Biochem. Cell. Arch. Vol. 18, No. 2, pp. 1909-1913, 2018 | www.connectjournals.com/bca | *ISSN 0972-5075*

ASSESSMENT OF SOME BIOCHEMICAL BLOOD ABNORMALITIES FOR LABORS OF DIESEL ELECTRIC GENERATORS

Alaa Abbas Fadhel[1]* and Bassam Faron Alfarhani[2]

[1]Al-Mussaib Technical College, Al-Furat Al-Awast Technical University, 51009, Babylon, Iraq.
[2]Department of Chemistry, College of Sciences, University of Al-Qadisiyah, Iraq.
*e-mail : Alhaddad2011@yahoo.comor, alaa4chem@knights.ucf.edu

(Accepted 27 September 2018)

ABSTRACT : Labors at the deiseal power generators are unceasingly exposed to a lot of hazardous and toxic fumes that has the potential to cause many health complications. The main purpose of the current research was to investigate whether there are any alterations or abnormalities for some biochemical aspects in the blood sera among those exposed labors in different locations of Hilla city. The results showed that there are a significant increasing in the average level of Alkaline phosphates(ALP), and Alanine aminotransferase (ALT) enzymes compared with control group. In addition, the studied groups demonstrated that there are decreasing in the average value of total protein while no significant differences were found for uric acid and cholesterol. Furthermore, hemoglobin (Hb) and white blood cells counts were also studied and the outcomes revealed a decreasing in the mean value for both parameters specially when time exposure increased.

Key words : Biochemical blood abnormalities, diesel electric generators, health complications.

INTRODUCTION

The use of non-sustainable energy resources like diesel generators will continue to increase in the future to support the world's growing population as well as taking the second hand in the living lodgings when the power went out. It is necessary to use these resources in a way that is efficient, and reduces their impacts on human health and the environment (Mehadi *et al*, 2014).

Gases rising from these generators inhale chemicals, including carbon monoxide and carbon dioxide, and heavy metals, which are carcinogenic and mutagenic (Gilberg, 1974; Moor, 1984). In general, many studies in this direction have proven that heavy metals when present beyond traces are toxic to humans. At the beginning, they may combine with proteins and may not cause any poisoning, however when their concentration exceeds the threshold level, they become a real health concern (Jaffar, 1988; Fadhel and Jonson, 2016). Furthermore, toxic metals might be interacting with essential cellular components through covalent and ionic bonding and when it became at high levels, both essential and non-essential metals can damage cell membrane, alter enzyme specificity, disrupt cellular function and damage the structure of DNA (Brunis, 2000; Blasiak, 1999). Based on the recent studies, they found that heavy metals like lead that might be present in this areaable to inhibit hemoglobin synthesis due to their impact on erythroblast growth and interference with hemoglobin production (Ghazi, 1995). Heavy metalslike lead (Pb), cadmium (Cd) and mercury (Hg) can generate pathophysiological affairs that generate radicals like reactive oxygen species (ROS), hydroxyl radical ($HO^{\bullet}$), hydrogen peroxide (H_2O_2) (Bassam Alfarhani *et al*, 2016). These free radicals can disturb the oxidant-antioxidant balance bringing a change called oxidative stress (Mehadi *et al*, 2014; Jacob, 1995; Fadhel and Yue, 2016). The biochemical parameters of this study typically focusing in liver and kidney functions for those workers such as Alkaline Phosphates (ALP), Alanine aminotransferase (ALT) enzymes, total protein, cholesterol and uric acid. All these parameters above have direct effect and might be associated with many health concerns. The current study aims to assessing and evaluation of biochemical and hematological abnormalities for workers in private electric generators in Hilla city. Blood specimens were collected from 40 persons working in private electric generator in Hilla city and 46 specimens were collected from normal (farmers) persons (control) with age ranged (17-54) years.

