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RESEARCH ARTICLE

DOES THE LONG TERM EXPOSURE TO PETROL FUMES AFFECT PLATELET COUNT? A STUDY IN PETROL PUMP ATTENDANTS

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ABSTRACT

Back ground: Petrol, also known as gasoline, is used as a fuel in internal combustion engines, also used as a thinner and industrial solvent. Ingredients in the petrol have got a deleterious effect on hemopoietic cells .Various studies suggested toxic effect of petrol fumes on RBC and WBC. Present study is an attempt to establish the toxic effect of long term exposure to petrol fumes on platelet count.

Material and Methods: Our study group consisted of 30 apparently healthy male volunteers, aged between 25-45 years, working as petrol pump attendants in Pune city (India) for more than 5 years. Control group consisted of healthy adults aged between 25-45 years with no history of exposure to petrol fumes. 5 ml of venous blood was collected from the peripheral vein and platelet count was determined. Data was analyzed statistically using student's't 'test.

Result: We observed a statistically significant reduction in the platelet count in the test group compared to control group.

Conclusion: Decrease in the platelet count observed in our study could be due to toxic effect of ingredients in the petrol such as benzene on hemopoietic cells of bone marrow.

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INTRODUCTION

Petrol, also known as gasoline, is a volatile liquid with a complex mixture of aliphatic and aromatic hydrocarbons. It is used as a fuel in internal combustion engines, and is also used as a thinner and industrial solvent Abubakar *et al.* (2015). These fractions of crude petroleum contain aliphatic and aromatic and a variety of other branched, saturated and unsaturated hydrocarbons. Those who work directly in petroleum industries are at a higher risk of exposure to these products. Petrol pump attendants are the one maximally exposed to petrol fumes. Volatile nature of petrol products make them readily available in the atmosphere any time it is dispersed especially at petrol filling stations Ali Mahmood *et al.* (2013). Sources of petroleum vapors at the petrol pump include losses from underground tanks, displacement vapor losses from filter pipes during re fuelling, fuel spillage and evaporative and tail pipe emission from motor vehicle Aleemudin *et al.* (2015). Crude petroleum yields different fractions of petroleum like petrol, kerosene etc., Benzene, an ingredient of petrol, has been recognized as a carcinogen.

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Benzene is a potent inducer of cytochrome P_{450} that could lead to biological and health consequences Nwanjo *et al.* (2007). Adverse effect of gasoline exposure may be primarily related to impairment of hemopoietic system with bone marrow depression. Benzene can cause deleterious effect on various tissues of the body including bone marrow which in turn can cause changes in the blood cells. It has been established that toxic constituents of petroleum such as benzene and lead are activated in the bone marrow, where these substances exert toxic cytotoxic effect that could be mediated through destruction in DNA function. The resultant bone marrow depressions is characterized by inadequate production of RBC and other formed elements Ita *et al*. (2011). Platelets are formed from megakaryocytes, giant cells in the bone marrow, by pinching off bits of cytoplasm and extruding them in to circulation. Platelets are important in hemostasis. Ganong (2001). Normal platelet count is 1.5 lakhs to 4 lakhs per cumm of blood. Bijlani (2011). As petroleum products are known to produce pancytopenia, the present study is an attempt to establish the hazardous effect of petrol fumes, if any, on platelet production.

Aim

To investigate the possible hazardous effect of long term exposure to petrol fumes on platelet count.

MATERIAL AND METHODS

The study was conducted on 30 healthy adult male volunteers who had been working in petrol pumps in Pune city (India) for more than 5 years.

Inclusion Criteria

Adult male of age group 25-45 years
History of occupational exposure to petrol for more than 5 years

Exclusion Criteria

- Family history of malignancy
- History of chronic smoking
- Any systemic illness
- Individuals on steroids, radiotherapy or chemotherapy
- Any acute infection

The control group consisted of adult male aged between 25-45 years with no history of exposure to petrol fumes. 5 ml of venous blood was collected from peripheral vein (median cubital vein). Platelet count was estimated.

Statsistical Analysis

Student's't' test was used to compare platelet counts of test group and control group. P values `of < 0.001 was considered statistically significant.

RESULTS

Our test group consisted of 30 adult males 25-45 yrs of age working in the petrol pump for more than 5yrs.

Table 1.

Parameters	Study group (n = 30)		Control Group (n = 30)		Statistical significance
	Mean	SD	Mean	SD	
Platelets	216666.7	37558.54	281800	27098.03	t = 7.7; d.f. = 58; p <0.001, Sig

Student's't' test is applied to test difference between study and control groups for different parameters.
Sig =The difference between study group and control group is statistically significant.

Control group consisted of 30 adult males with age matching with the test group but no history of exposure to petrol fumes The platelet count of the test group was 21.6666.7+ 37558.54 where as in the control group it was 281800= 27098.03. Values are expressed in mean + SD. There was a reduction in the platelet count in the test which was significant statistically. T=7, d f =58 (p<0.001) (Table-1)

DISCUSSION

There are studies which suggest that long term exposure to petroleum products has a deleterious effect on RBC and WBC. It has been established that chronic exposure to petrol fumes produce a decrease in RBC count as well as WBC count. Kamal *et al*. (2012), Bedekar *et al* (2015). There are not many studies which show association between long term exposure to petroleum products and platelet count. Platelets, similar to RBC and WBC are formed in the bone marrow. Platelets (also called thrombocytes) are minute discs 1 to 4 micrometers in diameter. They are formed in the bone marrow from megakaryocytes, which are extremely large cells of hemopoietic series in the bone marrow. The megakaryocytes fragment in to minute platelets either in the bone marrow or soon after entering the blood. Especially as they squeeze through the capillaries John E Hall (2013). Main function of platelets is hemostasis, mainly involved in thrombosis, formation of platelet plug and promoting coagulation. It has been established that toxic constituents of petroleum such as benzene and lead are activated in the bone marrow, where these substances exert toxic cytotoxic effect that could be mediated through destruction in DNA function.

The resultant bone marrow depression is characterized by inadequate production of RBC and other formed elements. As` benzene has a deleterious effect on formed elements, we expected a possible reduction in the platelet count in the test group. In our study there was a statistically significant reduction in platelet count in the test group compared to control group. Thrombocytopenia means very low number of platelets in the circulation blood. People with thrombocytopenia has a tendency to bleed. Ordinarily, bleeding will not occur until the no. of platelets in the blood falls below 50000/cumm. Level as low as 10000/cumm are frequently lethal. Even though platelet count was less in the test group, it was within the normal range. So in these people, if the exposure continues for more years, there is a chance that it can lead to thrombocytopenia. So proper measures are required to avoid this and improve the health status of petrol pump attendants.

Conclusion

Petrol, also known as gasoline, is used as a fuel in internal combustion engines, and is also used as a thinner and industrial solvent. It contains various ingredients which has got a deleterious effect on hemopoietic cells. We studied the effect of long term exposure to petrol fumes on platelet count, In our study, we arrived at a conclusion that long term exposure to petrol fumes leads to reduction in the platelet count.

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