterisks indicate statistically different from control. Columns are mean of six determinations.

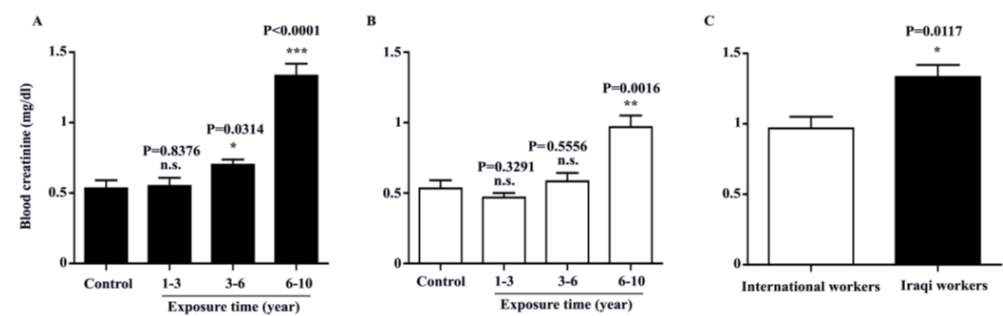


Figure (2). Blood creatinine level for petrol station workers compared with non-exposed subjects. (A) Iraqi workers. (B) International workers and (C) comparison between Iraqi and international workers after (6-10 years) exposure time. Asterisks indicate statistically different from control. Columns are mean of six determinations.

Table 2 summarized level of total protein of serum for Iraqi and international workers compared to non-exposed subject. Total plasma protein level is not significant changes for international workers. While, the results showed significant increase in the plasma protein level for Iraqi workers after (6-10) years exposed to petroleum products (Figure 3).

Table (2). Level of plasma protein in subjects exposed to petrol vapor and control group

Groups	Serum plasma (g/dl) Mean±SEM
Normal control	5.867±0.4402
Iraqi workers	
Exposure time 1-3 years	6.117±0.6150
Exposure time 3-6 years	5.783±0.4847
Exposure time 6-10 years	8.000±0.4944
International workers	
Exposure time 1-3 years	5.200±0.6191
Exposure time 3-6 years	5.850±0.4588
Exposure time 6-10 years	6.333±0.5383

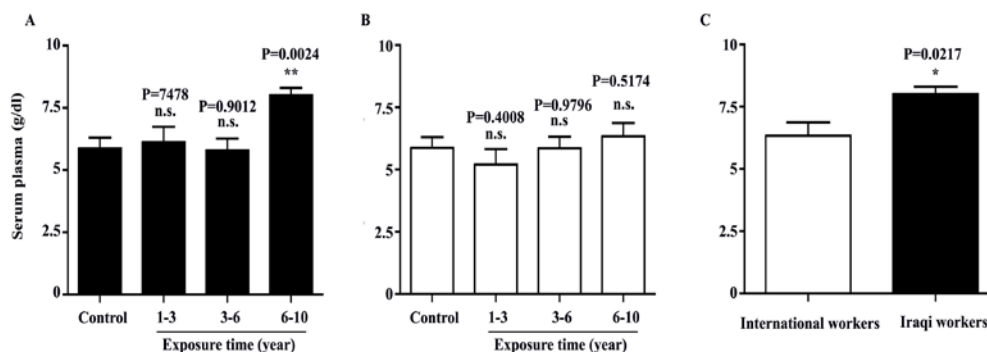


Figure (3). Total serum protein level in petrol station workers compared with non-exposed subjects. (A) Iraqi workers. (B) International workers and (C) comparison between Iraqi and International workers after (6-10) year's exposure time. Asterisks indicate statistically different from control. Columns are mean of six determinations.

Healthy problems effects due to exposure to chemical materials of petroleum are depending on many factors such as the exposure time, and substance concentration. Breathing of petroleum products and their derivatives can cause nervous system effects and respiratory irritation. Exposed of high level of petrol and their products can cause coma and death. Petroleum products can cause skin irradiation. Long-term exposure to petrol products may be causing healthy problems to organs and can cause many diseases such as nervous system, connective tissue disease and kidneys. Petrol contains amounts of benzene, have been demonstrated as human carcinogen. Other study showed that occupationally exposed people in the petroleum refining industry have an increased level of blood cancer which called leukemia [6,7].

In this study evaluated the effect of time exposure to petroleum products and their derivatives that are inhaled by the Iraqi and International workers on urinary system and kidney function. The results show no big changes in proteins of plasma except Iraqi workers after (6-10) year's exposure time. Fuel products are mixtures of chemical materials most of them have side effect and can be cytotoxic to many of body organs including the liver, and kidney [8,9], which may cause an increase in toxic metabolites including ROS. While experimental which used animal's lab. Such as rats showed that exposure by inhalation to the petrol products was kidney toxic [10]. This effect has not been showed in human [11]. Previous studies on human and experiment demonstrated that many chemicals could affect the kidney [12]. Our results showed that concentrations of blood urea and blood creatinine were increased in Iraqi people when compered the results with international workers. Other reports conformed that petrol products may have some effects on kidney functions [13,14]. Using a model of cohort model, Jacob *et al.*, their study demonstrated that exposure to petrol products was correlated with faster progression to end-stage renal disease in people with IgA and membranous glomerulonephritis [15].

Conclusions

In this study evaluated the effect of time exposure to petroleum products on kidney function. Our results showed that exposure to long term petrol vapor is highly affect

renal function tests. These effects may be associated with directly exposure to petrol products.

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