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Study of Hematological Parameters in Petrol Stations Workers in Samarra City-Iraq

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***Abstract*---**The current study is to assess the impact of benzene exposure to some bloody variables for fuel stations workers in Samarra, as well to detect whether incessant exposure perhaps lead to a pathological response in the blood system, which is inferred through changes in some blood markers. This study was conducted on 35 blood samples from males working in car filling stations in the city of Samarra, and the study was conducted on fuel suppliers considering that they are the most in contact with and exposed to benzene fumes used as car fuel, and divided according to the exposure period into two groups, a group exposed from 3-4 years old and another exposed group from 8-10 years, and they all underwent a CBC tests , and 25 blood samples were collected of the normal males who did not work in filling stations as a comparison group , they were subjected to the same previous tests. The results showed hematological changes in workers exposed to benzene fumes, as the results of this study showed a significant increase in MCHC, MCH, NUT, WBC, PLT, MCV, MPV in the two groups exposed to benzene for the periods of (3-4) and (8-10) years.

***Keywords*---**benzene, exposure, hematological parameters, males working, patrol stations.

Introduction

Benzene is a chemical composition made up of a variety of hydrocarbon molecules it is one of the most dangerous types of hydrocarbons. Benzene is a ring-shaped aromatic hydrocarbon having six carbon atoms and one hydrogen atom in its chemical formula [D'andrea and Reddy, 2014]. From it is Physical properties has

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a low boiling point that allows it to evaporate quickly under typical conditions. In many chemical processes it is utilized as a general solvent, pharmaceutical and industrial materials, and is used in the creation of various types of products [Moro et al., 2015].Thus, it is regarded as a major source of ecological contamination [Casale et al., 2016; Mishra et al., 2015]. Internationally the Agency for Cancer Research has categorized benzene as a severe carcinogen, and the World Health Organization has categorized it as a Class 1 substance.

According to the US Agency for toxic Substances and diseases Registry there are typically more than 150 chemicals in benzene, including small amounts of benzene, Toluene, xylene and ethylbenzene, and trace amounts of certain pollutants such as lead, Present simultaneously in crude oil. While benzene (group 1) and ethylbenzene (group 2) have been classified as carcinogenic, and the main effect of coloring and xylene is on the central nervous system [Moolla et al., 2015]. The first human case of leukemia of white blood cells was as a result of exposure to benzene in 1928, and this case was called benzene toxins, and it caused damage to the bone marrow. Observational studies have indicated that people who are most targeted for exposure to benzene in their occupational work are filling station workers, truck drivers, and refinery workers [Moolla et al., 2015]. Experimental studies indicate that the body absorbs about 50% of inhaled benzene and can be absorbed through the skin. Skin absorption is greatly improved when the skin is cracked, ulcerated, or eroded.

The ingested liquid benzene is rapidly absorbed through the gastrointestinal mucosa. Effects from benzene may be harmful and can vary Through exposure variables that impact the amount, manner, and duration of a substance's exposure. [Moro et al., 2015]. As the range that is not allowed for exposure or that constitutes danger is 1-30 parts per million or higher. Once immersed into the human body, benzene takes its path into the blood and then moves to parts of the body to store a quantity of it in the bone marrow and fatty tissues. Benzene compounds degrade in the liver and bone marrow to result in other harmful substances that remain in the body for a short period of a day, and then are eliminated through the urine. Among the harmful effects of benzene in the tissues that make up blood cells, especially the bone marrow, these effects can disrupt normal blood production and cause a decrease in important blood components, a decrease in red blood cells that can lead to anemia. Occupational exposure to benzene has also been primarily associated with an increased incidence of blood disorders such as chronic myeloid leukemia, acute lymphoblastic leukemia, and lymphoma [Zhang et al., 2022].

Method

Samples collecting

The current study was conducted in the city of Samarra, a comprehensive survey was conducted on the stations that supply the city with fuel, the data was obtained according to the organized questionnaire. Totally excluded workers with chronic diseases from this study so as not to interfere with the results of the research, and samples were collected from people exposed to benzene for periods ranging from (3-4), from (8-10) years, 35 blood samples of males directly exposed

to benzene were collected, and 25 blood samples were collected from normal males who did not work in filling stations as a comparison group (control group), and their ages ranged between 40-55 years, 5 ml of Blood was withdrawn from each sample via a single-use injection. After the blood was drawn for each sample, the blood samples were placed in special tubes containing an anticoagulant substance EDTA, and blood tests were conducted on them, which included a total count of white blood cells WBC and the number of red blood cells RBC, as well as an estimate of HBG hemoglobin concentration, The percentage of blood volume was estimated by HCT, as well as erythrocyte indices MCHC, MCV, platelet count and other CBC tests under study. And the significant changes in hematological indicators between groups were investigated using an independent T-test.

