

Dyshidrotic eczema and occupation: a descriptive study

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Dyshidrotic eczema (DE) is a chronic and/or recurrent vesicular eczema of the palmar sides of the hands and sometimes the soles of the feet. The major aetiologies to be considered are atopic DE, contact DE, systemic contact DE and DE due to fungal or microbial allergy. To clarify the role of occupational contact allergens, 59 workers with DE were examined to determine whether they had atopy, environmental contact sensitization and/or contact allergy coupled with work activity. For all, patch testing was carried out using the European standard series and the material brought in by the patients. No significant difference was found between the rate (42.4%) of history of atopy among the 59 workers with DE and that (30.6%) observed among 160 workers with other forms of hand eczema (HE). Positive patch test reactions were found in 72.8% of dyshidrotic patients. A relationship to occupational activity was strong for 18 (30.5%) of them but this rate was significantly lower than that (55%) observed among the 160 with other types of eczema. Results of the present study showed that contact sensitization is as much involved in workers with DE as in workers with other form of HE, even though the relationship to work is significantly less frequent for DE. It also suggests that atopic histories are no more involved in DE than in other forms of HE.

Key words: dyshidrotic eczema; atopy; contact dermatitis; occupational; hand eczema; patch testing. © Munksgaard, 2000.

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In 1982, Ackerman included the clinical entity of pompholyx in the concept of spongiotic/spongiform dermatitis (1). Pompholyx is defined as a form of palm and sole eczema in which oedema fluid accumulates to form visible vesicles or bullae (2). Schwanitz (3) concluded that atopy is probably the most important factor and that the rôle of dyshidrosis had been overemphasized in the past. For us, pompholyx is nothing other than chronic and/or recurrent vesicular palmar/plantar eczema and so a term that need not be used. We prefer to use the well-known term dyshidrotic eczema (DE). Among its major aetiologies, the respective roles of atopy, environmental or occupational factors are difficult to assess, partly because of the paucity of controlled studies (4). The aim of this study was to investigate the frequency of atopy and contact sensitization, environmental and occupational, in a consecutive group of patients with hand eczema (HE), with particular emphasis on DE.

Patients and Methods

Patients

The Department of Dermatology concerned in this study is part of Timone Hospital, 1 of 3rd public referral hospitals, and is located in the centre of Marseilles (900,000 inhabitants). This department provides an occupational health medical consultation by trained specialists. In this study were included only workers in whom DE was diagnosed at this department between January 1995 and September 1997, either as inpatients or outpatients. DE was defined as eczematous vesicles occurring symmetrically on the volar aspects of the hands and fingers, and sometimes also on the sides of the fingers. Dermatitis must be largely confined to the hands with only minor involvement of the other areas. Each of them had a questionnaire to fill out, including their background, occupational as well as non-occupational, and a physical exami-

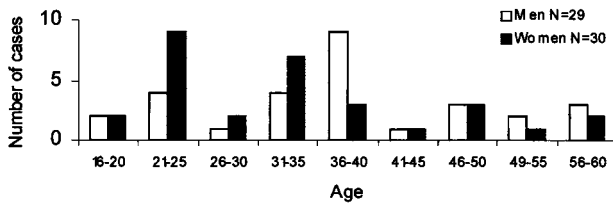


Fig. 1. Sex and age distribution.

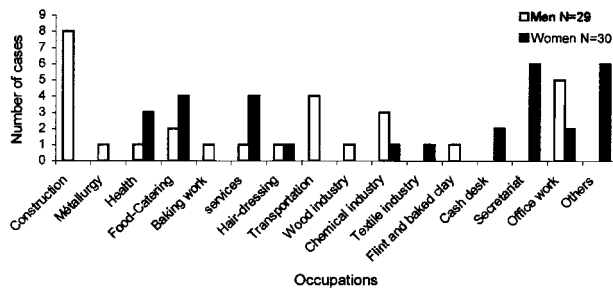


Fig. 2. Sex and occupational group distribution.

nation. Personal and family history of atopy, atopic dermatitis, namely, asthma, hay fever, or allergic conjunctivitis, was also recorded.

Skin diseases were determined to be occupationally related on the basis of: i) medical history: presentation of skin diseases, general health, hobbies, and effect of work exposure, holidays, and time off on skin problems; ii) work exposure: to chemicals including potential allergens; iii) physical examination, of the affected sites, and the rest of the skin; and iv) patch test findings. Current domestic exposures (wet cleaning work, minding of children under 6 years of age, gardening, decoration work) were recorded.

