The Effects of Oil Paint Vapor on Leukocytes and Platelet Count and MCV, MCH and MCHC in Rat

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***Abstract*---**Studies have shown that volatile emissions of chemicals may result in various disorders in our body. The main aim of this study was to determine the effects of oil paint vapor on leukocytes, platelets count and MCV, MCH, and MCHC in rats. In this experimental laboratory study, male Wistar rats were randomly divided into control and exposed to oil paint vapor for 1h/day and 8h/day. After 10 weeks blood samples were collected using cardiac puncture method. The assay method was routine. Data were statistically analyzed and compared between groups using ANOVA. The results indicated that platelets count significantly decreased in rats exposed to oil paint vapor for 1h/day and 8h/day compared with control animals (P<0.01). The results also have shown that neutrophil and eosinophil count significantly increased and lymphocyte count decreased in rats exposed to oil paint vapor for 1h/day and 8h/day compared with control animals (P<0.01). There was no significant change in MCV, MCH and MCHC compared to control group. We have shown that exposure to oil paint vapor results in decreased platelets and lymphocyte count and increased neutrophil and eosinophil count, according to which, exposure to oil paint vapor has damaging effects on immune system.

***Keywords*--**Oil Paint Vapor, Leukocytes, Platelets, MCV, MCH, MCHC.

I. Introduction

VOLATILE organic compounds (VOCs) are organic chemical that are volatile at ambient temperature and it include chemical substances like benzene and formaldehyde that evaporates from oil paints and other resources [1]. And cause wide range of acute and chronic health effect like asthma, liver and kidney dysfunction and cancer [2]. Platelets are blood cell which are derived from megakaryocytes of bone marrow [3] and they play a central role in hemostasis [4]. Leukocytes are blood cell that derived from bone marrow HSC, and they have fundamental roles in defence against invading microorganism [5]. Red blood cell indices are blood tests which include the assay of MCV, MCH, MCHC, and other indices that provide information about hemoglobin content and size of Red blood cell [6].

Studies show that there is association between exposing to paint odor and blood disorder [7]-[10].

Due to effect of benzene which is found oil paints emission on blood cells [11] and other disorder like cancer in human [2] and due to limited study in this filled, the main aim of this study was to determine the effects of oil paint vapor on leukocytes, platelets count and MCV, MCH, and MCHC in rats.

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II. Material and Methods

A. Animals

In this experimental laboratory study adult male Wistar rats weighting 200±30g were purchased and raised in our colony from an original stock of Pasteur institute (Tehran, Iran).The temperature was at 23±2 ^{0}C and animals kept under a schedule of 12h light: 12h darkness with free access to water and standard laboratory chow.

B. Protocol of Study

Male rats were randomly divided into control and exposed to oil paint vapor for 1h/day and 8h/day. After 10 weeks blood samples were collected using cardiac puncture method. *Platelets count measured by 1% ammonium oxalate solution, types of Leukocytes measured and RBC indices measured by routine method.*

C. Statistical Analysis

Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Significance was measured using Turkey's test. Differences with P<0.05 were considered significant

III. Results

Figure I represents platelets count in control male rats and rats exposed to oil paint vapor for 1h/day and 8h/day. The result indicated that platelets count significantly decreased in male rats exposed to oil paint vapor for 1h/day and 8h/day compared with control group (P<0.01).

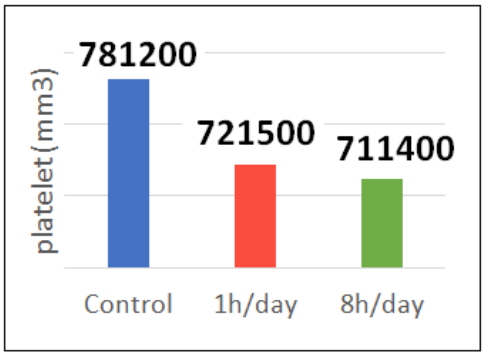

Fig. 1 Platelets count in control animal and male rats exposed oil paint vapor for 1h/day and 8h/day.

Figure II represents lymphocyte count in control male rats and rats exposed to oil paint vapor for 1h/day and 8h/day. The results indicated that lymphocyte count significantly decreased in male rats exposed to oil paint vapor for 1h/day and 8h/day compared with control group (P<0.01) .

