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Effect of diesel generators pollution on some biochemical parameters in blood serum of workers

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Abstract : The biochemical parameters in blood serum of (10) persons working in diesel generators age range between (20-35) year were randomly selected in different zones of Hilla city (The number of years work were five years at least and (10) persons has been assessed as control who were living and working in relatively clean environment .

The study focused on the determination of the levels of Glucose, Urea, AIP, GPT, GOT, Protein, Albumin, HDL, TG and Cholesterol significant differences were Observed in the levels of AIP, GPT, GOT, Protein, Albumin, HDL and TG in the blood serum of workers operating in diesel generators when comparing with control subjects , where as Cholesterol Albumin and LDL level were insignificant .

Keywords : DG , HDL , TG , Albumin.

Introduction

Pollution is the introduction of contaminates into the nature environments that cause adverse charge⁽¹⁾.

Pollution can take the form of chemicals substances or energy such as noise , heat or light pollutants, the components of pollution can be either foreign substance energies or naturally occurring contaminants, the release of chemicals and particulates in to atmosphere, common gaseous pollutants include carbon monoxide, sulfur dioxide and nitrogen oxide produce by industry and motor vehicles .

The (WHO) estimated in (2007) that air pollution causes half million deaths per year in India⁽²⁾.

Atypical stand by diesel generators produce 25-30 pounds of Nitrogen oxide per megawatt hour of power generated solution all fuel-burning engines produce exhaust containing carbon monoxide , hydrocarbons and nitrogen oxides, whether we use diesel bio-diesel, gasoline, propane or natural gas, we are emitting some level toxic pollutants⁽³⁾.

This is due to incomplete burning of fuel typical of an internal combustion engine the unused fuel is release through the exhaust as pollutants.

If the generator is not good condition it can also emit non burnt hydrocarbons which are oven worse for the environment ⁽³⁾.

The compounds that produce from diesel exhaust (DE) are mixtures of (450) different chemicals specially gases including carbon mono oxide(co) sulfur dioxide(SO₂), Nitrogen oxide(NO) non burnt hydrocarbon (HC) a pours and fine particles .

(4) The upper limit for particles matter in the air is 300 mg/L which has more noise and more air pollution

As we breathe, the toxic gases and small particles of (DE) are drawn into lungs.

The microscopic particles in diesel exhaust one – fifth the thickness of a human hair and are small enough to penetrated deep in the lung and in blood⁽⁵⁾.

Therefore many of these particles are into environment through air and affect human subsequently , the effect depend on time of exposure and weather condition in fact – long term exposure to diesel exhaust particles posses highest cancer risk of any toxic air contaminants ⁽⁶⁾.

The prevent health and air quality problems with proper filtration on all diesel generators (DG) and engine – on road and off road⁽³⁾.

The biochemical parameters of blood serum of diesel generators (DG) workers may badly affect by exposing to pollutants produced from (DG), therefore the present study evaluated Protein, Albumin, LDL, HDL, Cholesterol, GPT, GOT, TG, ALP, Urea and Glucose for blood serum workers.

Materials and methods

The biochemical parameters of blood serum of (10) persons working in diesel generators (DG) age range between (20-35) year were selected randomly in different zones of Hilla city and (10) persons have been assessed as control who were living and working in relatively clean environment. Five ml of blood was obtained from each subject by vein puncture and pashed slowly in to plain disposable tubes.

Blood was allowed to clot of 37C⁰ for (10-15) minutes and centrifuged at 300 (RPM) for approximately (10-15) minutes.

The serum were obtained and stored at -20C⁰ until analysis to measure the following :-

1. Estimation of Urea :- Urea was determined by enzymatic method according to⁽⁷⁾ .
2. Estimation of Glucose : This assay was done by enzymatic colorimetric method, the glucose was determined after enzymatic oxidation in the presence of glucose oxidase ⁽⁸⁾.
3. Estimation of triglycerides (TG) :- TG : concentration was determined by enzyme according to the method described by⁽⁹⁾ .
4. Determination of Cholesterol :- It was determined by enzyme according to the method described by ⁽¹⁰⁾ .
5. Determination of ALP (Alkaline phosphate):- It was determined by using a Biomerieux company France kit ⁽¹¹⁾ .
6. Determination of HDL (High density lipoprotein):- from specimens were precipitated by phosphotungstic acid and magnesium according to ⁽¹²⁾ .
7. Determination of LDL (Low density lipoprotein ⁽¹²⁾ .
8. Estimation of protein : It was determined according to the method described by⁽¹³⁾ .
9. Estimation of Albumin : It was determined according to the method described by⁽¹⁴⁾ .
10. 10-Determination of GPT (Glutamate Pyruvate transaminase) and GOT (Glutamate Oxaloacetates) they were determined by using method adapted by⁽¹⁵⁾ .

Results and discussions

Table -1- Biochemical parameters of serum for diesel generators workers .

Parameter	workers	Control group	L.S.D Value (P < 0.05)
Glucose mmol/L	6.4	6.3	0.9
Urea mmol/L	5.8	4.7	0.1
ALP U/L	60.7	50.8	8.2
Cholesterol mmol/L	4.3	4.1	4
GPT u/L	32	31	2.67
GOT u/L	35	34	2.31
HDL mmol/L	0.7	0.8	0.23
LDL mmol/L	3	3.6	0.84
TG mmol/L	2	1.8	0.04
Protein g/L	69	72	8.42
Albumin g/L	38	42	6.43

- Significant P < 0.05

It obvious from the results in table -1- mean of Glucose (6.4) mmol/L for (DG) workers and 6.3 mmol/L for control by using L.S.D (Least) significant difference , the variation was insignificant .

It is obvious from the same table that mean of urea was (5.8) mmol/L for (DG) workers and 4.7 mmol/L for control group by using L.S.D , the variation was significant , it shows that the control group has a normal kidney , where as the workers affected negatively , high levels of urea in renal failure are caused⁽¹⁶⁾.

The results in table -1- showed that the mean of Alp were (60.7) U/L for (DG) workers whereas (50.8) U/L for control group, the variation was significant when compared with control group at P < 0.05.

Recent in vitro study was shown that ALP is an essential component of serum classification which rise with large bile duct obstruction⁽¹⁷⁾.

It obvious from the results in table -1- that the mean of cholesterol was (4.3) mmol/L for control by using L.S.D, the variation was insignificant.

The results in table -1- showed insignificant between serum of workers and control group for GPT and GOT enzyme .

GPT and GOT are enzyme associated with liver parenchyma cell, they are raised in acute liver damage (16-40) U/L⁽¹⁸⁾.

The results in table -1- showed insignificant differences between serum of (DG) workers and control groups for HDL , LDL , protein and Albumin, whereas a significant difference indicated in (TG) between serum of (DG) workers and control group .

LDL and HDL blood levels are strong predictors of cardiovascular diseases high levels of HDL may reduce vascular endothelial uptake of LDL cholesterol through components inhibit of LDL-cholesterol receptor binding⁽¹⁹⁾.

Triglycerides related to Kidney function and the risk of renal dysfunction was increased with both low HDL and high triglycerides in the population – base⁽²⁰⁾.

From the same table it is obvious from the results that mean of protein and albumin for workers were 69 and 38 g/L consequently where as 72 and 42 g/L consequently for control groups by using L.S.D the variation were insignificant at P < 0.05 as compared to control group.

Protein and albumin are decreased in chronic liver disease.

Serum protein are affected by many factor and certain proteins are changed during the acute . phase proteins , those that declined are called the negative acute – phase proteins⁽²¹⁾.

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