Patch test

Patch testing was carried out using the European standard series of allergens and additional allergens as determined by the occupational and non-occupational exposure history. Readings were at 2, 3 and 4 days (D) according to the guidelines of the International Contact Dermatitis Research Group.

Patients were considered to have contact allergy

if they demonstrated a positive reaction at D3 or D4 to an allergen. An allergen was considered to be relevant if the patient was exposed to it in a manner consistent with the distribution and course of the dermatitis, and if it could be considered a significant factor in the aetiology of the dermatitis.

Occupational contact allergy was diagnosed if 1 or more allergens among the patient's regular work contactants gave positive patch test results (PPTR). In France, it is usual to employ the terms HE and DE even when, in some cases, irritation may be associated with them. Thus, patients suspected of having only irritant contact dermatitis were excluded from the study.

Criteria of atopy

Personal and family (line of direct descent or of direct ancestry) histories of allergy were used as indicators of atopy. Atopic dermatitis was determined on the basis of the Hanifin & Rajka (5) criteria, and, in some cases, with the help of total serum immunoglobulin E antibody levels and common allergen intradermal tests.

Statistics

The χ^2 -test and the Fisher exact test were carried out for statistical analysis of correlation between DE and sex, contact allergy, or family and personal history of atopy. The χ^2 -test was also used to compare different factors (such as mean age, sex distribution, atopy alone, contact sensitization, atopy associated with sensitization) between workers with DE and those with other forms of HE.

Results

Among the 219 patients with HE seen in the Department of Dermatology of Timone Hospital between January 1995 and September 1997, 59 (27%) DE were diagnosed. The 30 women and 29 men included in the study were aged between 17 and 69 years. The mean age of participants was 36.01 (standard deviation 12.82, median 35).

Table 1. Family and personal history of atopy, positive patch test reaction (PPTR) and relationship to work among 59 workers with dyshidrotic eczema (DE) compared to 160 with other forms of hand eczema (HE)

Type of disease	N	Mean age* (years)	Sex* (no. of cases)		History of atopy*	PPTR*	History of atopy and PPTR* No of cases (%)	Relationship to work**
			men	women				
DE	59	36	29	30	25 (42.4%)	43 (72.8%)	9 (18%)	18 (30.5%)
HE	160	38.4	88	72	49 (30.6%)	158 (72%)	12 (7.5%)	88 (55%)

* No significant effect.

** $p=0.0013$.

Table 2. Positive test reactions (to the standard series and to the materials brought in by the patients) by occupation in 43 patients (men=19, women=24) with DE

Cause	No. cases										All (%)	Men	Women
	Construction	Metallurgy, transport	Health	Food, catering & baking	Service	Hair dressing	Chemical, photographic	Cash desk	Textile industry	Others			
nickel	—	—	3	4	1	—	—	2	1	4	15 (34.8)	2	13
chromium	3	—	—	1	—	—	—	—	—	2	7 (16.3)	3	4
cobalt	—	—	2	2	—	—	—	—	—	2	6 (13.9)	1	5
balsam of Peru	1	1	1	—	—	—	—	—	—	3	6 (13.9)	3	3
fragrance mix	—	2	—	—	1	—	—	—	—	3	6 (13.9)	3	3
benzalkonium	1	1	1	—	—	—	—	—	—	1	4 (9.3)	2	2
thimerosal	—	—	3	—	—	—	—	—	—	1	4 (9.3)	1	3
PPD	—	—	—	1	—	1	—	—	1	—	3 (6.9)	1	2
mercapto mix	—	1	—	1	1	—	—	—	—	—	3 (6.9)	1	2
MBT	—	1	—	1	1	—	—	—	—	—	3 (6.9)	1	2
thiuram mix	—	—	—	—	2	—	—	—	—	—	2 (4.6)	—	2
colophony	1	—	—	—	—	—	1	—	—	—	2 (4.6)	2	—
benzocaine	—	—	1	1	—	—	—	—	—	—	2 (4.6)	—	2
formaldehyde	—	—	1	—	—	—	—	—	—	1	2 (4.6)	—	2
piperazine	1	—	—	—	—	—	—	—	—	1	2 (4.6)	1	1
candidine	—	—	—	1	—	—	—	—	—	1	2 (4.6)	2	—
black rubber mix	—	1	—	—	—	—	—	—	—	—	1 (2.3)	1	—
lanolin	1	—	—	—	—	—	—	—	—	—	1 (2.3)	1	—
quinoline mix	—	—	—	—	—	—	—	—	—	1	1 (2.3)	1	—
detergents	—	—	—	—	1	—	—	—	—	—	1 (2.3)	1	—
foods	—	—	—	1	—	—	—	—	—	—	1 (2.3)	1	—
resorcinol	—	—	—	—	—	1	—	—	—	—	1 (2.3)	—	1
shampoo	—	—	—	—	—	—	—	—	—	1	1 (2.3)	—	1
triethanolamine	—	—	1	—	—	—	—	—	—	—	1 (2.3)	—	1
quaternium-15	—	—	1	—	—	—	—	—	—	—	1 (2.3)	—	1
phenol-form resin	—	—	1	—	—	—	—	—	—	—	1 (2.3)	—	1
citric acid	—	—	—	—	—	—	1	—	—	—	1 (2.3)	—	1
Disperse Yellow	—	—	—	—	—	—	—	—	1	—	1 (2.3)	—	1

