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Research Article

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ABSTRACT

Exposure to the aromatic hydrocarbon is a public health problem and threat to environment with proven harmful impact on humanity, including industrial workers and general population. Petrol station attendants are workers chronically exposed at least five year to petroleum derivatives primarily through inhalation of the volatile fraction of petrol during vehicle refueling. Significant include harmful health impacts on hematological feature of worker by causing anemia. The adverse health effects of gasoline exposure may be primarily related to the impairment of the haemopoietic system with bone marrow depression. In this overview study evaluate the expected toxic effects of workplace exposure to petrol products in gasoline filling worker.

Keyword: Anemia, Gasoline, Hematotoxicity, Petrol station workers.

INTRODUCTION

By WHO criteria, anemia is defined as a hemoglobin concentration lower than 13 g/dl in men (Brautbar et al., 2006). Anemia can result from both shortened red cell life span and impairment of heme synthesis (Goyer, 1996). Changes in the hemoglobin level normally applied to detect minimal changes in hematopoietic system (Hayes et al., 2000). The association between exposure to benzene or benzene-containing mixtures and certain types of blood disorders has been shown in epidemiological studies in different countries (Schnatter, 1996;Patel et al., 2004; Lan et al., 2004; Rushton et al., 2013). Crude petroleum product yields different fractions of petroleum like petrol; kerosene and gasoline are constituent parts of the fractional distillation process. These different fractions of petroleum include aliphatic, aromatic and also multiplicity of branded saturated and unsaturated hydrocarbons in different forms (Katoat et al., 1993; Anderson et al., 1995). Benzene, an important component of petroleum products, is a widely distributed environmental contaminant. Therefore, occupational exposure to benzene in humans generally takes place in refineries and other industrial settings (IARC, 1989). In present overview Baghdad , Sulaimani, Sarajevo, Gaza Strip and Calabar Metropolis petrol station workers chronically exposed at least five year to petroleum derivatives primarily through inhalation of the volatile fraction of petrol during vehicle refueling considered and analysis done with One-Way ANOVA and Tukey's Multiple Comparison test applied to compare Hbof respondantsas shown in (Table.2).

Baghdad city study

Ali et al. (2011) observed in Baghdad city 292 workers of petrol filling station with five years duration of employment and consequently 146 petrol filling workers were found with hematopoietic changes. Significant changes in hemoglobin level were observed as compared with individuals who are not exposed to workplace. Petrol station attendants are workers chronically exposed to petroleum derivatives primarily through inhalation of the volatile fraction of petrol during vehicle refueling. The adverse health effects of gasoline exposure may be primarily related to the impairment of the haemopoietic system with bone marrow depression. Group of control subjects of smokers and nonsmokers showed significant differences in means of Hg level with no significant differences. This study related to

Duarte et al. (2001); and Nieters (2006), who found significant relationship with differences in means of hemoglobin level and concluded that the hematological indices may be useful in detection early hematological changes among workers exposed to benzene vapor.

Sulaimani City Study

Naza and Ali (2012) designed a study to evaluate the expected toxic effects of long-term exposure to petrol products in 48 gasoline filling workers with an age range between 27 to 65 years within Sulaimani city area and found significant differences in means of hemoglobin level on most workers.

Sarajevo City study

Mirsad et al. (2010) examinations of workers (n=73, n=81), male employees at the petrol stations in Sarajevo, at the work place of fuel pourer. Periodic examinations were performed in 2003 and 2008, on the same population of subjects, from the same job, same location and with the same content inspection. Characteristics of respondents age range 23-62 years, total work experience range 1-31 years, duration of exposure at the workplace 1-27 years. Among the respondents 70% of them were active smokers, and only 30% of were nonsmokers.

Gaza Strip study

Ismail et al. (2006) conducted research on 80 workers occupationally exposed to leaded gasoline and a control group of (18) healthy workers who have never been exposed to leaded gasoline. The mean value of the blood hemoglobin level of control and the studied groups were shown in table (1). Blood hemoglobin level in control group exhibited value of (14.5 g/dl). In studying groups blood hemoglobin level was decreased to (13.4, 12.7, 12.0, 10.2 and 8.8 g/dl) with percentage decreases of (7.59, 12.41, 17.24, 29.66 and 39.31 %) compared to the control group.

