The Effects of Oil Paint Vapor on White Blood Cells in Male and Female Rats

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Abstract— There is a diversified selection of solvents available for use with oil paints. All of them are caustic and emit vapors and fumes. And as a result can be harmful through contact and inhalation. The aim of this study was to determine the effects of oil paint vapor on white blood cells in male and female rats. In this experimental laboratory study, male and female 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. Differential white blood cell count was used. Data were statistically analyzed and compared between groups using ANOVA. The results indicated that WBC number was significantly decreased in rats exposed to oil paint vapor (1h/day or 8h/day) compared with control animals (p<0.01). The WBC number was also lower in rats exposed to oil paint vapor for 8h/day compared to rats exposed to oil paint vapor for 1h/day (P<0.01). Conclusively, exposure to oil paint vapor results in decreased WBC numbers, therefore, can attenuate immune system.

Keywords— Oil Paint Vapor, WBC, Rat.

I. INTRODUCTION

VOLATILE Organic Compounds (VOCs) in paint are considered harmful to the environment and especially for people who work with them on a regular basis. Exposure to VOCs has been related to organic solvent syndrome, although this relation has been somewhat controversial [1]. Exposure to volatile organic compounds (VOCs) in paint may bring about considerable signs and symptoms in patients who are allergic to VOCs including nose and mouth irritation, sore throat, dyspnea, tiredness, dizziness, headache and concentration difficulties. Patient typically report at least four or five symptoms occurring when they are exposed to particular substances, at a very low concentration that usually does not cause symptoms or harm in normal individuals. The common feature of products that appear to be responsible (either occupational or domestic) is that they have a strong smell and include: solvent, paint, glue, tar, oil, pesticides, perfume, cosmetics and spray products [2]. One of the most deleterious component existing in volatile organic compounds (VOCs) in paint is benzene. Benzene is commonly found in air in both domestic and spray products [3]. Studies show that there is association between exposing to paint odor and disorders of blood system [4]-[7]. The aim of this study was to determine the effects of oil paint vapor on white blood cells in male and female rats.

II. MATERIAL AND METHODS

A. Animals

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 °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 and female 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. Differential white blood cell count was used.

C. Statistical Analysis

All values are presented as mean±SEM. Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19Differences with P<0.05 were considered significant.

III. RESULTS

Figure I represents WBC number in control and rats exposed to oil paint vapor for 1 and 8h/day (male group) and figure II represents WBC number in female control and female rats exposed to oil paint vapor for 1 and 8h/day. The results indicated that WBC number was significantly decreased in rats exposed to oil paint vapor (1h/day or 8h/day) compared with control animals (p<0.01). The WBC number was also lower in rats exposed to oil paint vapor for 8h/day compared to rats exposed to oil paint vapor for 1h/day (P<0.01).

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IV. DISCUSSION

The results of current research show that exposure to paint odor results in decreased WBC number in blood system of male and female rats. Although odour pollution of air in small amount is not harmful to the health of man [8], it is high amount of odour which can lead to problems in human health. In line with our finding the other studies reported exposure to household painting and floor treatments, and parental occupational paint exposure has a risk for childhood brain tumors [4]. The studies show that household exposure to paint and petroleum solvents, chromosomal translocations, and the risk of childhood leukemia [7]. The research also indicate that child and maternal household chemical exposure has a risk for acute leukemia in children with Down's syndrome [5]. Paint also is referred to as a source of recontamination of houses in urban environments and its role in maintaining elevated blood leads in children [6]. 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 [3].

V. CONCLUSION

We have shown that exposure to oil paint vapor results in decreased number of white blood cells in male and female rats. Therefore, the impact of exposure to oil paint vapor on developing of blood system and immune system disorders is an issue of importance in clinical area.

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REFERENCES