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Long-term follow-up study of occupational hand eczema

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SUMMARY

Background: Long-term follow-up studies on the prognosis and consequences of occupational hand eczema (OHE) and the prognostic risk factors for persistent OHE are sparse.

Objectives: To determine the medical and occupational outcome after a follow-up of 7-14 years in 605 patients diagnosed with OHE and to identify the prognostic risk factors for the continuation of hand eczema.

Methods: Patients examined at the Finnish Institute of Occupational Health in 1994-2001 filled out a follow-up questionnaire 7-14 years after diagnosis.

Results: The hand eczema had healed (no eczema during the last year) in 40% of OHE patients. The duration of hand eczema before diagnosis associated strongly with the continuation of eczema. Age, sex, and diagnosis (allergic or irritant contact dermatitis) did not associate with the prognosis, but skin atopy, and especially respiratory atopy, correlated with the continuation of hand eczema. Contact allergies in general were not risk factors for persistent OHE, but the presence of a work-related chromate allergy associated with poor healing. A total of 34% of patients had changed their occupation due to OHE, and their long-term prognosis was better than those who had not. The hand eczema of patients originally in food-related occupations continued on an unfavourable course.

Conclusions: In the logistic model, risk factors for the continuation of OHE were the long duration of hand eczema before diagnosis, respiratory atopy, skin atopy, and continuation in the same occupation. Those who ended up changing occupation due to their OHE had a better medical and economic prognosis.

INTRODUCTION

Hand eczema is often a chronic condition. In follow-up studies of non-occupational hand eczema, healing rates have varied between 18% and 41%.¹⁻⁶ In studies with varying follow-up periods, occupational hand eczema (OHE) has been reported to heal in 21-72% of all cases.⁷⁻²⁰ Only a few long-term follow-up studies have been published previously,^{7,10,15,18-20} and the prognosis in these has not always been better than that of short-term studies. In some studies, a change of job or occupation has not lead to improvement of occupational skin disease.^{8-10,21} The most frequently reported predictive factors for poor prognosis (continuation of the OHE in the absence of previous exposure) include atopy,^{7,12,15,22} contact allergies,^{7,8,12,23} older age,^{21,24,25} and the severity^{21,26} and duration²⁶ of the eczema.

In our previous study, the occupational skin disease had healed in 27% of the patients six months after diagnosis.²⁷ To determine the long-term prognosis of OHE, we sent a questionnaire to the patients diagnosed with OHE at the Finnish Institute of Occupational Health (FIOH) 7-14 years ago who had answered the earlier questionnaire.

MATERIALS AND METHODS

Study population and design

FIOH is a national referral unit to which patients are referred by insurance companies, occupational physicians and dermatologists. Patients who were diagnosed with an occupational skin disease during the period of 1994-2001 at FIOH and who had answered a follow-up questionnaire six months after their diagnosis were sent a new questionnaire in 2008. A total of 605 patients who returned the filled-in questionnaire and who had occupational hand eczema in the fingers, palms, dorsa of the hands, wrists or forearms, were included in this study. The response rate was 80.1% (605/755).

Occupations of OHE patients

Occupation refers to the occupation that the patient had at the time of diagnosis. The seven most common occupations, comprising 44% of all OHE patients, were separated for the analysis. Machinists are exposed to metalworking fluids, while machinery mechanists are exposed to mineral

oils but not to metalworking fluids. All other occupations each comprised less than 4% of the patients.

Classification of diagnoses and atopy

Data on diagnosis, occupation, skin and respiratory atopy, and contact allergies were collected from the patient files.

The *diagnoses* were based on a clinical examination by a dermatologist and patch and skin prick test results. All patients were tested with extensive patch tests including occupation-specific test series and with patients' work-related chemicals and materials.

OHE was categorized to occupational allergic (ACD) and irritant (ICD) contact dermatitis. The definition of ACD included a work-related contact allergy confirmed in patch tests and relevant occupational skin exposure and hand eczema. ICD was defined by the following criteria: exposure to irritants at work, the clinical picture of the hand eczema correlating with the exposure at work, the eczema clearing up when not working, and the absence of relevant work-related contact allergies. Only one main diagnosis (either ACD or ICD) per patient was analysed.

