

EOSINOPHIL COUNT IN PETROL PUMP WORKERS IN AND AROUND THE MUZAFFARNAGAR CITY

Background: Benzene exposure is one of the main health concerns for high risk occupations like petrol pump workers. But there is little knowledge about the effect of benzene metabolites on blood parameters.

Aims & Objective: The objective of this study is to find out the effect of benzene exposure on hematological parameter especially eosinophil count on petrol pumps workers.

Materials and Methods: Fifty four (54) petrol pump workers between age group of 20-60 years were included in this study and categorized into 04 groups according to duration of exposure. The data collected are represented as mean \pm SD. These changes were statistically significant (<0.05) when we compared eosinophil count in study group and control group, when duration of exposure is less than 10 years.

Results: When we compared eosinophil count in subjects exposed to more than 15 years the count was significantly (<0.05) decreases. The count decreases as the duration of exposure increases.

Conclusion: Long term exposure to benzene may cause bone marrow suppression leads to decreased eosinophil count.

Key Words: Eosinophil Count; Benzene; Petrol Pump Workers; Hematotoxicity

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Received Date: 12.09.2013

Accepted Date: 29.09.2013

DOI: 10.5455/njppp.2014.4.290920132

INTRODUCTION

It is world known fact that petrol pump workers are exposed to many noxious substances present in the work premises of petrol pump. The most untoward effects are due to Benzene which is present in the petrol and being volatile substance it is present in the atmosphere nearby Benzene is an organic chemical compound with molecular formula C_6H_6 . It is a well known carcinogen with relative hematotoxicity.^[1] It is colorless and highly inflammable liquid with a sweet smell. Several studies show high prevalence of cancer, chromosomal damage and specific hematologic malignancies associated with it includes-Acute myeloid leukemia (AML), apastic anemia, myelodyplastic syndrome, acute lymphoblastic leukemia and chronic myeloid leukemia.^[2]

Benzene is used as additive in petrol to increase the octane rating and reduces knocking. As a consequence, petrol often contained several percentage of benzene. In India, 2-5% of benzene is added with petrol. As petrol evaporated during refilling, atmosphere of petrol filling station contains (1-25 ppm) more benzene than other place. Exposure of the general population to benzene occurs mainly through breathing. The major source of benzene being automobile station, exhaust from motor vehicles, tobacco smoke and industrial emissions.

Biomonitoring of petrol filling station workers who are directly exposed to benzene is an important measure for

the prevention and protection of occupational intoxication. The most important marker of benzene exposure is benzene in the exhaled air, in blood and in urine and its metabolites.

A complete blood count has been recognized as an easy and readily available screening tool for assessing the haematotoxicity of benzene.^[3] Several studies found no significant association between hematological profile and benzene exposure. There is, however, scarce information about hematological effects of exposure to benzene.^[4,5] We conducted this study to evaluate the correlation between blood cell indices (eosinophil count) in a group of petrol refilling station workers in and around Muzaffarnagar city. Thus the objective of this study is to find out the effect of benzene exposure on hematological parameter especially Eosinophil count on petrol pump workers.

MATERIALS AND METHODS

Study Population: Fifty four (54) petrol pump workers between age group of 20-60 years were included in this study. They worked in and around Muzaffarnagar city. They were healthy and had been working for more than six month. Forty (40) healthy male nonsmokers, matching socially and economically with study group and not exposed to any type of air pollutants were enrolled as control subjects. The study group was divided in to four groups according to the years of exposure. A brief physical

and general examination was carried out and relevant data regarding subject as age, sex, height, weight and smoker or nonsmoker) were collected. Subjects who had history of previous and present illness were excluded. After history out of 54 subjects enrolled 04 were excluded due to history of present illness. Consents were taken from all the participants. The study approved by ethical committee of the institution. 3 ml of venous blood were collected in EDTA tube from median cubital vein, taking all aseptic precautions

Laboratory Analysis: All blood samples were analyzed by automated hematological analyzer for white blood cell count including count of Neutrophil, Lymphocyte, Monocytes, Eosinophil and Basophil. The analysis was performed at the pathology lab of the Institution.

Statistical Analysis: Data were analyzed by SPSS Version 17 for windows; continuous data were presented as mean \pm SD. The mean value of two groups was compared by unpaired t test. A p value < 0.05 was considered statistically significant.