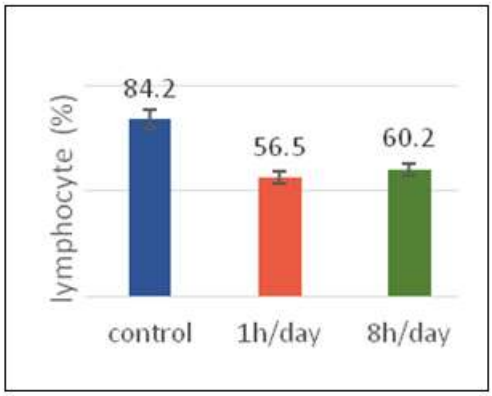

Fig. 2 Lymphocyte count in control animal and male rats exposed oil paint vapor for 1h/day and 8h/day.

Figure III represents neutrophil count in control male rats and rats exposed to oil paint vapor for 1h/day and 8h/day. The result indicated that neutrophil count significantly increased in male rats exposed to oil paint vapor for 1h/day and 8h/day compared with control group (P<0.01).

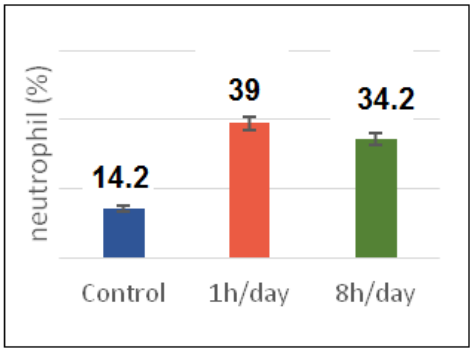

Fig. 3. Neutrophil count in control animal and male rats exposed oil paint vapor for 1h/day and 8h/day.

Figure IV represents eosinophil in control male rats and rats exposed to oil paint vapor for 1h/day and 8h/day. The result indicated that eosinophil count significantly increased in male rats exposed to oil paint vapor for 1h/day and 8h/day compared with control group (P<0.01).

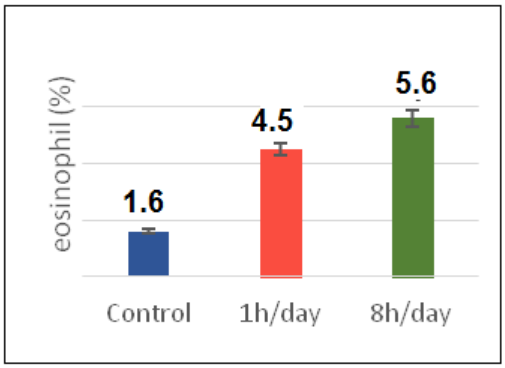

Fig. 4 Eosinophil count in control animal and male rats exposed oil paint vapor for 1h/day and 8h/day.

Table I represents MCV, MCH and MCHC in control male rats and rats exposed to oil paint vapor for 1h/day and 8h/day. The result indicated no significant change in MCV, MCH and MCHC in male rats exposed to oil paint vapor for 1h/day and 8h/day compared with control group.

MCHC gr/dl	MCH pg	MCV fl	Indices / Groups
35.56±0.76	19.22±0.76	54.08±2.46	Control
34.425±0.43	18.9±0.95	54.95±2.13	1h/day
33.28±0.646	18.96±0.80	56.92±2.34	8h/day

IV. Discussion

The results of current research show that exposure to paint odor account for decrease in platelets count and lymphocyte, and an increase in neutrophil and eosinophil count. In line with our findings there are other studies showing that exposure to paint or petroleum emissions can result in disorders in blood system [8], [10]. The findings also show that child and maternal household chemical exposure has a risk for acute leukemia in children with Down's syndrome [8]. Although it seems that odor pollution of air in small amount is not harmful to the health of man [12], the high amount of volatile substances in air can lead to problems in human health. The studies also show that exposure to oil paint vapor can result in cancer and tumor occurrence [7]. The studies indicated that exposure to oil paint vapor may result in increased blood lead level [9], which in turn, imposes adverse health effects . It seems that components of paint odor, in particular benzene, has a significant part in development of blood system disorders in subjects exposed to paint odor (13).

V. Conclusion

We have shown that exposure to oil paint vapor results in decreased platelets and lymphocyte count and increased neutrophil and eosinophil count, according to which, exposure to oil paint vapor has damaging effects on immune system.

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