

Chemical Use and Self-Reported Exposure associated Health Effects among Finnish House Painters

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Introduction

Water-based paints have mainly replaced solvent-based paints in the construction industry. Earlier studies carried out in Scandinavia and in Finland detected some neurotoxic symptoms among house painters, who had been exposed to Stoddard solvent and other organic solvents in their work [e.g., Lindström and Wickström 1983, Lundberg et al 1995].

Water based paints (WBP) have less volatile organic compounds (VOCs) than solvent-based paints (SBP) but contain some reactive compounds, such as biocides, glycol ethers and binder monomers. Swedish researchers reported that house painters were exposed to low levels VOCs (e.g. texanol), metals, formaldehyde and ammonia [Norbäck 1995]. Wieslander and her co-workers [Wieslander 1994a, 1994b, 1997] examined the occupational exposure to WBP and skin and airway symptoms. Although some skin symptoms may be caused by the components in the WBP, they caused less discomfort and airway irritation than SBP. No increase of respiratory symptoms among painters exposed only to WBPs was found even though VOCs in WBP could cause airway irritation in some subjects. Wieslander concluded that the

introduction of WBP has improved the work environment for house painters.

The Federation of Painting and Decoration Contractors in Finland, the Finnish Construction Trade Union and the Finnish Association of Paint Manufacturers agreed on primary use of WBP in house construction in 1989. This study was initiated to establish the present chemical exposure and health status of construction painters. The project was carried out at FIOH in 1999—2002 in co-operation with the previously mentioned parties in construction painting and with financial support from the Finnish Work Environment Fund. The study comprised a study of the occurrence and causes of occupational diseases among construction painters, a questionnaire study on chemical use and symptoms, a clinical examination of painters with symptoms and an analysis of work. This article discusses the chemical use and causes of exposure associated symptoms experienced by the painters.

Materials and methods

Working conditions, chemical use and health status of 1000 Finnish house painters and 1000 carpenters as their referents

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were studied by a posted questionnaire. The painters and carpenters were randomly picked from the member register of the Finnish Construction Trade Union. All of them were male and were at work or had been unemployed less than 500 days. A half of the painters (n=500) and of the carpenters had entered the occupation before 1980 and thus had at least 20 years practice in the construction trade.

The questionnaire had questions on work history, present and past use of chemicals, use of personal protection, health status and experienced symptoms (cough, asthma, rhinitis, eye and skin irritation, dermatitis and neurological symptoms). In addition, questions on hobbies with chemical exposure, smoking and drinking habits and earlier allergies were included.

Results

Both worker groups were similar in response rate (60.4 % painters and 60.6 % carpenters), occupational history, and alcohol and tobacco consumption. During the questionnaire survey, 15.5 % of the painters were unemployed and 3.6 % were on sick leave. In the latest five years, 19.8 % of the painters had been unemployed more than two years. The mean duration of construction work was 23.9 years, of this 23.6 years in construction painting. 17.5 % of the painters had less than 10 years experience in the construction industry. Only the results for the painters are presented here.

Construction painting work

In addition to construction painting and plastering work, the painters had worked temporarily in other construction occupations, e.g., as a handyman (11 %), a concrete worker (2 %) or a carpenter (2 %). Altogether 13 % of the painters had worked as a painter in other industries, e.g., in metal manufacturing (9 %), in car painting (3 %), in furniture painting (2 %) or in ship painting (2 %). The time in other industries had been short, usually less than 2 years.

On the average the painters had worked in renovation painting 11.8 years and 11.6 years at new construction sites. Also the work in the past year was split evenly between renovation painting (main work for 46 %) and new buildings (main work for 38 %). A half of the construction painters never painted with a spray gun. Spray painting was main job for 8 % of the painters, and 12 % of the painters did more than 25 % of their work time spray painting.

