



Occupational health hazards in painters

Anupma Kumari, Kakoli Ghose Roy, Supriya Nath, Nisha Gupta, Puja Pallavi, Shreya Singh, Sweta Kumari, Shahla Yasmin, Nidhi Rastogi

Department of Zoology, Patna Women's College, Bailey Road, Patna-800001, Bihar, India

Abstract: The possible effects of chemicals that the painters are exposed to have been surveyed. 103 painters were interviewed with the standard predesigned questionnaire regarding occupational diseases in which 65 had skin related problems, 30 had respiratory problems. Out of 103 painters, 31 had volunteered to undergo patch test in order to diagnose any sort of allergy and 8 painters had volunteered to undergo blood tests. Age, sex matched with 8 control healthy individuals to assess their liver and kidney functions. Analysis of patch test revealed 84% painters had contact dermatitis and the remaining 16% were found to be suffering from skin irritation. There was a rise in the level of Serum Glutamic Pyruvate Transaminase (ALT), Serum Glutamic Oxaloacetic Transaminase (AST) and Serum Creatinine (SC) in the painters as compared to control ones. However Serum Alkaline Phosphatase (ALP) showed insignificant 't' test.

Key Words: Patch Test, Contact Dermatitis, Liver function test, Kidney function test, ALT, AST, ALP, Serum Creatinine.

Introduction

An occupational health hazard is defined as "a condition that results from exposure in a workplace to a physical, chemical or biological agent, to the extent that the normal physiological activities are affected and the health of the worker is impaired". In developed countries, use of technological methods and equipments minimize the effects of health hazards in painters, whereas in India, painting industry does not take adequate measures rendering painters exposed to various chemicals present in paints like lead, chromium, cadmium, cinnabar, chloracetamide etc. In addition to these, they are also exposed to various chemicals like turpentine, cobalt, polyesters, resins, formaldehyde, epoxy resin, adhesives etc (Kokelj, 1992). These substances may be inhaled through nose, even inadvertently swallowed or absorbed through skin and eyes upon contact, thereby causing skin irritation and the amount of lead and duration of exposure directly effect the level of lead to permeate into the blood. According to Legge (1934) industrial

lead poisoning is almost entirely due to inhalation of lead dust and fume.

Short term exposure cause irritation, dermatitis, burns to the skin and eyes, vomiting, diarrhoea, irritation to nose, throat and lungs, headache, dizziness. (Hogberg and Wahlberg, 1980).

Contact dermatitis is the most common skin disease characterized by clearly demarcated areas of rash at the sites of exposure (Adams 1990). The occurrence of this disease depends on the duration of exposure to the chemicals that act as irritants. They affect workers of all age groups, irrespective of the type of their working place. Fischer *et al.* (1995) reported that skin disease and contact sensitivity are most prevalent in those house painters who use water based paints, glue and putties. Skin disorders, including chemical burns are most frequently reported. (Adams, 1990). Long term heavy exposure to organic solvents damages liver (Lundberg *et al.*, 1994). In some cases, long term exposure has caused lung, bladder, liver and stomach cancers (Kyle and Sue 1999).

The objective of the present investigations were to find the incidence of 'occupational disease' among painters and to suggest ways and means to alleviate their sufferings.

Materials and Method

This study has been conducted in Digha, Boring Road, Rajendra Nagar and Phulwari areas of Patna (Bihar). One hundred and three painters were interviewed with standard pre-designed questionnaire which included details about their age, service period, number of working hours and addiction if any. Out of 103 painters, 31 had volunteered to undergo Patch test in order to diagnose any sort of allergy and 8 painters had volunteered to undergo blood tests who were age, sex matched with 8 control healthy individuals to assess their liver and kidney functions. Patch test was performed with the help of leucoplast strips. Blood samples was analysed with the help of autoanalyzer. The different tests conducted for blood analysis include liver function test (AST, ALT, ALP) and kidney function test (creatinine test). To find out if the duration of service affected any of the parameters (AST, ALT, ALP, SC), the subjects were divided in two groups- first, whose work

experience was less than 6 years and second whose work experience was greater than 6 years. Each group comprised of four volunteers.

The statistical analysis was conducted using unpaired 't' test (two-tailed) and the level of significance was taken as $p < 0.05$.

Results and Discussion

Persons engaged in this profession for upto 20 years formed the majority, whereas very few remained doing so after 20 years (Table 1). This decrease may be due to their old age or even their physical disabilities (because of certain health problems).