Skin atopy was defined as either present or past atopic dermatitis. If the patient had no skin atopy, but had a history of hay fever or atopic respiratory disease and/or positive skin prick tests to common environmental allergens, the classification of *respiratory atopy* was applied. Data on occupational ACD from chromium compounds, rubber chemicals, epoxy chemicals, acrylates and formaldehyde were analysed separately.

The *duration* of the eczema was calculated from the onset of symptoms to the time of diagnosis.

Questionnaire

The questionnaire was based on the one used in our previous six-month follow-up study.²⁷ It consisted of 26 questions concerning the healing of skin diseases and the occupational and economical consequences of OHE. Information on the following issues was elicited: healing of the skin disease, frequency of the symptoms, need for sick leave and medical consultations, changes in work tasks, job or occupation, loss of job (unemployment or retirement), rehabilitation (occupational retraining), and changes in economical situation. The questionnaire also included quality of life data which will be reported later.

Occupational changes

In the categorization of occupational consequences, '*no changes*' means that after the diagnosis the patient had not made any changes in his/her daily work. Minor changes, such as changes in working methods or tasks, change in exposure, change in the use of protective gloves etc, were grouped as '*changed work tasks*', and analysed together with change of job (but not occupation). '*Change of occupation*' refers to changing to a different occupation due to OHE, often through retraining by insurance companies. Loss of job includes both unemployment and retirement due to hand eczema.

Statistical analyses

Chi-square tests were used when examining the associations between outcomes and explanatory variables. To estimate the risk ratios for continuation of OHE, we applied logistic regression analysis. The logistic model included the following explanatory variables: age, gender, atopy, patch test results, duration of OHE, occupation, occupational change, and work-related contact allergies. Odds ratios (OR) for the continuation of OHE with 95% confidence intervals (95% CI) for explanatory variables are presented. A p-value of <0.05 was considered to indicate statistical significance. All analyses were carried out using the SAS 9.1 statistical package.

RESULTS

Table 1 shows the characteristics of the patients. The follow-up time varies from 7 to 14 years (mean 10.5 years). The mean duration of occupational hand eczema was 4.82 years.

Healing of hand eczema

The healing of OHE 7-14 years after the diagnosis, defined as absence of eczema during the last 12 months, is presented in Table 2. As much as 40% of the patients had had no hand eczema during the past 12 months. The healing of OHE was poorer in patients with skin or respiratory atopy compared to those with no atopy. The duration of hand eczema before the diagnosis correlated most significantly with healing: it was most frequent among patients whose hand eczema had lasted a year or less. The presence of work-related chromate allergy was associated with poor healing. In the multivariate logistic regression analysis, change of occupation, duration of hand eczema before diagnosis, and skin and respiratory atopy were significant risk factors for the continuation of OHE (Table 3).

Sick leave and clinical symptoms

During the follow-up period, 48% of patients had consulted a doctor, and 23% had been on sick leave because of their hand eczema. Sick leave was associated with an age of over 45 at the time of diagnosis, but not with sex, diagnosis, atopy, occupation or specific work-related allergies.

Of patients with hand eczema during the past 12 months, 27% reported having symptoms every week. Two-thirds of patients (67%) with continuing hand eczema had needed treatment with topical corticosteroids or some other active treatment. The healing of hand eczema was poorest when located in the palms of hands compared to other locations.

Occupational consequences

The occupational consequences of OHE during the follow-up period are presented in Table 4. During the 7-14 years of follow-up, 34% of patients with OHE had changed their occupation. This was most common in younger patients, and in patients with food-related occupations and hairdressing. Only 8% of the patients had continued their work with no changes. Loss of job (unemployment and retirement) due to OHE was reported by 25% of patients and was most common in patients of 45 years or older, in patients with ACD, or in food-related occupations. Healing of OHE by current occupational status is analysed in Table 5.

The economic situation of 23% of all patients had worsened during the follow-up because of OHE, but had improved for 25% of those who had changed occupation (Table 6). Patients with continuing OHE reported deterioration of economic situation (27%) more often than patients whose eczema had healed (18%).