Chemical use

In addition to paints and solvents, house painters use also many other chemicals, such as fillers and plasters, paint removers and wood preservatives in their work. Even at present, alkyd paints were used frequently, daily or almost daily by 20 %, other solvent paints by 9 % and fillers and plasters by 69 % of the painters (figure 1).

Surprisingly, the painters experienced filler and plaster dust and construction dust as the most harmful chemical (Figure

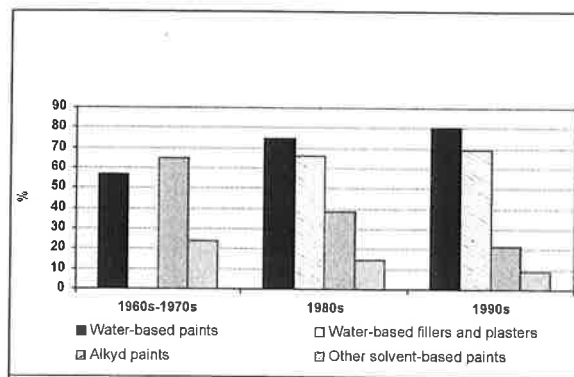


Figure 1. Daily use of chemicals by the construction painters in the 1960s-1990s (note: use of fillers and plasters in the 1960-70s not listed).

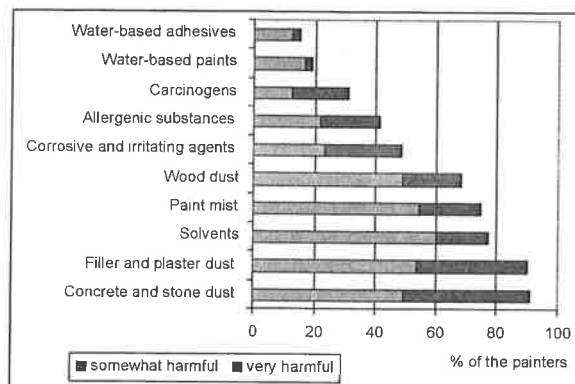


Figure 2. Construction painters' opinions about chemical hazards in their work.

2). Solvent products were considered very harmful by 17 % and somewhat harmful by 49 % of the painters. Water-based paints were named as very harmful by only 2 % and somewhat harmful by 17 % of the painters.

Respiratory and eye symptoms were experienced by 14 - 46 % (depending on the symptom) of the painters during the last 12 months. Rhinitis and irritative eye symptoms were the most frequent symptoms, followed by symptoms of the lower respiratory tract and laryngeal symptoms. Sanding of filler and plaster was named most often as an occupational cause for symptoms among the painters suffering from cough (67 % of those with symptoms), asthma (50 %), rhinitis (65 %), throat irritation (57 %) and eye irritation (66 %) (Figure 3). Symptoms were linked to solvent-based products in 20-30 % of the cases and to water-based paints only in 4-12 % of the cases.

Skin symptoms of the hands had occurred among 32 % of the painters during the past 12 months. Filling and sanding of the filler and plaster were named most frequently as a probable cause for dermatitis (Figure 4).

Personal protection

Most painters used respirators and protective gloves nearly always when needed. However, 14 % of them reported that they did not use a respirator even though they felt it neces-

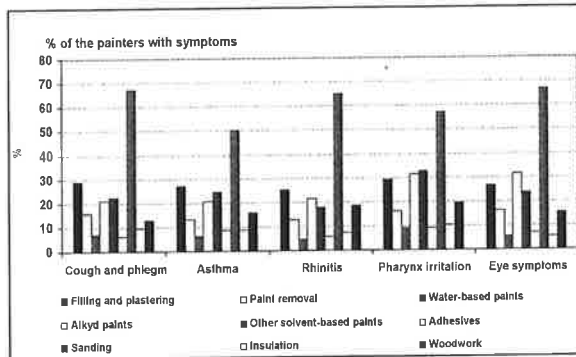


Figure 3. Suspected occupational causes associated with respiratory and eye symptoms by the construction painters (% of those painters with experienced symptoms (n= 92-224).