MATERIALS AND METHODS

Forty diesel power generator workers between age group of 17-54 years were included in the study. They were healthy and had been working for certain time as in

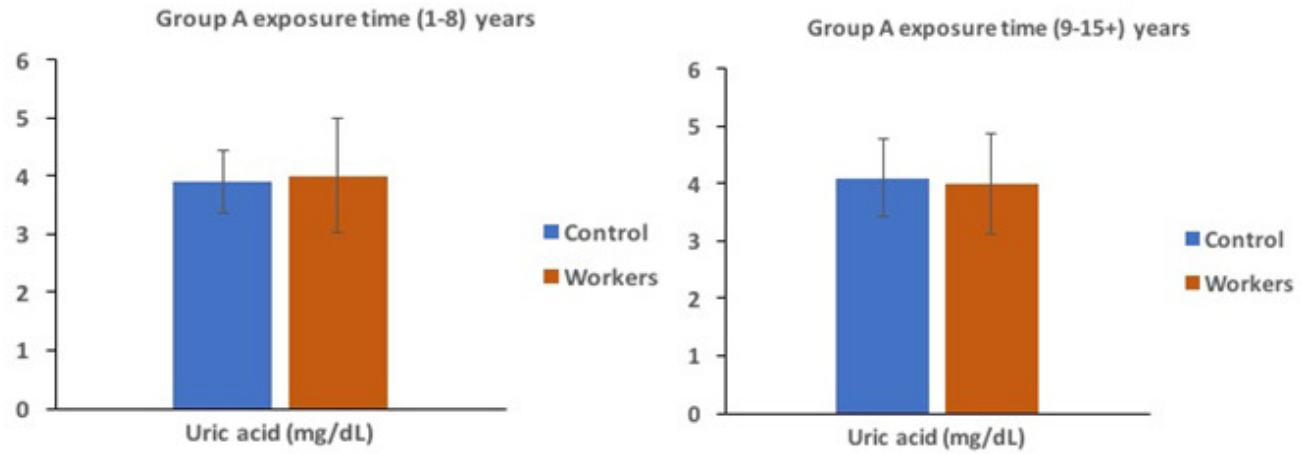

Fig. 1 : Comparison of Uric acid values for Group A and B workers with control.

Table 1 : The study group (workers) according to the duration of work.

Group	Duration of work (year)	No. of workers
A	1- 8	24
B	≥ 9	16

Table 1. Subjects, who were smokers, alcoholics had a history of previous or present illness had worked have been excluded. Forty-six healthy males working as farmers were selected as controls. Study subjects were divided into two main groups according to years of working on power generators. Table 1 shows the two main groups according to the exposure time.

Five (5) ml of whole blood were collected by venipuncture technique form each subject. Two (2) ml of blood then dispensed in Ethylenediamine tetra-acetic acid (EDTA) anticoagulatedlabeled tubes for hematological study while the remaining blood samples were dispended into sterile plain tubes with each blood specimen allowed to clot, centrifuged for 12 min at 3000 rpm then serum was taken for biochemical analysis. Enzymes levels (ALP, and ALT) were measured by using colorimetric spectrophotometer (Shimadzu) at 405, 340 nanometer (nm) respectively. Enzymatic Randox (manufacture company) kits were assayed for measurement of ALP, ALT. Serum total protein, cholesterol and uric acid were estimated by technique according to instructions company kits (AGAPPE).

For hematological study, hemoglobin (Hb) were estimated using Cyanmethaemoglobin method (Drabkin), while White blood cells WBC were measured using (SoodR. 1985)method usinghaemocytometer.

Statistical analysis data were analyzed by Microsoft excel. Continuous data were presented as mean ± Standard Deviation. The mean values of two groups were compared by unpaired T-test. It was taken as statistically significant when P value was <0.05.

RESULTS AND DISCUSSION

Human exposure to diesel components is associated with multiple toxicities affecting the hematological, hepatic, immunologic and chromosomal functions and an increased risk of carcinogenesis. However, the precise mechanism of diesel components induced toxic effects is not fully understood. Therefore, this study was conducted to investigate the changes in the biochemical and hematological parameters among power generator workers to know, if there are any effects on liver and kidney functions.

Biochemical analysis of blood serum

Uric acid, cholesterol, ALT and ALP were studied as a biochemical parameter to compare it with health group. For uric acid (Table 2) and cholesterol (Table 3) the results show that there is no statically difference with control values, which gives an indication that working with diesel power generator has no effect on uric acid and cholesterol levels. Fig. 1 shows the levels of uric acid and control at different duration of work. Fig. 2 illustrates the levels of cholesterol in workers and control.