DISCUSSION

The aims of the study were to analyse the long-term medical and occupational outcome of patients with OHE, and to identify the risk factors associated with its continuation. Only a few previous studies have investigated the long-term prognosis of patients with occupational skin disease.^{7,10,15,18-20} The Finnish study has surveyed hand dermatoses in a cohort of farmers,¹⁵ and a more recent Swedish study has included patients with occupational skin diseases (82% having hand eczema) diagnosed in various clinics.⁷ The comparison between different studies may be difficult, since the criteria for healing differ, and are not always presented clearly. Since hand eczema can fluctuate greatly, we preferred the criterion 'no eczema during the last year' to 'no eczema at this moment'. Term 'improvement' can be confusing unless the definition is clearly stated.

The strengths of the present study include a study population representing a wide-range of occupations examined in the same national referral unit, a large sample size and a high response rate after a long follow-up time. The limitation of the study is that the severity of hand eczema was

not assessed at the time of diagnosis. Also, the use of questionnaire instead of assessment by an investigator, is a limitation.

Healing of hand eczema and factors predicting persistent OHE

In studies with varying follow-up periods, OHE has been reported to heal in 21-72% of cases.⁷⁻²⁰ After a follow-up period of approximately 10 years in the present study, 40% of OHE patients reported that their occupational hand eczema had healed, defined as no eczema during the past year, while the clearing rate was 27% after six months (85% of patients had occupational skin disease on hands).²⁷ Because of a different criterion for the healing of skin disease in these two studies, no direct head-to-head comparison was possible. Veien et al.⁵ reported better healing over time in a five-year follow-up study of hand eczema (30% occupational). In two previous 12-year follow-up studies of occupational skin diseases, the healing rates were 28%⁷ and 60%¹⁵. As a comparison, the healing of non-occupational hand eczema has varied between 33-56% after follow-up periods of 8-15 years.^{1,3} These figures highlight the chronic nature of non-occupational and occupational hand eczema.

The healing and prognosis of occupational hand eczema was not dependent on *age*; although better prognosis in younger patients was seen in our previous study as well as in some other studies.^{21,24,25,27} This may result from the fact that most older patients (age > 45 years at the time of diagnosis) no longer worked (63%). When only patients continuing to work were analyzed, the healing was better in younger patients (44% healed) than in older patients (32% healed).

Skin *atopy* (15% of patients), and even more strongly respiratory atopy (12% of patients), associated with the continuation of OHE (Tables 2 and 3). In our previous six-month follow-up study of occupational skin disease, only respiratory atopy was a risk factor for continuation of occupational contact dermatitis.²⁷ Most studies have indicated that atopy increases the risk for prolonged occupational and non-occupational hand eczema,^{4,7,15,21-23,25,26} but not all³. In a Danish five-year follow-up study of hand eczema patients, the history of atopy did not correlate with poor healing, but the diagnosis of atopic hand eczema did.⁵ In the present study, the prevalence of atopy was the same^{7,25} or lower²⁸ than in other reports. In Finland atopic hand eczema is not diagnosed as an occupational skin disease and a patient with atopic dermatitis can not have the diagnosis of occupational irritant contact dermatitis. This excluded many patients with skin atopy from the study population. The clinical criteria for skin atopy were strict, and consequently many patients with only respiratory atopy might in fact have atopic skin diathesis (for example due to memory bias concerning childhood eczema). Moreover, most previous studies have not separated respiratory atopy and skin atopy and thus the results are not totally comparable. The results of different OHE studies are also influenced by the laws in the respective countries defining the criteria for occupational diseases.

The presence of *contact allergies*, including nickel allergy, did not associate with the continuation of OHE (Tables 2 and 3). The prevalence of contact allergies (79%) was higher than in most recent studies of occupational⁷ and non-occupational^{4,29,30} hand eczema. In most reports, the presence of nickel allergy or contact allergies in general, has been associated with a poorer prognosis of both occupational^{7,8,12,15,25} and non-occupational^{31,32} hand eczema, or has correlated with the severity^{4,30} of hand eczema. However, it can be speculated that impaired skin barrier function in severe eczema facilitates the penetration of contact allergens, and thus the presence of multiple contact allergies may be the consequence of severe hand eczema rather than the cause of it. In concordance with our results, contact allergy was not found to be a risk factor for poor prognosis in the Danish studies of OHE²¹ and HE³. In a recent report a positive patch test associated with the initial severity of hand eczema but did not influence the prognosis⁴.

