

Review Article

Differences between the sexes with regard to work-related skin disease*

BIRGITTA MEDING

Occupational Dermatology, National Institute for Working Life, Stockholm and Department of Medicine, Occupational and Environmental Dermatology, Karolinska Institutet, Stockholm, Sweden

Work-related skin disease is common and usually presents as hand eczema. From the Occupational Injury Information System in Sweden, as well as from registers of industrial injuries in other countries, it is evident that females report skin disease more often than males. Epidemiological studies of hand eczema also show that women are more often affected than men, in particular young women. The most common type of hand eczema is irritant contact dermatitis, which is often caused by wet work. Many female-dominated occupations involve extensive wet work, e.g., hairdressing, catering, cleaning and health-care work. These occupations are also high-risk occupations for hand eczema. Experimental studies of skin irritation have not confirmed differences between the sexes; thus, the higher prevalence of irritant contact dermatitis among females is most likely due to exposure, occupational and non-occupational. Nickel allergy is the most common contact allergy, which is most frequent in young females, and in 30–40% results over time in hand eczema. Hand eczema has an impact on quality of life and females seem to report a higher degree of discomfort than males. To achieve the optimal effect of preventive efforts regarding occupational skin disease, the focus for prevention should aim at reducing wet exposure.

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Skin disease caused or worsened by factors in the working environment is one of the most commonly occurring work-related illnesses. The predominant condition is hand eczema, since in many jobs the skin on the hands is subjected to damage caused by contact with skin irritants and allergens. Unequivocal reports in industrial injury registers, epidemiological studies and clinical records indicate that women are affected far more than men. However, differences between the sexes with regard to work-related skin disease have never been studied to any great extent. A summary of a number of dermatological textbooks was drawn up in 1996 at the University of Linköping Faculty of Health

Sciences (1), which aimed to study how the authors of the books had treated existing sex differences for skin diseases in their presentation. These textbooks contain a collective overview of knowledge within the area of dermatology, and are used in areas such as medical training and as reference books by both dermatologists and other categories of doctors, as well as by other medical personnel. The analysis showed that differences between the sexes had largely been overlooked, even for common dermatoses such as hand eczema, clearly documented to be predominant among women. Hand eczema caused by exposure to wet work, irritant contact dermatitis, is still in the 1990s often called “housewife’s dermatitis”, even though the woman’s rôle as a housewife may have been replaced by an occupational rôle in modern western society. Many cases of irritant contact dermatitis on the hands are clear occupational injuries. Examples are also given of how a teasing tone is

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sometimes used, for instance, to describe nickel allergy. Measures for analysing causes and prevention of occupational dermatoses have to date been covered to only a modest degree in relation to how common these complaints are, and the impact they have on society and the individual. One possible explanation is the uneven distribution between the sexes and the fact that the most highly affected occupations are typical female occupations. The fact that women are treated unfavourably in terms of rehabilitation has recently been pointed out in a report from the National Social Insurance Board in Sweden (2).

Hand Eczema

Hand eczema accounts for an estimated 90% of skin disease caused by factors in the working environment. Irritant contact dermatitis is most common and, in many cases of allergic contact dermatitis on the hands, exposure to skin irritants can contribute to deterioration of the condition. The relation between heredity and environment as regards the risk of developing hand eczema is discussed further in the section "Risk factors".

Hand eczema can have a tangible effect on society and the individual in the form of health care consumption and sickness absence, and in some cases a change of job is inevitable. In a population-based study, 69% of individuals having hand eczema reported medical consultations, 21% reported sick leave for more than 7 days and 8% had changed job because of the hand eczema (3). Hand dermatitis also has an impact on the individual's quality of life. In the study mentioned above, over 1000 people with hand eczema were interviewed about how the condition affected their working life, private life, sleep and mood. 85% of the women and 74% of the men reported some kind of negative effect on their everyday lives. Restraining effect on leisure activities and handicap in occupation were each reported by 1/2 of the individuals and disturbances of sleep and mood were admitted by 1/3. Negative influence of hand eczema on social contacts was also experienced by 1 out of 3. Women reported a higher degree of discomfort in most of the questions.