Out of 103 painters, 30 had Respiratory problems and 65 had skin related problems (Table 2). Out of 65 painters having skin problem, only 31 volunteered to undergo patch-test in which 84% were encountered with contact dermatitis and 16% had chronic skin irritation. In our study it was observed that those painters who spent greater number of years in this occupation had suffered from contact dermatitis and those that spent less number of years had irritation. Cronin (1980) suggested

Table 1. Information about the study subjects

| S. No. | Age (in yrs) | No. of painters | Work experience (in yrs) | No. of working hrs | Tobacco consumption (if any) |
|--------|--------------|-----------------|--------------------------|--------------------|------------------------------|
| 1 | 15-20 | 6 | 1-2 | 8-12 | Yes |
| 2 | 21-26 | 32 | 4-6 | | |
| 3 | 27-32 | 24 | 8-10 | | |
| 4 | 33-38 | 19 | 11-14 | | |
| 5 | 39-44 | 14 | 15-20 | | |
| 6 | 45-50 | 8 | 25-30 | | |

Table 2. Respiratory and skin problems among painters shows the duration of years spent by them in this occupation.

| Health related problems | Work duration (1-10 yrs). | Work duration (11-20 yrs). | Work duration (21-30 yrs). |
|-------------------------|---------------------------|----------------------------|----------------------------|
| No. of painters | 62 | 33 | 8 |
| Respiratory problem | 9 | 15 | 6 |
| Skin problem | 27 | 30 | 8 |

that the occurrence of the skin disease depends upon the duration of exposure at the working place.

An analysis of ten years (1974-1984) of statistics was carried out at the Dermatology section of Institute of Occupational Health, Helsinki. A total of 1,082 cases of occupational skin disease were diagnosed during this period. Allergic (50.1%) and toxic eczema (47.1%) comprised the majority of occupational cases of dermatoses. The most frequent causes of allergic occupational eczemas were rubber chemicals (19.9%) chromates (19.8%) and epoxy resins(13.1%) (Estlander 2006).

Hogberg and Wahlberg (1980) studied skin disease among house painters and found that occupational dermatoses was prevalent among them. Chloracetamide was found to be an important cause of occupational contact dermatitis. Isocyanates in some paints also caused skin irritation and allergic eczema (Lessage *et al.*, 1992; Christopher and Donald, 1999). Skin diseases, including chemical burns, are the most frequently reported of all occupational illnesses (Adams, 1990).

Minov *et al.* (2008) described two patients who had developed asthma after working as automobile painters with isocyanate based

aerosol paint for two years or more .The results of the present study are in general agreement with those of workers mentioned in preceding paragraphs.

There was a significant increase in the level of Serum Glutamic Pyruvate Transaminase (U/L) in painters (mean 46.12, SD=21.86) when compared to control persons (mean=25.37, SD=4.36). This is suggestive of the fact that the liver has been impaired to some extent (Fig. 1). The mean values of individual and total serum bile acid concentrates were all found to be higher in the high exposure group than in the low exposure group of spray painters. The increase in serum bile acids may be indicative of a subclinical liver dysfunction (Jane, *et al.*, 1996). The Serum Glutamic Oxaloacetic Transaminase (U/L) level in painters showed significant increase ($t = 3.64$, $p < 0.05$) in comparison to that of the controls. The difference is significant which indicates some liver damage (Fig. 1). Lundberg *et al.* (1994) conducted liver function tests and urinary albumin test in house painters. He concluded that long term heavy exposure to organic solvents has a damaging effect on the liver. The Serum Alkaline Phosphatase (Unit/dl) level in painters did not cross the normal range but the values of the subjects showed a slight increase over that of the controls. As t-statics