RESULTS

Table 1 shows the demographic distribution among study group and control group. The data collected were statistically non-significant ($p > 0.05$). Table 2 depicts the changes in eosinophil count among control and study group. The data collected are represented as mean \pm SD. These changes were statistically significant (< 0.05) when we compare eosinophil count in study group and control group, when duration of exposure is less than 10 years. When we compared Eosinophil count in subjects exposed to more than 15 years the count was significantly (< 0.05) decreases as shown in Table 2. The count decreases as the duration of exposure increases, because long term exposure to benzene causes bone marrow suppression leads to decreased Eosinophil count.^[8]

Table-1: Demographic distribution of the study and control groups

Traits	Study Group (n=50)*	Control Group (n=40)*	P value
Age (years)	31.68 \pm 8.92	34.69 \pm 10.91	> 0.05
Height (cm)	165.68 \pm 2.42	165.49 \pm 4.82	> 0.05
Weight (kg)	59.02 \pm 7.82	60.59 \pm 7.13	> 0.05

* Values are in Mean \pm SD

Table-2: Eosinophil count in study and control group

Parameter	Years of Exposure	Number of Subjects	Count in Subjects	Count in Control	P value
Eosinophil count (%)	1-5	16	6.38 \pm 0.96	4.08 \pm 0.47	< 0.05
	6-10	12	5.00 \pm 0.74	4.08 \pm 0.47	< 0.05
	11-15	14	3.97 \pm 0.85	4.08 \pm 0.47	> 0.05
	> 15	08	2.56 \pm 1.42	4.08 \pm 0.47	< 0.05

* Values are in Mean \pm SD; P < 0.05 - Significant; p > 0.05 Non significant

DISCUSSION

This study was conducted among petrol pump workers with the objective of determination of fact that the noxious chemicals present in the vicinity may cause untoward changes in blood parameters. The present study was conducted on petrol pump workers because they are at high risk of benzene exposure and study was important as prolonged exposure to benzene may cause known effect like bone marrow depression, hematological and neurological toxic effect and cancer.^[6,14] The agency for toxic substances and disease registry (ATSDR) have several cases of well documented toxicity and recommended monitoring of benzene exposure for the at risk group.^[7] In the present study eosinophil count taken as marker of benzene toxicity. In the present study the eosinophil count was measured in study group and control group, a value of eosinophil count was little bit higher in study group than control group when duration of exposure was less than 10 years and on comparison statistically significant ($p < 0.05$) changes were seen as shown in Table 2. When duration of exposure was increases (> 15 years) the eosinophil count was decreased statistically ($p < 0.05$).^[8-13] The lower number of eosinophil in those with duration of exposure are more than 15 years may be due to suppression of bone marrow by the effect of benzene, as reported by many studies.^[15-17]

T. Tunsaringkarn et al^[8] conducted a study in 2013 and reported that exposure to benzene cause bone marrow depression presenting as drop in hemoglobin, hematocrit and eosinophil counts and also reported that as the duration of exposure of benzene less eosinophil count increases and as duration of exposure increases eosinophil count decreases, the lower of eosinophil count in those with duration of exposure are more may due to suppression of benzene on bone marrow. Our study also shows same result as previous study.

Another study conducted by Pesatori AC et al in 2009^[10], the eosinophil count was inversely related to benzene exposure only among smokers. Conversely, basophils increased with increasing exposure. No effect on benzene hematotoxicity was found for any of the investigated polymorphisms. This study also supported to our study and find association of benzene exposure and eosinophil count.

Schnatter AR et al^[12] conducted a study in 2012 on myelodysplastic syndrome and benzene exposure among petroleum workers and concluded that, relatively low

level of exposure to benzene experienced by petroleum distribution workers was associated with an increased risk of MDS, but not AML, suggesting that MDS may be the more relevant health risk for lower exposures.

CONCLUSION

In this study we concluded that eosinophil count may be used as a sensitive indicator of benzene toxicity than all other hematological parameter because Eosinophil count decreases as duration of benzene exposure was increases. So, proper biomonitoring of petrol pump workers should we done time to time and they must be provided with effective masks to avoid inhalation of noxious substances.

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Cite this article as: Singh D, Hasan SN, Siddiqui SS, Kulshreshtha M, Aggarwal T, Agarwal S. Eosinophil count in petrol pump workers in and around the Muzaffarnagar city. *Natl J Physiol Pharm Pharmacol* 2014; 4:118-120.

Source of Support: Nil

Conflict of interest: None declared