Occurrence

Different countries have different systems for registering industrial injuries, and different rules regarding which illnesses are covered by industrial injury insurance. In the Swedish system, musculo-skeletal conditions have been approved as industrial injuries on a relatively broad basis, and these conditions are predominant in Swedish industrial

injury statistics, skin diseases being the 2nd most commonly recorded condition (4). Reports are registered by the Occupational Injury Information System with the National Board of Occupational Safety and Health. A compilation has been made of all reported cases of occupational skin disease in Sweden in 1980–92 (5). This indicates that the number of reported cases of skin disease per 1000 paid employees during the whole period was higher for women than for men, and 2× the number of cases were reported in the 16–24 age group compared with other age groups (Fig. 1). Young women therefore constitute a clear risk group for work-related skin disease. In a report regarding Danish industrial injury statistics for the years 1984–91, 2/3 of eczema sufferers were women (6). Figures taken from other countries also indicate a clear over-representation among women (7–9).

Epidemiological studies of hand eczema also show that women are more often affected than men. During the 1980s, the occurrence of hand eczema in Gothenburg was studied using a postal survey of 20 000 randomly selected people of working age 20 to 65 years (3). The diagnoses were verified by clinical examination. The reported 1-year prevalence for women was 15%, and for men 9%. It also became clear that young women were most affected, with a 1-year prevalence of 19% in the 20–30 age group (Fig. 2). The results indicated 2× the prevalence of hand eczema compared to a similar study conducted during the 1960s (10).

Very limited information is available in the dermatological literature on the incidence rates of hand eczema, but several epidemiological studies are under way in which this illness occurrence parameter is being used. A current Swedish survey-based study on hand eczema in bakers and ran-

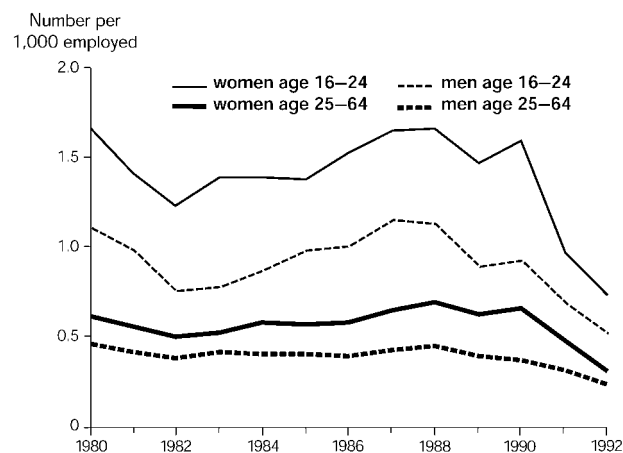


Fig. 1. Frequency of skin disorders reported to the Occupational Injury Information System in Sweden 1980–92. Source: Hedlin et al. 1994 (5).

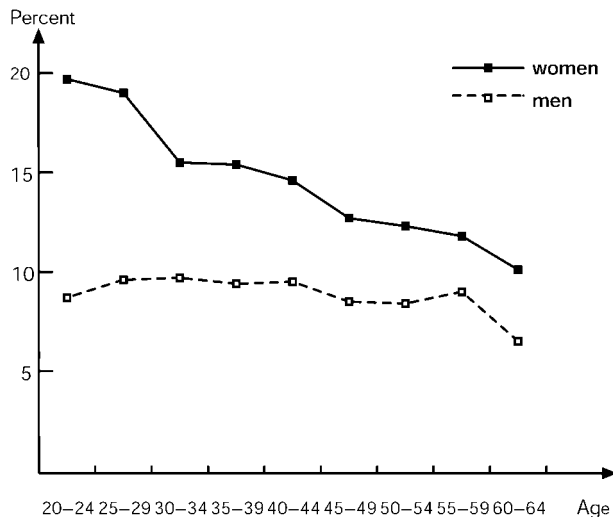


Fig. 2. 1-year prevalence of self-reported hand eczema in relation to age and sex. Source: Meding 1990 (3).

domly selected population controls has found an incidence rate of hand eczema among women of 11.3 cases/1000 person-years, compared to 4.4 cases among men, in the population controls, which involves a relative risk of 2.6 (11).