The present results for ALP (Table 4), ALT (Table 4) and total protein (Table 5) reveal that there is a statically differences in the above parameters as compared to the control value. For ALP, the results show that ALP for

Table 2 : Uric acid levels of workers and normal males (control).

Group	Parameters	Control	Workers
A	Uric acid (mg/dL)	3.9± 0.54	4.0±0.98
B	Uric acid (mg/dL)	3.9± 0.54	4.1 ± 0.88

Table 3 : Cholesterol levels of workers and normal males (control).

Group	Parameters	Control	Workers
A	Cholesterol (mg/dL)	161± 4.2	165.7±6.1
B	Cholesterol (mg/dL)	161± 4.2	167± 5.3

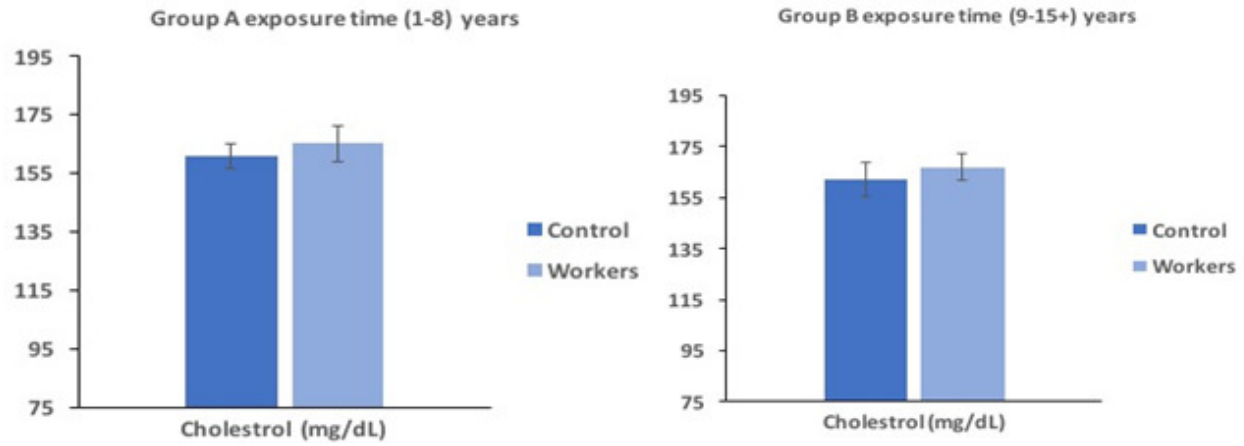

Fig. 2 : Comparison of Cholesterol values for Group A and B with control.

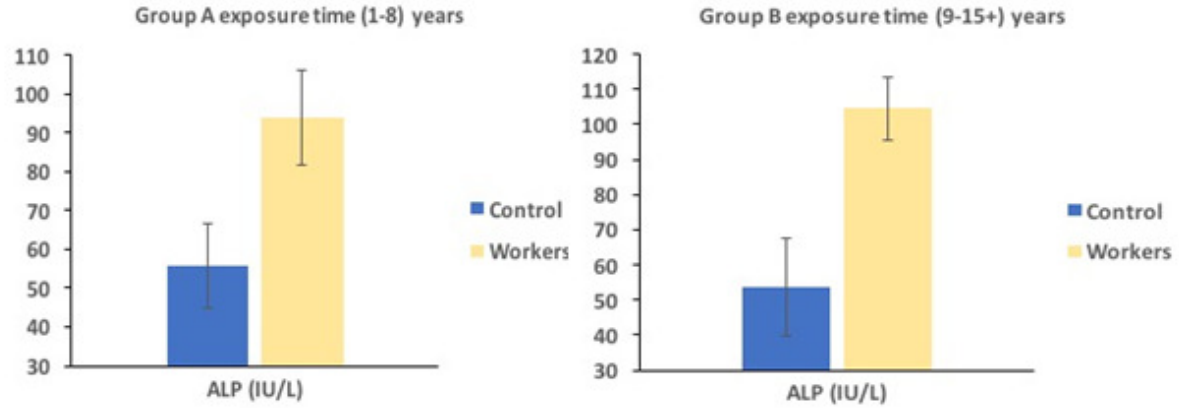

Fig. 3 : Comparison of ALP results for group A and B with control.