Calabar Metropolis study

Okoro et al. (2006) conducted research in Calabar metropolis to find an effect of petroleum fumes on hematological parameters of a petrol station attendant. Many fuel stations were located and test subjects sample collected from these fuel stations while controls subjects considered as the shop attendants and students. Total 400 subjects in which include 200 males and 200 females. This study was carried out on adult human subjects aged between 18-30years that participated, who gave informed consent to the study. The test group was further subdivided into test one group which include population who had worked for two years or less and test two group population who had worked for more than two years. A it has been found that Subjects exposed to petroleum fumes for two years and below are becoming anemic while subjects exposed for more than two years were highest.

Table.1: Comparsion hamoblobin in control population and workers population.

Location		Control Population		Workers Population	
		No of Normal Sample	Mean ± S.D Hb g/dl	No of Samples	Mean ± S.D Hb g/dl
Sulaimani	2012	n=27	14.8 ± 1.2	n=48	14.2 ± 1.4
Baghdad	2011	n=146	13.8 ±0.3	n=146	12.5±1.5
Calabar Metropolis	2006	Female n=100	13.66±0.01	n=100	9.45±0.12
		Male n=100	14.69±0.01	n=100	11.12±0.18
Gaza Strip	2006	n=90	14.5 ± 0.8	n=80	11.42 ± 0.9
Sarajevo	2003			n=73	13.5±9.2
	2008			n=81	14.6±6.6

Table.2: Comparsionhamoblobin level in workers population in different region of world.

Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? P < 0.05?	Summary	95% CI of diff
Sarajevo vs Gaza Strip	2.630	6.646	Yes	***	1.083 to 4.177
Sarajevo vsCalabar Metropolis	2.922	7.924	Yes	***	1.481 to 4.363
Sarajevo vsSulaimani	-0.1500	0.3160	No	ns	-2.005 to 1.705
Sarajevo vs Baghdad	1.550	4.673	Yes	*	0.2536 to 2.846
Gaza Strip vsCalabar Metropolis	0.2920	0.6779	No	ns	-1.392 to 1.976
Gaza Strip vsSulaimani	-2.780	5.303	Yes	**	-4.829 to -0.7309
Gaza Strip vs Baghdad	-1.080	2.704	No	ns	-2.641 to 0.4812
Calabar Metropolis vsSulaimani	-3.072	6.093	Yes	***	-5.043 to -1.101
Calabar Metropolis vs Baghdad	-1.372	3.681	No	ns	-2.829 to 0.08488
Sulaimanivs Baghdad	1.700	3.558	No	ns	-0.1674 to 3.567

