

# Clinical severity and prognosis of hand eczema

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## Summary

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### Conflicts of interest

None declared.

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**Background** Hand eczema (HE) is a frequent, long-lasting disease with both personal and societal repercussions. Consequently, more information is needed on factors that maintain symptoms.

**Objectives** In this study, patients with HE were followed for 6 months from the first visit to a dermatologist to identify factors associated with severe disease and a poor prognosis.

**Methods** Study participants were 799 patients with HE from nine dermatological clinics in Denmark. Severity assessment of the HE was done at baseline and at the 6-month follow-up using the Hand Eczema Severity Index (HECSI) and by patients using a self-administered photographic guide. Additional information was obtained from a baseline questionnaire.

**Results** At baseline, 60.3% assessed their HE as moderate to very severe using the self-administered photographic guide compared with 36.1% at follow-up. The mean HECSI value decreased from 19.9 points at baseline to 11.2 points at follow-up ( $P < 0.001$ ). In a multivariable logistic regression analysis, statistically significant associations with severe HE at baseline were older age ( $P < 0.001$ ), atopic dermatitis ( $P = 0.01$ ) and  $\geq 1$  positive patch test ( $P < 0.001$ ). Being an unskilled worker was a predictor for a poor prognosis at follow-up ( $P = 0.04$ ), and the presence of frequent symptoms during the previous 12 months was associated with severe initial disease ( $P = 0.02$ ) and a poor prognosis ( $P = 0.04$ ).

**Conclusions** Overall, the disease had improved 6 months after the dermatological examination: nevertheless, many patients continued to have significant symptoms. Dermatologists should pay special attention to patients with frequent eruptions and to unskilled workers.

Hand eczema (HE) is a common disease with a poor prognosis.<sup>1,2</sup> It impairs quality of life<sup>3</sup> and can affect labour participation, resulting in sick leave and ultimately unemployment.<sup>4,5</sup> More information about intrinsic and extrinsic factors associated with a poor prognosis is needed to improve treatment. An evaluation of the clinical course after a dermatological examination is relevant to reveal subgroups of patients requiring special attention.

In most epidemiological studies of HE, follow-up results are obtained via self-administered questionnaires, few of which include a clinical examination.<sup>6–10</sup> A systematic severity score based on physical examination is likely to contribute to a better evaluation of the clinical course.

Our objectives were to assess changes in clinical severity occurring between the first visit to a dermatologist and follow-up 6 months later in a cohort of patients with HE and

to identify factors associated with severe disease and a poor prognosis/lack of improvement.

## Materials and methods

We conducted a multicentre study comprising nine dermatological clinics: three outpatient clinics at university hospitals and six private dermatological clinics, geographically representing the three main areas in Denmark. The study population consisted of consecutive patients with HE, aged 18 years or older, enrolled January 2006–February 2007. The study was a prospective design to evaluate the prognosis of HE in a cohort of patients.

Patients referred with HE were invited to participate in the study. At the first consultation, eczema severity was assessed by the dermatologist using the Hand Eczema Severity Index (HECSI) and by the patient using a self-administered photographic guide (see below), and additional information was obtained from a self-administered questionnaire. All patients were patch tested with the European Baseline patch test series,<sup>11</sup> and additional patch tests were used when indicated. Hermal (Reinbek, Germany) and Chemotechnique (Malmö, Sweden) patch tests were used in seven clinics, and two clinics used the True test (Hilleroed, Denmark) panel 1 and 2. Patch test readings were according to the International Contact Dermatitis Research Group criteria<sup>12</sup> and were performed as a minimum on day 3. Patients were informed about the cause of their HE and received medical treatment and information about skin care and prevention of HE.<sup>13</sup>

Approximately 6 months later (median 7, range 3–15) patients received a second questionnaire. Severity assessment was repeated using both the HECSI and the self-administered photographic guide. Nonrespondents received a reminder after 3 weeks.

## Assessment of the clinical severity of hand eczema

The assessments by the dermatologists were performed using the HECSI.<sup>14</sup> The HECSI is based on a combination of the severity of clinical signs and includes erythema, fissures, vesicles, scaling, oedema, papules and measurement of the area affected by the disease. The range of the score is 0–360, where 0 corresponds to no eczema and 360 indicates the most severe eczema. In this study, cut-off points were made to divide the numerical scale into three groups. Each group had the same number of patients and comprised a third of the cohort: those with mild (score 0–11), moderate (score 12–27) and severe (score  $\geq 28$ ) symptoms, respectively. The same cut-off points on the HECSI score were applied at follow-up for the classification of mild, moderate and severe HE. The course was categorized as unchanged/aggravated or improved. It was defined as unchanged/aggravated in cases where HE was classified as moderate or severe at baseline and was without change at follow-up, or if it was classified in a group of more severe symptoms at follow-up than at baseline. Improved

cases included all patients classified in a group of less severe symptoms at follow-up than at baseline or in clinically unchanged cases initially classified as mild HE.