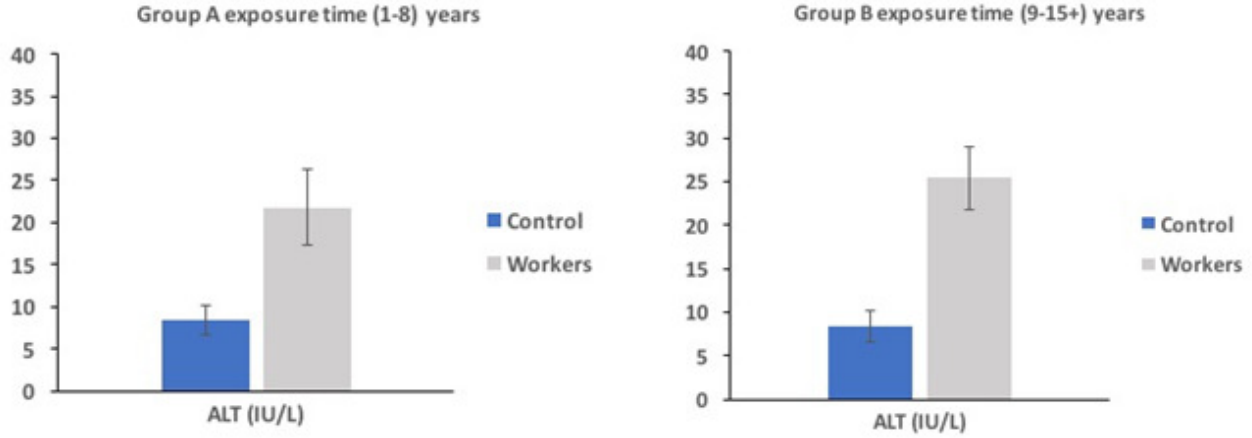

Fig. 4 : Comparison of ALT results for group A and B with control.

workers with duration of work less than 8 years, the average value raised up from 55.7 in control group to 93.9 in the workers, while for workers with more than 9 years duration of work, the value of ALP is going higher. As we can see from the obtained results, longer duration of wok lead to higher ALP value. Fig. 5 shows the comparison.

Table 4 : ALP levels for workers and normal males (control).

Group	Parameters	Control	Workers
A	ALP (IU/L)	55.7± 11	93.9 ± 12
B	ALP (IU/L)	55.7± 11	104.5 ± 9

ALT obtained results (Table 5) also show a statically difference. The results show that workers in group A and B show higher values of ALT compared to control. Fig. 4 show a noticeable difference in ALT values among the different groups of workers.

Total protein levels (Table 6) were getting lower with any duration of work, which gives an additional indication

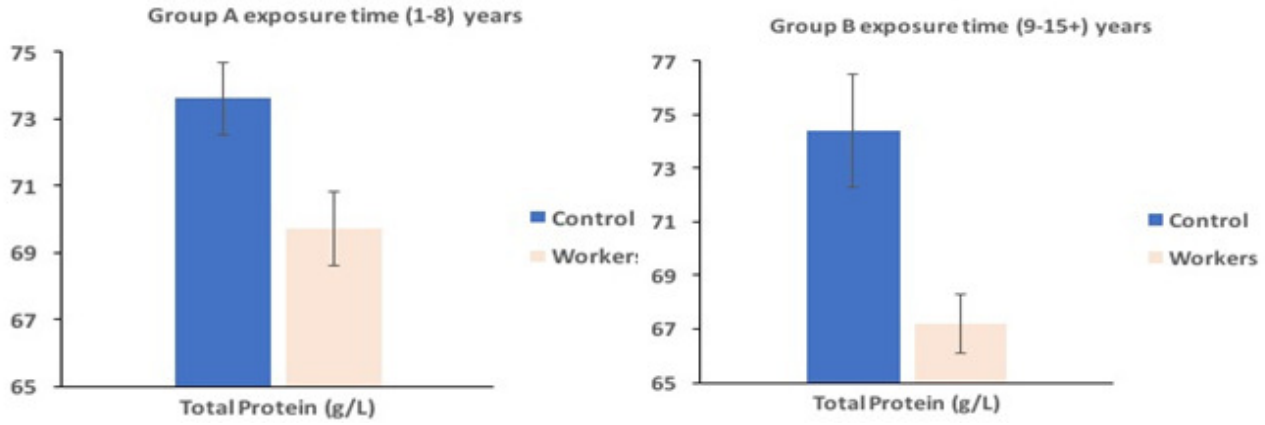

Fig. 5 : Comparison of Total protein results for group A and B with control.

