



## Evaluation of Eosinophil count and Hemoglobin concentration in petrol pump workers in Allahabad

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### ABSTRACT

**Introduction** It is world known fact that petrochemical workers are exposed to many noxious substances present in the work places. 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

**Objective** Thus the objective of this study is to find out the effect of benzene exposure on hematological parameter especially Eosinophil count and Hemoglobin concentration on petrol pump workers.

**Material and Method** Sixty petrol pump workers healthy male nonsmokers, matching between age group of 20-60 years were included in this study. The forty not exposed to any type of air pollutants were enrolled as control subjects are included in the study. Blood samples were analyzed by automated hematological analyzer for hemoglobin concentration white blood cell count including count of Eosinophil.

**Result** Anthropometric parameter of study group and control group are statistically non-significant ( $p > 0.05$ ). The Eosinophil count in study group and control group in subjects exposed to more than 15 years the count was significantly ( $< 0.05$ ) decreases Hemoglobin concentration non-significant in all stage.

**Discussion** The petrol pump workers under high risk of benzene may cause bone marrow depression, hematological and neurological toxic effect and cancer. In the present study Eosinophil count and Hemoglobin concentration taken as marker of benzene toxicity. Other study also support our study like T. Tunsaringkarnet et al.

**Conclusion** The Eosinophil count decreases as the duration of exposure increases, because long term exposure to benzene causes bone marrow suppression leads to decreased Eosinophil count.

**KEYWORDS :** Anthropometric parameter, Eosinophil count, Hemoglobin, benzene

### Introduction

It is world known fact that petrochemical workers are exposed to many noxious substances present in the work places. 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.<sup>1</sup> 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), aplastic anemia, myelodysplastic syndrome, acute lymphoblastic leukemia and chronic myeloid leukemia.<sup>2</sup> 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. Bio-monitoring 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.<sup>3</sup> Several studies found no significant association between hematological profile and benzene exposure. There is, however, scarce information about hematological effects of exposure to benzene.<sup>4,5</sup> We conducted this study to evaluate the correlation between blood cell indices (Eosinophil count and Hemoglobin concentration) in a group of petrol refilling station workers in

and around Allahabad city. Thus the objective of this study is to find out the effect of benzene exposure on hematological parameter especially Eosinophil count and Hemoglobin concentration on petrol pump workers.

### Material and Method

**Study Population:** Sixty petrol pump workers ( $n=60$ ) between age group of 20-60 years were included in this study. They work was conducted in Allahabad city. They were healthy and had been working for more than six month. Sixty healthy male nonsmokers, matching socially and economically with study group and not exposed to any type of air pollutants were enrolled as control subjects ( $n=40$ ). 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. 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 hemoglobin concentration 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

### Result

Table 1 shows the anthropometric 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. Hemoglobin concentration shown in table-3 which is non-Significant in all stage included in this study. The count decreases as the duration of exposure increases, because long term exposure to benzene causes bone marrow suppression leads to decreased Eosinophil count.<sup>8</sup>

**Table-2:- Eosinophil count in subject and control group**

Parameter	Years of Exposure	Number of Subjects	Count in Subjects	Count in Control	P value
Eosinophil Count (%)	1-5	20	6.38 $\pm$ 0.96	4.08 $\pm$ 0.47	<0.05*
	6-10	16	5.00 $\pm$ 0.74	4.08 $\pm$ 0.47	<0.05*
	11-15	15	3.97 $\pm$ 0.85	4.08 $\pm$ 0.47	>0.05
	>15	09	2.56 $\pm$ 1.42	4.08 $\pm$ 0.47	<0.05*

\*Significant

**Table- 3:- Hemoglobin concentration in subject and control group**

parameter	Year of exposure	No of subject	Hemoglobin in subject	Hemoglobin in control	P value
Hemoglobinconcentration	1-5	20	14.4 $\pm$ 1.3	14.2 $\pm$ 1.2	>0.05
	6-10	16	14.8 $\pm$ 1.4	14.2 $\pm$ 1.2	>0.05
	11-15	15	14.5 $\pm$ 1.1	14.2 $\pm$ 1.2	>0.05
	>15	09	15.1 $\pm$ 1.3	14.2 $\pm$ 1.2	>0.05

## 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.<sup>6,14</sup> 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.<sup>7</sup> In the present study Eosinophil count and Hemoglobinconcentration taken as marker of benzene toxicity. In the present study the Eosinophil count and Hemoglobinconcentration 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 ( $p < 0.05$ ).<sup>8-13</sup> 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.<sup>15-17</sup> Hemoglobinconcentration is not statistically significant ( $p > 0.05$ ) in this study

T. Tunsaringkarn et al<sup>8</sup> 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 bonemarrow. Our study also shows same result as previous study.

**Table-1:- Anthropometric distribution among subject and control group**

Traits	Study Group (n=60)	Control Group (n=40)	P value
Age (years)	31.68 $\pm$ 8.92	34.69 $\pm$ 10.91	>0.05
Height (cm)	165.68 $\pm$ 22.82	165.49 $\pm$ 22.42	>0.05
Weight (kg)	59.02 $\pm$ 7.82	60.59 $\pm$ 7.13	>0.05

Naziaujmaet al<sup>9</sup> conducted a study in 2008 and reported chronic exposure to solvents like benzene and pollutants like carbon monoxide in petrol filling workers had adverse effect on blood parameters, thyroid and respiratory functions. In this study the Hemoglobin concentration is increased. Result of our study is not similar above study because to this may be due to less number of subject.

Another study conducted by Pesatori AC et al in 2009<sup>10</sup>, 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 Eosinophilcount.

Schnatter AR et al<sup>12</sup> 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 myelodysplastic syndrome, but not acute myeloid leukemia suggesting that myelodysplastic syndrome may be the more relevant health risk for lower exposures.

## Conclusion

In this study we concluded that Eosinophil count and Hemoglobinconcentration may be used as a sensitive indicator of benzene toxicity than all other hematological parameter because Eosinophil count and Hemoglobinconcentration 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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