The patient-rated severity assessment was done using a photographic guide based on photographs of HE. The original photographic guide was developed and validated as an instrument for dermatologists to achieve a consistent severity rating of HE.<sup>15</sup> The self-administered version of the photographic guide consists of a five-item questionnaire and 16 photographs. The photographs are divided into four groups of severity of HE with four photographs in each group of almost clear, moderate, severe and very severe HE. A validation of the self-administered photographic guide showed good inter-rater agreement between the severity assessment by a dermatologist and that done by the patient.<sup>16</sup> We used the self-administered photographic guide also to measure changes between baseline and follow-up.

## The questionnaire

The first self-administered questionnaire was completed at the time of patch testing. Patients who did not return the questionnaire received a reminder and a new questionnaire by post. Questions concerned the HE history, e.g. the year of onset and the periods with symptoms during the previous 12 months categorized as: constant,  $> \frac{1}{2}$  time,  $= \frac{1}{2}$  time,  $< \frac{1}{2}$  time. Wet work was defined as exposure to water or detergents  $> 2$  h per day, use of occlusive gloves  $> 2$  h per day or very frequent hand washing  $> 20$  times per day.<sup>17</sup> Questions on skin exposure to water or detergents, use of occlusive gloves and number of hand washings were adapted from the NOSQ-2002.<sup>18</sup> Atopic dermatitis was defined using the U.K. Working Party's diagnostic criteria.<sup>19,20</sup> Socioeconomic status was adapted from the socioeconomic classification system DISCO-88, a Danish version of the international nomenclature ISCO-88. This is a system based on education and managerial responsibilities. In the present study three categories were used: medium to high level, basic level and unskilled. For persons outside the labour market, the three subgroups were: unemployed (including housewives/husbands), students and pensioners. Socioeconomic data were recorded from the questionnaire or from the history obtained at the medical examination.

The development of the questionnaire included a pilot test with 33 patients with HE from the private clinics and the university hospitals.

## Statistical analysis

Nonparametric analysis was used in the descriptive analyses of the cohort. The  $\chi^2$  test was used for testing independence of categorical variables. The data from the self-administered photographic guide were analysed by nonparametric statistics. The Wilcoxon signed rank test was used to compare paired data, and the Mann–Whitney test was used for analysis of two independent groups. After a logarithmic transformation, the HECSI

scores became normally distributed as assessed by Kolmogorov–Smirnov test ( $P = 0.06$ ), allowing t-tests.

The association between background factors and the likelihood of having a HECSI score  $\geq 28$  (severe symptoms) was analysed using logistic regression. The association between the severity of HE at baseline and severe HE at follow-up (HECSI score  $\geq 28$ ) was also analysed by logistic regression as was the analysis of the clinical course. Statistical results were expressed as odds ratios (ORs) with 95% confidence intervals (CIs). Statistical significance was defined as  $P < 0.05$ .

With data adapted from the HECSI forms, the clinical course was analysed in relation to the area affected by HE and the different morphological signs at baseline. The area is theoretically given from 0 to 25 points. In the present analysis, cut-off points were made to divide the area score into three groups. Each group had the same number of patients and comprised one of the following: those with a small area of HE (0–2 points), those with a moderate area of HE (3–5 points), and those with a large area of HE ( $> 5$  points). The presence of the different morphological signs at baseline was recorded with no intensity ratings. All analyses were done using Statistical Products and Service Solutions package (SPSS Inc., Chicago, IL, U.S.A.) for Windows (release 15.0).

## Results

The study population comprised 799 patients: each centre provided from 18 to 184 subjects. The data collection resulted in 727 HECSI forms, of which 718 were fully completed (completion rate 89.9%), 718 self-administered photographic guides (response rate 89.9%) and 731 questionnaires (response rate 91.5%). No differences were found between questionnaire respondents and nonrespondents regarding sex, age and HECSI score at baseline. Data collected at baseline and follow-up are given in Figure 1.

Table 1 shows the baseline characteristics of the patients. Median age was 41 years (range 18–84). A history of atopic dermatitis was more frequently reported in the younger age groups (test of trend  $P < 0.0001$ ). No socioeconomic differences were found between men and women ( $P = 0.23$ ) in employment, but more women (21.9%) than men (15.2%) were outside the labour market ( $P = 0.02$ ). More women (52.1%) than men (33.8%) were employed in wet occupations ( $P < 0.001$ ). A higher prevalence of positive patch test