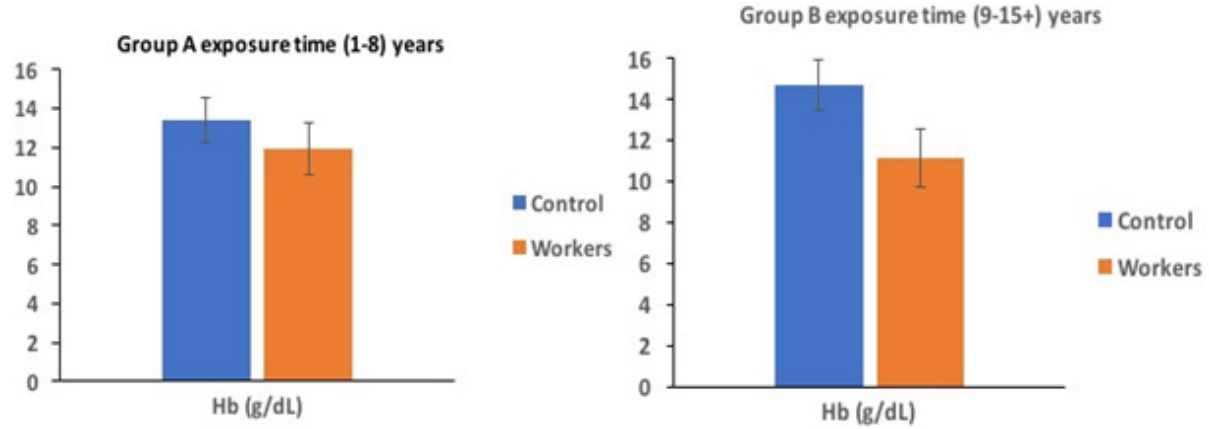

Fig. 6 : Comparison of Hb values for group A and B with control.

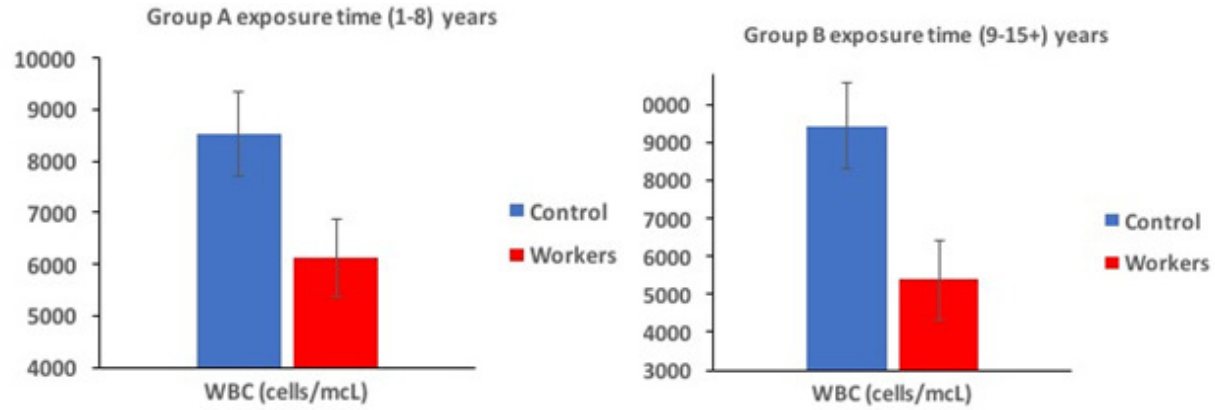

Fig. 7 : Comparison of W.B.C values for Group A and B with control.

about the effect of working on diesel generators on liver and or kidney functions. Fig. 5 shows the comparison in total protein levels between different time of working and the control group.