Irritant Contact Dermatitis

The most common type of hand eczema is irritant contact dermatitis, an effect of repetitive damage to the skin. The most common cause is wet work, i.e., skin contact with water and detergents. Many female-dominated occupations involve extensive wet work. This applies to most occupations in the care and service sectors, such as hairdressing, catering and cleaning. Since women are affected by irritant contact dermatitis to a greater extent than men, the question has arisen as to whether women have more sensitive skin. Skin irritation can be studied using several objective methods, most commonly transepidermal water loss (TEWL) by evaporimetry and blood flow by laser Doppler technology. Major differences have been observed between individuals, though no difference between the sexes has as yet been confirmed (12). Differences in occurrence of irritant contact dermatitis between males and females are therefore most likely due to differences in exposure. Exposure at the workplace is probably the most important factor, due to the amount of time spent at work, though many women spend further time performing wet work at home, especially young women with small children. A prospective study of female nursing staff in northern Sweden showed that the

presence of children under the age of 4 in the family and the absence of a dishwasher increased the risk of developing hand eczema 4× (13).

Allergic Contact Dermatitis

Allergic contact dermatitis occurs on skin contact with certain substances that act as contact allergens. Individuals probably have a varying propensity to develop contact allergy, though no definite genetic markers have so far been identified. The most significant factor in contact allergy development seems to be the degree of exposure, comprising concentration as well as the duration. To date, over 3700 different substances have been identified that can cause contact allergy (14). The most common contact allergens are nickel, fragrances, rubber chemicals, preservatives and colophonium (natural rosin). These substances are present in our everyday environments at home, at work and at play. Only limited details are available regarding the occurrence of contact allergy among the general population. A Danish population-based study showed that 19% of female subjects and 12% of men gave at least 1 positive reaction on patch testing (15). This would suggest that a difference between the sexes does exist, though this requires further investigation.

Nickel Allergy

Nickel allergy is the most common contact allergy, and is one area in which a pronounced difference does exist between the sexes. At least 10% of women in the Nordic countries are allergic to nickel, but only 1–2% of men (16). Nickel allergy is more common among young women (approximately 20%), and is common even among schoolgirls (17). Many develop their allergy through contact with jewellery, watches and metal clothing details. Ear-piercing involves a risk if nickel-releasing jewellery is used. Over time, 30–40% of people who are allergic to nickel develop hand eczema. These eczemas can be extremely troublesome, and have an impact on working ability in manual occupations. For nickel allergy sufferers, wet work involves an increased risk of developing hand eczema, as water and detergents harm the skin barrier, so that much less nickel is required to cause or worsen hand eczema. Other often occupationally used objects which release nickel are coins, keys and hand tools (18). Nickel hand eczema can become chronic – most probably due to the fact that it is difficult to avoid nickel contact completely in everyday life – and can lead to long-term sickness absence or even enforced early retirement (19).

Risk Factors

Hand eczema occurs as a result of exposure to skin irritants and allergens, but endogenous factors are also of importance. One particular factor of great significance is atopy. Atopic constitution is very common among the Scandinavian population – at least 1/3 are atopics. In recent decades, symptomatic atopic disease has become more common. It has not been possible to identify the cause of this increase with any certainty, though there is much to indicate that factors in the western lifestyle bear some significance. Several major studies have shown a clear connection between atopic eczema in childhood and hand eczema in adulthood (20, 21). A population survey of hand eczema conducted in Gothenburg in the 1980s indicated a 3× increase in the prevalence of hand eczema among individuals who had suffered from childhood eczema (3). According to population-based studies in Scandinavia, the female/male ratio of atopic eczema is about 1.4:1, which may also contribute to the higher prevalence of hand eczema among women (22). People with atopic eczema have more sensitive skin, which is why hand eczema is more easily contracted when exposed to skin irritants. This should be borne in mind in situations where people who have suffered from eczema in childhood are choosing a career, to avoid any troublesome hand eczema symptoms in the future, with such potential consequences as sickness absence and job changes.

Grading the risk of hand eczema in different types and degrees of exposure is not easy, and has not been sufficiently researched. A study of certain Swedish industrial injury records showed that in 1/2 the reported cases, exposure to water and detergents had been given as the cause of the skin disease (23). In practice, wet exposure probably also accounts for a further proportion of the number of eczema cases. Nickel stands on its own as the major contact allergen, though contact allergic reactions to fragrances and preservatives are also given as causes of, or detrimental factors in, many types of hand eczema. Another common cause of work-related skin conditions is allergy to glove materials, particularly rubber, which can cause contact allergy to rubber chemicals, and IgE-mediated allergy to natural rubber latex.