Table 3. Types of dermatosis and occupations in 59 patients with DE

Occupational sector	Atopic history (AH)		Contact sensitization (CS)		AH+CS		Total <i>N</i>
	men	women	men	women	men	women	
construction	3	—	5	—	—	—	8
service	—	—	2	3	—	1	6
secretarial	—	1	—	4	—	1	6
office workers	2	—	1	2	—	—	5
health	—	2	—	2	1	—	5
food	—	—	1	1	—	2	4
transportation	2	—	—	—	2	—	4
chemical	1	—	2	1	—	—	4
catering	—	—	2	—	—	1	3
cash desk	—	—	—	2	—	—	2
hairdressing	—	—	1	1	—	—	2
paper library	—	—	—	2	—	—	2
commercial representative	2	—	—	—	—	—	2
textile	—	—	—	—	—	1	1
metallurgy	—	—	1	—	—	—	1
flint and baked clay	—	—	1	—	—	—	1
wood	1	—	—	—	—	—	1
manager	—	1	—	—	—	—	1
student	—	1	—	—	—	—	1
total	11	5	16	18	3	6	59

Fig. 1. shows the breakdown of the population according to age and sex in the 59 patients with DE. It indicates that the majority of men and women are under 40 years, with a peak frequency located in the 36–40 and 21–25 age groups, respectively. A family or personal history of atopy was obtained in 25 (42.37%) out of the 59 patients and, among them, 16 (27.11%) had an atopic history alone. PPTR was found in 43 (72.88%) subjects and an atopic history in 9 (15.25%) of these. For 18 patients, the relationship to work was strong and, among them, 4 were atopic. The higher frequency of atopic dermatitis observed among men (48.27%) compared to women (36.66%) was not statistically significant. Furthermore, in patients with an atopic history, female workers had more tendency to develop a sensitization than male workers (54.54% versus 21.42%), but not significantly so. Among the 43 PPTR subjects, no significant difference was found between women and men as to positive reaction rates (80% versus 65.51%, $p=0.21$).

In Table 1 are shown the frequency of family and personal atopic history, contact sensitization, and relationship to work for the 59 workers with DE compared to the 160 workers with other forms of HE examined during the same period. No significant difference was found between the 2 populations for the various factors: mean age, sex distribution, family or personal history of atopy, contact sensitization, atopy associated with sensitization. Relationship to work was significantly less frequent among workers with DE ($p=0.0013$).

The distribution of occupations in accordance with sex shown in Fig. 2 demonstrates that the main occupational groups concerned were construction, office work and transportation for men, and secretarial, catering and service industries for women. The occupational group termed “others” was mainly represented by shop assistants, commercial representatives, managers and students. A significantly higher number of office workers, secretaries, shop assistants, managers and students were found among patients with DE than among those with other forms of HE ($p=0.018$).

Table 2 lists positive test reactions (to the standard series and to the materials brought in by the patients) and occupations of 43 patients with DE. Table 3 lists different types of dermatosis and occupations in 59 patients with DE. Among the 18 patients in whom a relationship to work was found, 10 were men and 8 women. The occupations concerned were construction ($n=4$), services ($n=3$), hairdressing ($n=2$), health ($n=2$), cash desk ($n=2$), metallurgy ($n=1$), catering ($n=1$), chemical industry ($n=1$), textile ($n=1$) and food ($n=1$). The main allergens were chromate, nickel, colophony, mercapto mix (and mercaptobenzothiazole: MBT), followed by cobalt, para-phenylenediamine (PPD), thiuram mix and thimerosal.