Hematological studied parameters

In the present study, Hb and W.B.C as hematological parameters were measured in compared with control group. Table 7 represent the results obtained for the two groups of workers.

The Hb in study subjects who were having working time less than 8 years is 11.5 ± 1.33 in comparison to control group having Hb equal to 13.4 ± 1.12, which is not statistically significant (Fig. 6). When duration of work is more than or equal to nine years the Hb is 11.10 ± 1.42 which is lower than control group but also not statistically significant. This result is an agreement with Peter (1996).

In measuring W.B.C the results in Table 7 shows that when the duration of work increases the W.B.C values decrease. The values for both groups of workers show a

Table 5 : ALT levels of workers and normal males (control).

Years of working	Parameters	Control	Workers
A (1-8)	ALT (IU/L)	8.34 ± 1.75	21.8 ±4.53
B (9-15+)	ALT (IU/L)	8.34 ± 1.75	25.4 ±3.59

Table 6 : Total protein levels of workers and normal males (control).

Group	Parameters	Control	Workers
A	Total Protein (g/L)	73.6 ± 1.1	69.7±1.1
B	Total Protein (g/L)	73.6 ± 1.1	67.2±1.1

Table 7 : Results obtained for Hematological parameters.

Group	Hb (g/dL)		W.B.C (Cells/mcL)	
	Control	Worker	Control	Worker
A	13.4 ± 1.12	11.5 ± 1.33	8535±818	6120± 754
B	14.7 ± 1.21	11.1 ± 1.42	9433 ± 1128	5381 ± 1053

statistical difference (Fig. 7).

CONCLUSION

The obtained biochemical and hematological results and the deviation from abnormality might be due to the long-term exposure to petrochemical fumes like benzene and toxic gases like carbon monoxide and carbon dioxide had adverse effects on those parameters as a result might be effects the liver and kidney functions.

REFERENCES

Mehdi Wesen Adel, Mehde Atheer Awad (2014) The effect of increased levels of lead in serum on several antioxidants parameters assed among workers from a large private electrical generator company. *European Journal of Chemistry* [S.l.] **5**(3), 526-528, sep. 2014.ISSN 2153-2257.

Gilberg B O (1974) Chemically induced genetic damage. In: *Against pollution and hunger* (ed. Hilton A M), pp. 213-214, Universstetsforlaget.

Moore J and Ramamoorthy S (1984) *Heavy metals in natural waters*. pp. 435-441**,** KedarNath-Ram Nath, Meerut, India.

Jaffar N A (1988) Pirprofen in treatment of non-articular rheumatism in Pakistani autpatients. A multicentre study. *J. Pak. Med. Assoc.* **38**, 265-268.

Fadhel A A, Johnson M, Trieu K, Koculi E and Campiglia A D (2017) *T alanta* **164**, 209.

Bruins M J, Soeters P B and Deutz N E (2000) Endotoxemia affects organ protein metabolism differently during prolonged feeding in pigs. *J. Nutr.* **130**, 3003-3013.

Blasiak J, Trzeciak A, Malecka-P Anas E, Drzewoski J and Iwanienko T (1999) DNA damage and repair in human lymphocytes and gastric mucosa cells exposed to chromium and curcumin. *Teratog. Carcinog. Mutagen.* **19**, 19-31.

Ghazi S (1993) *Work disease and toils*. Tehran University. p. 59-82.

Bassam Alfarhani A, Maha Al-Tameemi A, Agustina V, Schenone B, Hector C, Goicoecheab, Fernando Barbosa Jr C and Andres D (2016) *Campiglia a Microchemical Journal* **129**, 83–89.

Jacob R A (1995) *Nutr. Res*. **15**(5), 755-766.

Fadhel A A, Yue X, GhazviniZadeh E H, Bondar M V and Belfield K D (2016) **11**, 6161–6168.

Sood R (1985) Hematology for studen and practitioners. *India Jappebrothers* pp. 243–320.

Peter D and Bryson M D (1996) *Comprehensive Review in Toxicology for Emergency Clinical*, Third Edition p. 605.