Wet Work

Wet work is a well-documented risk factor for hand eczema, and is the single most significant exposure factor in the development of hand eczema. In a survey-based study of hand eczema in female cleaners in Denmark, just over 80% reported wet

hands for over 1/4 of their working time, and there was a positive correlation between the number of hours per week the hands were wet and skin disease symptoms (24).

A Finnish follow-up study of people with atopic eczema in childhood found that 90% of subjects performing wet work for 2 h or more per day developed hand eczema (25). As described above, water and detergents have a direct impact on skin irritation. More recent research has also shown that constituents of everyday detergents (surfactants) have an allergenic effect (26–28). Ethoxylated surfactants can be oxidized by oxygen in the air during storage and handling. Formaldehyde has been found to form in such products, together with substances that have shown to have contact allergenic potential in experimental studies on laboratory animals. It is not yet certain to what extent this is also a problem as regards hand eczema in wet work, though research is ongoing.

High-risk Occupations

Risk occupations for hand eczema are primarily those in which the skin on the hands is exposed to water and detergents to such a degree that the skin barrier is harmed. If the job also involves exposure to substances that can cause contact allergy, the risk of hand eczema is even higher. Industrial injury statistics provide an indication of the occupations in which the most skin damaging exposure exists. It is reasonable to assume that the problems of working in these occupations with an established hand eczema are greatest, and have contributed to the illness being reported as an occupational illness. Fig. 3 shows which occupations in Sweden have the highest number of reported cases of occupational skin disease in relation to the number of individuals employed in each occupation. This clearly indicates that most cases occur within female occupations involving extensive wet work.

The fact that these occupations involve an in-

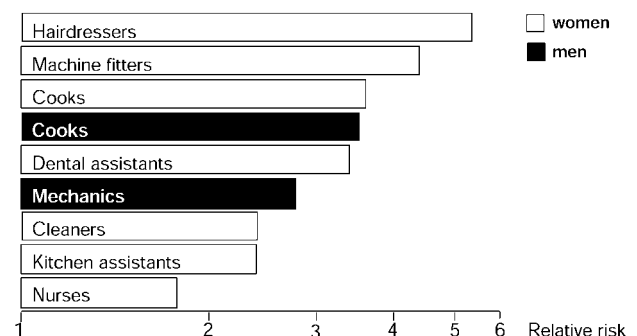


Fig. 3. Occupational groups with an elevated incidence of reported skin disorders 1990–1991. Source: Hedlin et al. 1994 (5).

creased risk of hand eczema has been reported in several publications. It is well-known that hair-dressing is a high-risk occupation in terms of hand eczema (29–31). One population-based study (3) indicated a significantly higher prevalence of hand eczema among female cleaners (22%) than in other occupations, and several other studies report a high risk of hand eczema in this type of work (24, 32). Food handling and bakery work are other risk areas with a high occurrence of hand eczema, especially among women (11, 33).

Nursing involves extensive wet work, and the sector predominantly employs women. Cumulative prevalences of hand eczema of between 30 and 40% have been reported in Sweden and Finland (13, 20). In the Netherlands, a 1-year prevalence of hand eczema of 30% has been noted among nurses (34). In comparison with population data, an age-adjusted prevalence ratio of 2.2 was found for female nurses. In an Italian hospital, the risk of hand eczema was found to be highest among young female nurses (35).

Because of the risk of blood-transmitted infections, protective gloves are used extensively in nursing. In recent years, many employees in the nursing sector have developed an IgE-mediated allergy to natural rubber latex. Apart from contact urticaria, symptoms have included rhinitis and asthma, and some cases have resulted in serious general allergic reactions (anaphylaxis). Rubber latex allergy is reported to affect up to 17% of nursing staff who use protective gloves (36). Since the majority of nursing and care staff are women, most sufferers from rubber latex allergy are also women.