In the logistic analysis, a *duration* of hand eczema for over 10 years before the diagnosis was the strongest risk factor for the continuation of OHE (Table 3). Fourteen per cent of patients had suffered from hand eczema for ten years or more (Table 1), which is less than in some other reports.^{3,5} The healing of hand eczema was most frequent if the duration of OHE was a year at most (Tables 2 and 3). It may be that people who are prone to seek medical help at an early stage also have better compliance to treatment and suggested interventions. Except for the duration of 1-2 years, the risk for continuation of OHE increases over time. We suggest that the deviation from the trend at the one to two year duration might be because the patients first try to cope in their previous occupations and exposure continues and after 2 years the necessary interventions (for example change of occupation) have been accomplished. These results are congruent with previous findings of longer delays before diagnosis, leading to worse prognosis.^{2,3,5} In a recent study by Hald et al.³³, the odds ratio of a poor prognosis of hand eczema increased by a factor of 1.05-1.1 per month of delay before medical attention.

Of the present cohort, 59% had been *diagnosed* with ACD and 41% with ICD. Consistent with our six-month follow-up study, the subdiagnosis of either ACD or ICD had no significant effect on the prognosis (Tables 2 and 3). In the literature, ACD has been associated with both a better^{14,24,34,35} and worse^{8,16,31,36,37} prognosis, or there has been no difference^{12,17,21}. In our study, there were more significant differences in the continuation of OHE between different work-related contact allergies among ACD patients than there were between ACD and ICD (Table 3), probably because possibilities to avoid exposure to allergens differ greatly depending on the allergy and on the patient's work.

Although statistically not significant, the frequency of healing was lowest in food-related *occupations* (Table 2). This association has also been previously shown in short-term follow-up studies.^{21,27} Occupations in the food and bakery industry are listed as risk occupations for the development of occupational dermatitis in many countries.³⁶ In these occupations, the exposure to wet work and irritants (for example detergents, occlusive gloves) is both extensive and continuous.

Among the analysed *work-related contact allergies*, allergies to chromate, rubber chemicals, and formaldehyde associated with lower frequency of healing of OHE, whereas allergies to acrylates and epoxy chemicals associated with a high percentage of healing (Table 2). This is consistent with our previous six-month follow-up results, and strengthens the hypothesis that prognosis is better in patients that have work-related allergies to chemicals that are easily avoided compared to chemicals that are ubiquitous in work or in everyday life. When a patient had occupational chromate allergy (2.5% of patients), the OHE healed in only 13% of cases compared to 40% of all patients (Table 2). Because of small patient groups, the difference was not statistically significant in multivariate analysis (Table 3). Chromate allergy is notorious for poor prognosis even in the absence of continuing of occupational exposure,^{8,11,12,16,18,37,38} although not all studies have confirmed this finding^{21,39}. In a recent short-term follow-up study of hand eczema by Hald et al.²⁹, chromate allergy was associated with a poor prognosis by an odds ratio of 4.18, whereas other contact allergies had no effect⁴. The reason for the poor prognosis of chromate allergy is not clear.

Occupational consequences

Frequency of *sick leave* due to occupational skin disease has varied between 17% and 69%.^{7,24-26,40} The respective figure in the present study is 23% during the 7-14 year follow-up period. This figure has not increased from that of the six-month follow-up.²⁷ This may reflect the alleviation of hand eczema in the course of time, or may also be due to memory bias. Sick leave was not associated with skin atopy, as has been reported in some studies^{26,30} but not in all²⁴. Overall, sick leave is highly affected not only by the clinical picture of hand eczema, but also by type of work, availability of occupational health care, and individual differences.