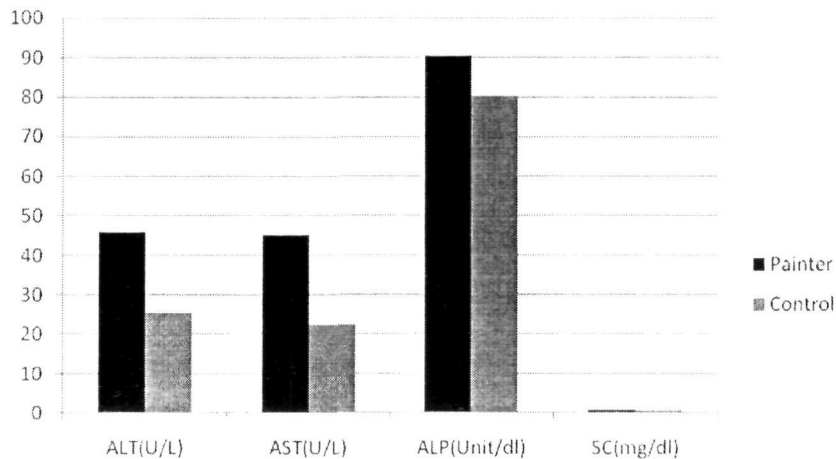


Fig. 1 : Comparison of ALT, AST, ALP and SC level between painter and control

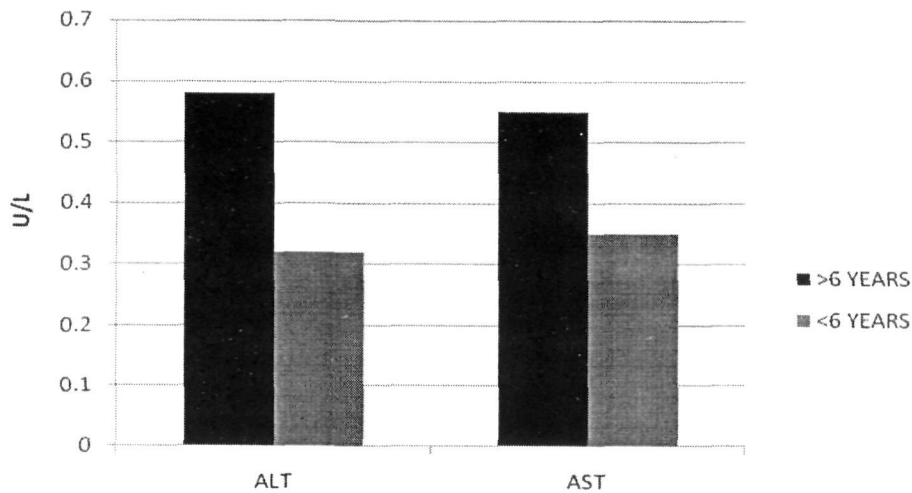


Fig. 2. Comparison of ALT and AST Level in painters on the basis of number of years of service

(0.73) < t-critical (2.364), therefore the difference is insignificant (Fig. 1). Kyle and Sue (1999) suggested that there might be some occupational risks for lung, bladder, liver and stomach cancers in painters as they are exposed to a range of complex chemical mixtures which include organic solvents and dye products known to be carcinogenic and mutagenic. The Serum creatinine of painters showed significant increase ($t = 2.681$, $p < 0.05$) in comparison to that of the controls (Fig. 1). Serum creatinine level can be used as a practical tool to identify the patients at risk of damage to kidneys (Valdivieso *et al.*, 2007). Jensen *et al.* (1987) found that those painters who used cigarette and tobacco were subjected to greater risks of kidney affliction and bladder cancer. There was a significant increase in the level of AST and ALT in painters having exposure of more than 6 years as compared to those painters who were exposed to less than 6 years. (Fig. 2), but the difference is insignificant.

The study clearly reveals that occupational skin diseases among painters are quite prevalent. Of all the occupational dermatoses, contact dermatitis is the most common skin disease. The high level of ALT, AST and creatinine in the

blood serum of painters indicates damage caused to the vital organs- liver and kidney respectively. However the results of this study are not enough to establish any correlation between haematological parameters and chemicals present in paints. This is because of the small sample size (8) in the study, are the limiting factors for the observed results.

Acknowledgements

We are grateful to our college principal, Dr. Sister Doris D'Souza for providing the necessary facilities. Financial support provided by CPE is greatly acknowledged.

References

- Adams, R.M. (1990) Occupational skin disease. 2nd ed Philadelphia, Saunders., 45,1321-1330.
- Christopher, T.L. and Donald, K.M. (1999) Occupational Asthma and Contact Dermatitis in a spray painter after introduction of an Aziridine cross-linker. *Environ. Health Perspect.*, 107, 599-601.
- Cronin, E. (1980) Contact dermatitis. New York. Churchill Living Stone .12-23.
- Estlander, T. and Kanerva, L. (2006) Skin disease among house painters. *Irritant Dermatitis.*, 1,153-161.
- Fischer, T., Bohlin, S., Edling, C., Rystedt, I. and Wieslander, G. (1995) Skin disease and contact

Occupational health hazards in painters

- sensitivity in house painters using water based paints, glues and putties. *Contact Dermatitis.*, **32**,39-45.
- Hogberg, M. and Wahlberg, J. (1980) Health screening for Occupational dermatose in house painters. *Contact Dermatitis.*, **6**, 100-106.
- Jensen, O.M., Wahrendorf, J., Knudsen, J. B. and Sorensen, B. L (1987) The Copenhagen case-referent study on bladder cancer: Risks among painters, drivers and certain other occupations. *Scan. J. Work. Environ. Health.*, **13**,129-134.
- Kokelj, F. (1992) Occupational acne. *Clin Dermatol.*,**10**, 213-217.
- Kyle, S. and Sue, P. (1999) Cohort mortality study of 57000 painters and other union members; a 15 year updates. **56**, 315-321.
- Lessage , Goyer. N., Desjardins, F., Vincent, J. Y.and Perrault, G. (1992) Workers exposure to Isocyanates. *Am Ind Hyg Assoc J.*, **53**, 146-153.
- Legge.(1934) *Industrial Maladies* Oxford University Press, London.
- Lundberg, I., Nise, G., Hedenborg, G. and Hogberg, M. Vesterbergo. (1994) Liver function tests and Urinary albumin in house painter with previous heavy exposure to organic solvent. *Occup. Environ Medicine.*, **51**, 347- 353.
- Minov, J., Karadzinska- Bislsmonska, J., Vasilenska, K. and Risteska-Kucs, Stoleskis. (2008) Work related asthma in automobile spray painters. *Arch Hig Raga Toksikol.*, **59**, 117-125.
- Valdivieso, J.R., Rastrollo, M., Monedero, P., Irala, J. and Lavilla, F.J. (2007) Prognosis and serum creatinine levels in acute renal failure at the time of nephrology consultation. *BMC Nephrol*, **8**, 1471-2369.