Preventive Measures

The occurrence of contact dermatitis and its prognosis are clearly related to skin exposure to the causal factors. For this reason, there should be good potential for prevention by reducing exposure to skin irritants and allergens in various ways. Legislation is an important and powerful instrument in reducing exposure to harmful substances. Regulations exist which aim to lead to reduce skin contact with certain allergens in the workplace. Examples of such regulations are the addition of iron sulfate to cement, which binds and inactivates the allergenic chromate, and the directives relating to the use of thermosetting plastic. It should, however, be noted that many of these regulations are primarily intended for work environments in male-dominated occupations. Since wet work involves the highest risk of hand eczema, rules restricting such exposure are of course desirable. There are currently no such rules in Sweden,

though Germany has recently initiated measures for regulating wet work (37).

Due to the high costs nickel allergy involves for society, the EU decided on nickel regulation in 1994 (38, 39). The regulations concern on the one hand materials used in connection with ear-piercing, and on the other materials in objects intended for direct, long-term contact with the skin, e.g., jewellery, buttons, buckles and watches. Regulation came into force in January 2000. However, it applies only to "personal objects", and therefore not to hand tools, keys, coins and other everyday objects. An extension of regulation to include such objects would therefore be desirable.

Another prominent preventive measure is the EU directive on cosmetics, which demands an obligatory declaration of contents on all cosmetics and hygiene product packaging (40).

In certain situations, the use of protective gloves is necessary and desirable. EU regulations exist pertaining to control of the design and production of gloves (41). For gloves used in medical care, standards regarding quality and physical properties have been elaborated (CEN/TC205). Tight gloves often involve a strain on the skin, and there is also some risk of allergic reactions towards glove materials.

One preventive measure would be to manufacture work and leisure products that are gentle on the skin. It is important to study the allergenic and skin irritant properties of the substances used, and to take the results into account when launching the products on the market.

A basic precondition for success with preventive measures is to ensure good levels of knowledge as regards identifying risks and potential protective steps. There is a wide information gap concerning skin care and protective measures for the skin. Such information should be conveyed during training for various occupations, especially those that are manual, and then be followed up in the workplace. Young people with a high risk of contracting hand eczema, i.e., atotics and those that are allergic to nickel, should be given vocational guidance.

Requirements for Continued Research and Development

When it comes to work-related skin diseases, a great deal of background data regarding occurrence and risk factors – which must constitute the basis of preventive efforts – is still missing. Much of our existing knowledge comes from clinical studies on patients who seek treatment at dermatology clinics, which means a basic selection has already taken place. A need exists for population-

based studies in which risk factors and preventive potential is studied for both female and male working environments.

In order to have an impact on hand eczema risks in female working environments, it is essential to study, quantify and analyze exposure levels in wet work, which is the basic cause of at least 1/2 the number of cases of hand eczema, and which contributes to the worsening of a further large proportion of cases, in order to produce a sound platform on which to base research into preventive measures. It is also of interest to investigate whether it is possible to reduce wet exposure at work through official regulations, and to study any effects of such measures.

Continued research into the surfactants used in soaps and detergents is important. It is crucial that skin irritation properties and any allergenic characteristics are established in order to maximize the accessibility of 'gentle' products on the market.

Skin irritation is the main cause of hand eczema predominantly in the working environment of women. Continued research on skin irritation with objective bioengineering methods will increase our knowledge of the mechanisms and of the possibilities for prevention.

Nickel allergy is one of the major causes of hand eczema. There ought to be continued efforts to reduce the risk of nickel sensitization. The EU nickel regulation is one stage in this development. It is essential that the effects of this are studied and documented.

The use of protective gloves is necessary in many lines of work, especially within the nursing sector, but in far too many cases wearing gloves unfortunately results in unwanted side-effects. Continued efforts to identify the risks and to produce glove materials with as few side-effects as possible is also essential.

In the long term, research into the situation of women in the labour market may be expected to lead to changes and improvements which result in less monotonous work tasks, thereby reducing harmful exposure.

It is important to integrate exposure in the home and the total life situation when studying work-related skin diseases, as these factors can differ considerably between women and men.

How changes in work organization might influence the risk of diseases and provide possibilities for improvements is an interesting new field for research in the area of occupational skin disease.

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Address:

Birgitta Meding
Occupational Dermatology
National Institute for Working Life
S-112 79 Stockholm
Sweden