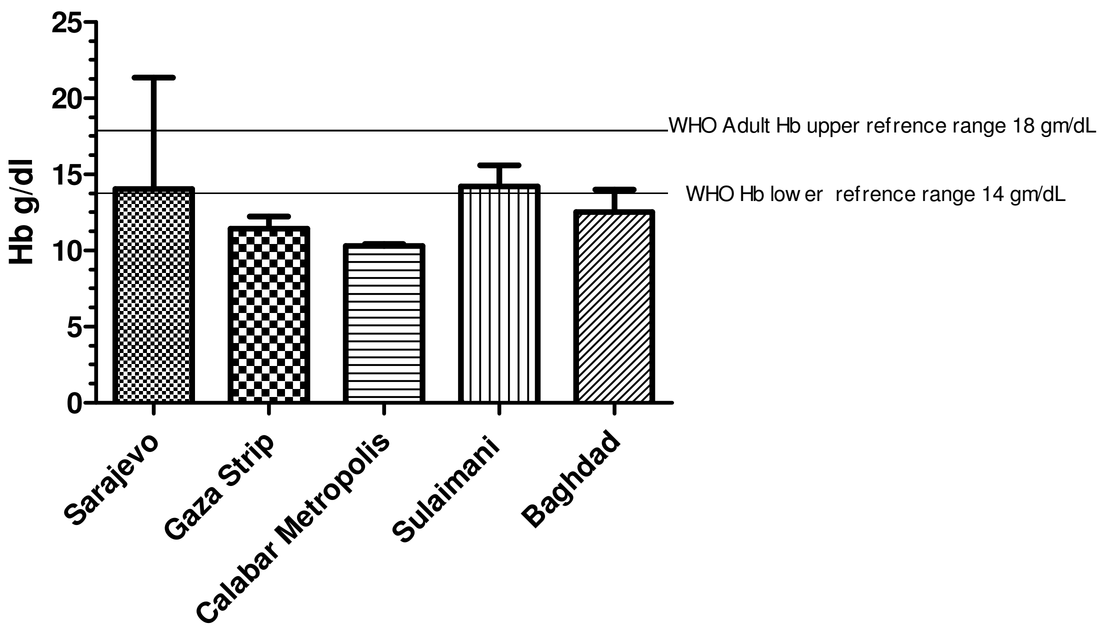

Fig.1: Comparsionrefrence value and hamoblobin level in workers population in different region of World.

DISCUSSION

Decrease in hemoglobin content was due to decrease in red blood cells or impaired biosynthesis of heme in bone marrow (Zayed et al., 1993).Decreased hemoglobin and red blood cell could also be attributed to insufficiency of protein synthesis that mainly induces decrease of essential amino acids and shortage of the energy source of protein synthesis incorporated in hemoglobin production. The decrease in red blood cell count were observed in the exposed population (Gautam and Chowdhary.,1987; Solliway et al., 1996; Bersenyi et al., 2003 and Lavicoli et al., 2003).

Occupational exposure to benzene has mainly been associated with increased incidences of blood disorders such as chronic myeloid and acute lymphoid leukemia and non-Hodgkin's lymphomas (Carletti and Romano, 2002). In recent research china on benzene related products workers are exposed to has hamatoxcity at levels below 1 ppm benzene vapor in the air and this level considered as exposure standard compared with the unexposed control group (Browne, 2007). Boffetta et al. (1997) found that cigarette smoking outdoor petrol filling workers had relatively no difference in hemoglobin level among nonsmokers petrol filling worker as consequence hydrocarbon directly related to cause in declination of hemoglobin level. Aromatic hydrocarbon contained in gasoline, recognized to affect hemoglobin levels during occupational exposure (Gupta et al.1995).

Petroleum fumes occupational exposure in petroleum sector has been described to have toxic effects on, immune and nervous systems. Different organs such as the skin, heart, kidneys, and lungs are affected by these toxic effects resulting in various diseases and different forms of carcinogenic, neurotoxic, immunotoxic, genotoxic and mutagenic manifestations (Smith et al., 1996; Dede and Kagbo, 2002).

Harmful effects on the lymph nodes, spleen, and bone marrow caused by hydrocarbons (Ovuru and Ekweozor , 2004). Mostly environmental and physiological factors of petroleum fumes attributable to exposure to affect blood parameters and the resultant effect is stress in the animals exposed. The hematopoietic components in the red marrow are destroy or inhibit by toxic fumes (Pranjic et al., 2002). Petroleum derivatives are recognized to cause chromosomal aberrations at high occupational doses (Zhang et al.2002). The degree of hematotoxicity at low levels of exposure was largely unidentified and non point but hematologic effects could reflect events in the bone marrow that may be linked with harmful health effects in the future (Lan et al., 2005).

CONCLUSION

In Baghdad , Sulaimani, Sarajevo, Gaza Strip and Calabar Metropolis studied proved that petroleum derivatives are predictable to cause hematotoxicity at high occupational exposures. The observed decrease in hemoglobin content may be attributed to decrease red blood cells or impaired biosynthesis of heme in bone marrow in petrol station workers. Occupational exposure to petroleum products has mainly been associated with hematological parameters of workers which increasing probability increased incidences of blood disorders and should be given full attention in medical surveillance of workers.

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