After 7-14 years of follow-up, 92% of patients reported that they had made some kind of occupational changes due to their hand eczema (Table 4), which was more than after the six-month follow-up (39%)²⁷. One third of the patients had *changed their occupation* (not only their job) due to OHE (Table 4). In many other reports, more than a third of patients had changed either job or occupation, but the reasons for change were not always clearly stated.^{10,15,21,24,40} Twenty per cent of OHE patients had been retrained at the expense of insurance companies, which is twice the amount after six-month follow-up²⁷. Retraining policies and reimbursement differ greatly between countries, but the present figure is similar to the 19% of Swedish patients retrained after 12-year follow-up.⁷

There has been ongoing discussion as to whether change of job or occupation is beneficial for the prognosis of occupational skin disease. Several reports have indicated that the change does not necessarily lead to the healing of OHE.^{8-10,21} In the present study, as well as in most other studies including our six-month follow-up, the prognosis was significantly better among patients who had not continued in their previous work (46% vs. 31% healed) (Table 5).^{10,15,19,20,24,27,41,42} However, the least healed were among those who had retired due to their OHE, which may relate to more severe eczema in these patients. Interestingly, patients in food-related occupations had poor healing, even though 56% of them had changed occupation. In the logistic model, change of occupation associated with better prognosis (Table 3).

The economic situation after follow-up period was on average better among OHE patients who had changed occupation than those who had not (Table 6). This may be connected to the fact that in Finland, it is possible by retraining to raise the level of education, the cost of which is covered by insurance companies.

CONCLUSIONS

The healing of OHE was better after a ten-year follow-up than after a six-month follow-up of mostly the same patients. However, 60% of patients still had persistent hand eczema, which suggests that in most patients the eczema does not heal adequately even though most of them had made some occupational changes. As a whole, the medical and economic prognosis was better among those who ended up changing occupation due to their OHE.

The results indicate that short duration (less than a year) of hand eczema before diagnosis is associated with favourable prognosis of OHE, which emphasizes the importance of early diagnosis and interventions. Atopy, also respiratory atopy, and continuation in the same occupation were risk factors for the continuation of OHE. Since the majority of signs for poor long-term prognosis are detectable at the early stages of diagnostics, it is possible to focus preventive actions particularly on patients at the greatest risk for persistent hand eczema.

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Table 1. Characteristics of study population. (n=605)

	men (n=275)	women (n=330)
Mean age* , years (SD)	42.9 (10.5)	42.2 (11.1)
Duration** , years (SD)	4.6 (5.7)	5.0 (6.0)
Atopy , n (%)		
No atopy	210 (76)	230 (70)
Skin atopy	35 (13)	58 (17)
Respiratory atopy***	30 (11)	42 (13)
Patch test results , n (%)		
Negative patch tests	80 (29)	48 (15)
Nickel allergy****	16 (6)	130 (39)
Any other contact allergy	179 (65)	152 (46)
Duration of OHE** , n (%)		
0-1 years	89 (33)	95 (30)
1-2 years	47 (17)	62 (19)
2-5 years	62 (23)	65 (20)
5-10 years	38 (14)	48 (15)
Over 10 years	35 (13)	50 (16)
Occupation* , n (%)		
Dental personnel	4 (1)	51 (15)
Food related occupations	13 (5)	39 (12)
Machinery mechanics	42 (15)	0
Farmers	10 (4)	24 (7)
Hairdressers	0	32 (10)
Machinists	24 (9)	5 (2)
Health care workers	1 (0)	24 (7)

* At time of diagnosis

** From onset of symptoms to diagnosis

*** Only respiratory atopy without skin atopy

**** May include other contact allergies

Table 2. Healing of occupational hand eczema (not present during the last 12 months) 7-14 years after diagnosis. (n=605)