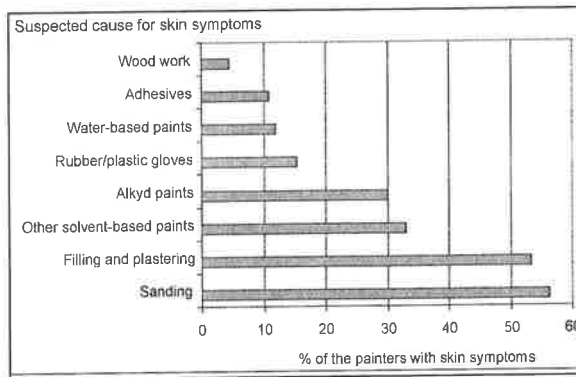


Figure 4. Suspected occupational causes associated with hand dermatitis by the construction painters (% of those painters with skin symptoms).

sary to do so. Two-thirds of the painters considered their personal protective equipment to be suitable for the work and in good condition. Nearly one out of three painters felt that the maintenance and storage of the equipment was not properly organised. 18 % of the painters felt that the personal protection equipment are in poor condition or not suitable for the work and exposure.

Work phases where respiratory protection is recommended include spray painting and spraying of plaster. Half of the painters did not use a respirator during spraying of plaster and 17 % did not use one either during the spraying of water-based paints or during sanding of plaster. More attention should be paid to the selection of correct respiratory protection. E.g., painters spraying fillers and plasters as their main task used only disposable dust masks with a poor protection factor.

Protective gloves were not worn by 24 % of the painters when working with water-based paints and by 15 % of the painters when working with solvent-based products. The use of correct skin protection with epoxy work should be encouraged, as 20 % of the painters reported applying epoxy products without gloves. Special rubber or plastic gloves suitable for epoxy work were used by only 16 % of the painters. In filling and plastering work, most painters used textile gloves

not suitable for irritating and corrosive substances. 20 % of the painters use no hand protection during plastering work or sanding of the plaster and filler, even though fillers and plasters appeared to cause skin problems to many painters.

Discussion

Construction house painters' work includes many different tasks and chemicals. In addition to paints, surprisingly often the work with fillers and plasters was mentioned as a cause of respiratory, eye and skin symptoms. We reviewed the product information and material safety data sheets for 100 fillers and plasters used for ceilings and walls. Fillers, plasters and putties are technical products, which contain mainly fillers and binders such as limestone, cement, aluminium cement and gypsum. The ready-to use fillers and plasters contain biocides e.g., isothiazolinones. There are also special fillers and plasters containing solvents and epoxy products. The most common fillers and plasters are based on limestone and cement, with no components classified as harmful or toxic. However, many fillers and plasters are alkaline, with pH value between 7 and 12, so they are irritating and even corrosive to the skin. Only few exposure measurements on the filling and plastering work were found in the literature. Norbäck [1995] measured total dust concentrations ranging from 9.2 to 14.3 mg/m³ in manual sanding of walls and ceilings. In Finland, total dust concentration during the spraying of the filler was as high as 48 mg/m³, during the manual trowelling 39 mg/m³ and during manual sanding 37 mg/m³ [Riala 1993].

Fillers and plasters are a major respiratory and skin irritant factor in the painters' work in Finland at present. Work methods and personal protection for filling, plastering and sanding should be re-evaluated. Also, solvent-based alkyd paints were still much used, and the use of water-based paints should be enhanced by campaigns and training of the constructors. Water-based paints should not be a major occupational problem, especially when considering their extensive use. However, paint producers should notify possible risks on material safety data sheets, e.g. the allergenic properties of paint preservatives to the user. Occupational health units must bear in mind in detecting diseases and symptoms among construction painters both the previous exposures (asbestos, solvents) and the present work (water-based and solvent paints, fillers, epoxy products). Ensuring occupational health services to all construction painters is essential in minimising occupational hazards.

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