Discussion

Most cases of HE have a multifactorial etiology. This not only makes treatment difficult, but it can cause considerable problems in medicolegal cases (e.g., occupational dermatitis in which negligence

is alleged against an employer). Atopy, allergic contact or irritant contact dermatitis may obscure or potentiate the original cause. Daily mild trauma of normal life, fungal and microbial agents, climatic influences, stress (6), hormonal factors (7) and smoking (8) may cause exacerbation of the condition. Last but not least, ingested metals may play a rôle in provoking exacerbation of vesicular palmar HE among metal-contact-sensitive patients (9–11).

In our study, DE accounts for 26.9% of all cases of HE. This rate is slightly higher than the 20% found in a previous study (12). Among the 59 cases with DE, the male:female ratio was close to 1:1 and the mean age was under 40, as in earlier reports (12, 13). However, the peak frequency in women was located in a younger age group (21–25) compared to that in men (36–40) (Fig. 1). This could be explained by the fact that a large number of women suffered from allergic contact dermatitis, caused mainly by nickel: most of these could be accounted for by jewellery reactions (pierced ears) (14). On the other hand, among workers with an atopic history, even though it was not significant, women had more tendency to develop sensitization than men (54.54% versus 21.42%). Results of studies on the correlation between atopy and DE are divergent. Certain studies have shown no correlation (15, 16). Lodi et al. (17), in a recent survey of 104 DE, found 50% coupled with atopy, against 11.5% in the general population. In Marseilles, Oddoze & Temime (18) obtained a family or personal history of atopy in 54 (41.2%) out of 131 DE. In our study, 42.4% of 59 workers with DE had a family or personal history of atopy and no significant difference was found with that (30.6%) observed among 160 workers with other types of HE examined during the same period (Table 1). This result suggests that atopy is no more frequently involved in DE than in other forms of HE.

The majority (72.8%) of workers had a PPTR to 1 or more allergens (Table 2). A rate of 30% was found by Meneghini et al. (19) in 364 patients (not only workers) with DE, but cases of irritant contact dermatitis alone might have been included. For Yokoseki et al. (20), 44% of 25 patients with DE had positive reactions. In the present study, the high rate of workers with DE having a contact sensitization could be explained by the fact that some diagnoses such as occupational contact eczema may have been over-represented. Because this Department of Dermatology was the only one to provide an occupational health consultation, the patient population had a comparatively greater pro-

portion of workers investigated by occupational physicians. Results showed that contact sensitization was as much involved in workers with DE as in workers with other forms of HE. However, the relationship to work was significantly less frequent for DE (Table 1). This may be a consequence of the small sample size or it may signify that DE lesions lead patients to take more occupational preventive measures (gloves, barrier cream, etc.) or to prefer a job without any allergen exposure as soon as the 1st lesions occurred. Thus, we found a significantly higher number of office workers, secretaries, shop assistants, commercial representatives and managers among patients with DE than among those with other forms of HE. The distribution of occupations in accordance with sex (Fig. 2) showed that the main jobs involved in this study were secretarial, services and catering for women, and construction, office work and transportation for men. This is somewhat different from the statistics on the 160 patients with other types of HE, in whom the main occupations involved were health, hairdressing and services for women, and construction, transportation and chemical industry for men. In the 18 patients where DE was related to work, the main jobs concerned were construction and services, while hairdressing, cashiers, textile industry and metallurgy had the highest rates (Table 3).

Among all cases with PPTR, the most common allergens were nickel, cobalt and chromate in the female group, while chromate, balsam of Peru (*Myroxylon Pereirae*), fragrance and colophony (colophonium) were the most important in the male group (Table 2). In patients in whom a relationship to work was made, the most important allergens were chromate, nickel, colophony and mercapto-mix. Chromate and nickel represent the main causes of skin disease in construction (21, 22) and colophony is actually increasingly used in various products (such as paint, silicone and glue). In their study, Yokoseki et al. (20) indicated that sensitivity to metal compounds, with local hyperhidrosis, may contribute to the development of vesicular lesions in DE. It may be the same for mercapto mix and mercaptobenzothiazole which were involved in frequent allergies as they are included in occupational rubber gloves or shoes, which promote hyperhidrosis.

Results of the present study showed that, in some cases, DE may be related to occupational conditions. Though atopic factors are frequently involved in DE, positive cutaneous reactions to environmental allergens are found in many instances. Preventive measures should be developed against the most important of these, especially

metal constituents, so as to avoid any contact sensitization that may lead to systemic contact DE among exposed subjects.

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