	OHE healed n (%)
Sex	
Men (n=275)	105 (38)
Women (n=330)	135 (41)
Age*	
< 45 years (n= 320)	128 (40)
> 45 years (n= 385)	112 (39)
Atopy	
No atopy (n=440)	192 (44)
Skin atopy (n=93)	29 (31)
Respiratory atopy** (n=72)	19 (26)
	<i>p=0.0041</i>
Patch test results	
Negative patch tests (n=128)	41 (32)
Nickel allergy*** (n=146)	60 (41)
Any other contact allergy (n=331)	139 (42)
Duration of OHE****	
0-1 years (n=184)	103 (56)
1-2 years (n=109)	33 (30)
2-5years (n=127)	50 (39)
5-10 years (n=86)	29 (34)
Over 10 years (n=85)	18 (21)
	<i>p<0.0001</i>
Occupation*	
Dental personnel (n=55)	24 (44)
Food related occupation (n=52)	16 (31)
Machinery mechanics (n=42)	19 (45)
Farmers (n=34)	15 (44)
Hairdressers (n=32)	13 (41)
Machinists (n=29)	10 (34)
Health care workers (n=25)	9 (36)
Other (n=336)	134 (40)
Diagnosis	
ACD (n=354)	151 (43)
ICD (n=251)	89 (35)
Work-related allergy	
Rubber chemicals (n=49)	15 (31)
Formaldehyde (n=38)	12 (32)
Epoxy chemicals (n=36)	21 (58)
Acrylates (n=31)	20 (65)
Chromate (n=15)	2 (13)
Other (n=436)	170 (39)
	<i>p=0.0011</i>
ALL (n=605)	240 (40)

p-values are shown only when $p < 0.05$.

* At time of diagnosis

** Only respiratory atopy without skin atopy

*** May include other contact allergies

**** From onset of symptoms to diagnosis

Table 3. Odds Ratios (OR) for continuation of occupational hand eczema 7-14 years after diagnosis with 95% confidence intervals (95% C.I.). Statistically significant results are shown in bold. (n=605)

	OR	(95% C.I.)
Age*		
< 45 years	1	
> 45 years	0.80	(0.53-1.21)
Sex		
Women	1	
Men	1.30	(0.83-2.04)
Atopy		
No atopy	1	
Skin atopy	1.86	(1.08-3.19)
Respiratory atopy**	2.69	(1.44-4.92)
Patch test results		
Negative patch tests	1	
Nickel allergy***	0.74	(0.39-1.40)
Any other contact allergy	0.67	(0.39-1.18)
Duration of OHE****		
0-1 years	1	
1-2 years	3.05	(1.78-5.21)
2-5 years	1.90	(1.16-3.09)
5-10 years	2.57	(1.44-4.58)
Over 10 years	4.55	(2.38-8.71)
Occupation*		
Other than below	1	
Dental personnel	1.13	(0.55-2.32)
Food related occupation	1.86	(0.91-3.80)
Machinery mechanics	0.72	(0.35-1.49)
Farmers	0.78	(0.36-1.67)
Hairdressers	0.91	(0.39-2.10)
Machinists	1.27	(0.53-3.03)
Health care workers	1.07	(0.40-2.86)
Change of occupation		
Yes	1	
No	1.55	(1.03-2.34)
Work related contact allergy		
No work-related contact allergy	1	
Rubber chemicals	1.58	(0.75-3.33)
Formaldehyde	1.08	(0.47-2.46)
Epoxy chemicals	0.58	(0.25-1.37)
Acrylates	0.50	(0.19-1.29)
Chromate	2.83	(0.58-13.78)
Other than above	0.85	(0.53-1.38)

- * At time of diagnosis
- ** Only respiratory atopy without skin atopy
- *** May include other contact allergies
- **** From onset of symptoms to diagnosis

Table 4. Occupational consequences due to occupational hand eczema during follow-up period. The categories are not mutually exclusive. (n=605)