Result and Discussion

The blood tests under study

WBC: White blood cells; RBC: red blood cells; Hb: Hemoglobin: HCT: Hematocrit; MCV: Mean Corpuscular Volume; MCH: Mean corpuscular hemoglobin; MCHC: Mean corpuscular hemoglobin concentration; RDW: Red blood cell distribution width; PLT: Total number of platelets; MPV: Mean platelet volume. The hematological system and bone marrow cells are the most vulnerable targets among the body's systems, vocational and environmental exposure to many polluting elements such as petrol derivatives including benzene has damaging influence on various bio-body processes. Therefore, this study focused on measuring hematological indicators to diagnose the integrity of blood cells and bone marrow for workers exposed to benzene fume for different periods. The results of the current study indicate significant and insignificant differences for the measured hematological variables, table (1) shows the mean ±standard deviation of hematological variables in the blood serum of people exposed and non-exposed to benzene fume.

Table 1
The mean ± standard deviation of the hematological variables in the blood serum of people exposed and non-exposed benzene fume

Hematological Parameter	Comparison group	Mean± S.D The Exposures group (3-4) years	Exposures group 8-10) years(
WBC(10^9/L)	7.89±1.99	7.87±1.22	9.8±3.25
Neutrophils	57.88±11.65	58.28±13.96	59.49±14.22
Lymphocytes	31.08±9.56	31.54±11.48	29.49±11.87
Monocytes%	7.67±2.56	7.68±2.09	6.92±3.53
Eosinophil%	2,44±1.55	2.17±1.22	2.86±2.59
Basophils%	0.91±0.39	0.80±0.41	0.76±0.31
RBC	5.47±0.39	5.16±0.36	4.94±0.5
HGB(g/dl)	13.45±1.21	13.81±1.17	13.99±1.49
HCT%	41±3.59	43.52±12.28	42.31±3.75

MCV (femtoliter)	76.99±801	81.19±3.54	86.19±4.59
MCH (pg/cell)	24.69±2.65	26.23±1.35	28.48±1.93
MCHC(gm/dL)	32.05±0.5	32.41±0.89	33.03±1.04
RDW%	13.57±1.58	12.71±1.03	12.21±1.19
PLT (10^9/L)	235.75±47.5	272.66±53.73	296±93.7
MPV	7.14±1.16	7.73±0.84	8.07±1.63
All measurements showed significant values at P<0.05			

The results of this study showed a significant increase at the P<0.05 in MCHC, MCH, NUT, and WBC . PLT, MCV, MPV in the two groups exposed to benzene for periods of (3-4) and (8-10) years than comparison group, and it was more high with the increase in the years of exposure. Also, the level of hemoglobin HGB showed an insignificant increase in the both groups than comparison group. The results show that the number of white blood cells increased in the fuel workers' blood than comparison group due to the defensive white blood cell function after exposure to benzene and its components and the damage it causes to cells and tissues. This is consistent with the results of Abdel Aziz [Nida et al., 2021]. It does not agree with the results of Gebre et al [Teklu et al., 2021]. And it also does not agree with the results of Al Jothery, which indicated that there were no significant differences except for the average platelet volume MPV that increased significantly [Al Jothery and Al-hassnwi, 2017]. The results also indicated a significant decrease at p<0.05 in RBC, Baso, and RDW in the two groups exposed to benzene for the periods of (3-4) and (8-10) years than comparison group, and it was more decreasing with the increase in the years of exposure. This study is agree with the study of Abou-Elwafa corresponds to low RBC and high average white blood cell count WBC and platelet count PLT among benzene station workers [Abou-ElWafa et al., 2015].

Previous studies did not show a decrease in the number of blood cells upon routine follow-up of workers exposed to a low level of benzene. And the results of the current study showed an insignificant increase at p<0.05 in HCT in the group exposed to benzene for a period of (8-10) years, and a significant increase in the group exposed to benzene for a period of (3-4) years. The results also showed a significant increase at p<0.05 in Eosino in the group exposed to benzene for a period of (8-10) years. And a significant decrease in the group exposed to benzene for a period of (3-4) years than comparison group. Some results of the current study agree and differ in others with the study of Sultan, it is correspond to low RBC, Baso, and high NUT, WBC, MHC, and do not coincide in the concentration of hemoglobin HGB and hematocrit HCT. Mono, MVC, PLT [Sultan et al., 2020]. The results also showed a significant decrease at p<0.05 in Mono and LYM in the group exposed to benzene for a period of (8-10) years, and an insignificant increase in the group exposed to benzene for a period of (3-4) years than comparison group. This is what was observed in a Croatian study, by Bogadi-Sare which found that the number of B lymphocytes in patrol station workers was decreased considerably than comparison group. As a result, chronic benzene exposure effect on blood cells and bone marrow can appear in the form of hematological and immunotoxicity, marrow failure, precancerous blood disorders, and acquired anemia.

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