	Changed work tasks or job n (%)	Changed occupation n (%)	Retrained to new occupation n (%)	Loss of job ^a n (%)	No change in work n (%)
Sex					
Men (n=275)	151 (55)	90 (33)	50 (18)	66 (24)	23 (8)
Women (n=330)	175 (53)	115 (35)	72 (22)	87 (26)	27 (9)
Age*					
< 45 years (n=320)	138 (43)	159 (50)	100 (31)	62 (19)	18 (6)
> 45 years (n=285)	188 (66)	46 (16)	22 (8)	91 (32)	32 (11)
	<i>p<0.0001</i>	<i>p<0.0001</i>	<i>p<0.0001</i>	<i>p=0.0004</i>	<i>p=0.0125</i>
Atopy					
Ao atopy (n=440)	241 (55)	140 (32)	79 (18)	119 (27)	40 (9)
Skin atopy (n=93)	48 (52)	38 (41)	25 (27)	15 (16)	5 (5)
Respiratory atopy** (n=72)	37 (51)	27 (38)	18 (25)	19 (26)	5 (7)
Patch test results					
Negative patch tests (n=128)	66 (52)	44 (34)	24 (19)	25 (20)	14 (11)
Nickel allergy*** (n=146)	70 (48)	60 (41)	38 (26)	42 (29)	14 (10)
Any other contact allergy (n=331)	190 (57)	101 (31)	60 (18)	86 (26)	22 (7)
Diagnosis					
ACD (n=354)	189 (53)	117 (33)	72 (20)	107 (30)	30 (8)
ICD (n=251)	137 (55)	88 (35)	50 (20)	46 (18)	20 (8)
				<i>p=0.0009</i>	
Occupation *					
Dental personnel (n=55)	37 (67)	17 (31)	13 (24)	9 (16)	1 (2)
Food-related occup. (n=52)	18 (35)	29 (56)	21 (40)	21 (40)	2 (4)
Machinery mechanics (n=42)	20 (48)	18 (43)	8 (19)	8 (19)	4(10)
Farmers (n=34)	22 (65)	9 (26)	5 (15)	8 (24)	2 (6)
Hairdressers (n=32)	12 (38)	18 (56)	13 (41)	11 (34)	2 (6)
Machinists (n=29)	15 (52)	11 (38)	6 (21)	6 (21)	2 (7)
Health care workers(n=25)	18 (72)	3 (12)	2 (8)	2 (8)	2 (8)
Other (n=336)	184 (55)	100 (30)	54 (16)	88 (26)	35 (10)
	<i>p=0.0039</i>	<i>p=0.0001</i>	<i>p=0.0002</i>	<i>p=0.0319</i>	
Work-related allergy					
Rubber chemicals (n=49)	29 (57)	15 (31)	7 (14)	13 (27)	2 (4)
Formaldehyde (n=38)	18 (50)	12 (32)	6 (16)	14 (37)	7 (18)
Epoxy chemicals (n=36)	13 (39)	14 (39)	9 (25)	10 (28)	3 (8)
Acrylates (n=31)	17 (48)	14 (45)	10 (32)	9 (29)	2 (6)
Chromate (n=15)	5 (33)	3 (20)	2 (13)	6 (40)	3 (20)
Other (n=436)	262 (56)	147 (34)	88 (20)	101 (23)	33 (8)
ALL (n=605)	326 (54)	205 (34)	122 (20)	153 (25)	50 (8)

p-values are shown only when $p<0.05$.

* At time of diagnosis

** Only respiratory atopy without skin atopy

*** May include other contact allergies

a Includes unemployment and retirement due to OHE

Table 5. Healing of occupational hand eczema (not present during the last 12 months) by current occupational status. (n=605)

	OHE healed n (%)
Working (n=380)	142 (37)
+ changed occupation (n=167)	76 (46)
+ not changed occupation (n=213)	66 (31)
Unemployed (n=30)	13 (43)
Retired due to OHE (n=71)	20 (28)
Not working for other reasons* (n=121)	63 (52)
All OHE patients (n= 605)	240 (40)

* Mostly patients on retirement pension

Table 6. Changes in economic situation due to OHE. Data was available from 577 patients.

Occupational status	Economic situation		
	unchanged n (%)	better n (%)	worse n (%)
Working (n=373)	279 (75)	46 (12)	48 (13)
+ changed occupation (n=165)	92 (56)	41 (25)	32 (19)
+ not changed occupation (n=208)	187 (90)	5 (2)	16 (8)
Unemployed (n=27)	12 (44)	1 (4)	14 (52)
Retired due to OHE (n=68)	22 (32)	3 (4)	43 (63)
Not working for other reasons* (n=109)	74 (68)	5 (5)	30 (28)
All patients (n= 577)	387 (67)	55 (10)	135 (23)

* Mostly patients on retirement pension