**Table 1** Baseline characteristics of 799 patients with hand eczema

| Number of included patients                  | Total (%)  |
|----------------------------------------------|------------|
| Total                                        | 799 (100)  |
| Men                                          | 278 (34.8) |
| Women                                        | 521 (65.2) |
| Age group (years)                            |            |
| 18–29                                        | 199 (24.9) |
| 30–39                                        | 177 (22.2) |
| 40–49                                        | 169 (21.2) |
| 50+                                          | 254 (31.8) |
| Atopic dermatitis (n = 714)                  | 205 (28.7) |
| Symptoms during the past 12 months (n = 719) |            |
| < ½ the time                                 | 130 (18.1) |
| ≥ ½ the time                                 | 589 (81.9) |
| Socioeconomic status (n = 798)               |            |
| Unskilled                                    | 73 (9.1)   |
| Basic level                                  | 377 (47.2) |
| Medium/high level                            | 192 (24.0) |
| Unemployed                                   | 49 (6.1)   |
| Student                                      | 24 (3.0)   |
| Retired                                      | 83 (10.4)  |
| Wet work (n = 551) <sup>a</sup>              | 251 (45.6) |
| ≥ 1 positive patch test                      | 364 (45.6) |

<sup>a</sup>Reports obtained among the 642 patients in employment.

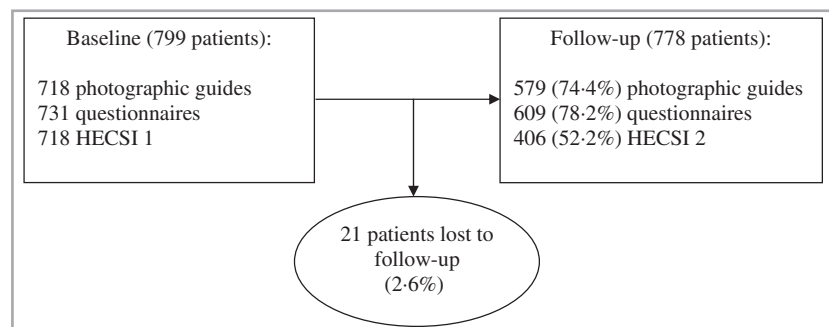
results was found in patients from the hospital sector (56.9%) compared with patients from private clinics (40.9%) ( $P < 0.001$ ), but no difference was found between the different private clinics ( $P = 0.21$ ).

The median duration of HE, from first event to baseline in the study, was 4 years (interquartile range 1–12); 94 (13.0%) patients reported HE as a child: 71 (15.0%) women and 23 (9.2%) men.

## Baseline clinical severity of hand eczema

Figure 2 gives the patient-rated severity of HE using the photographic guide. Moderate to very severe HE was reported by 417 of 692 patients (60.3%) at baseline. HECSI scores at baseline, reflecting dermatologist-assessed severity of HE, are given in Figure 3. Mean HECSI score at baseline was 19.9 (range 0–209). Table 2 shows the results from the logistic regression of severe HE (HECSI  $\geq 28$ ) at baseline. Severe HE was found to be associated with increasing age, atopic

**Fig 1.** Flow chart of the 799 patients enrolled in the cohort and the data collected. HECSI, Hand Eczema Severity Index.



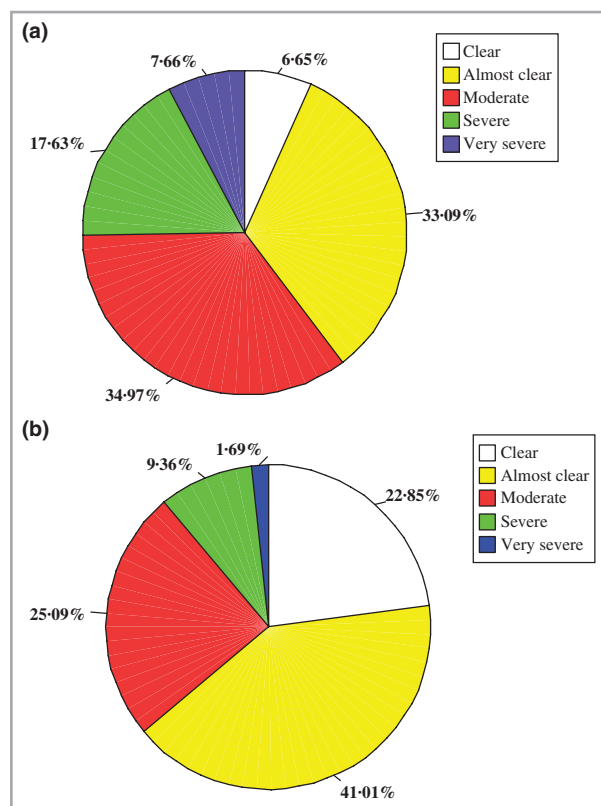


Fig 2. (a) Patient-rated severity of hand eczema at baseline using the self-administered photographic guide (n = 692). (b) Patient-rated severity of hand eczema at follow-up using the self-administered photographic guide (n = 534).

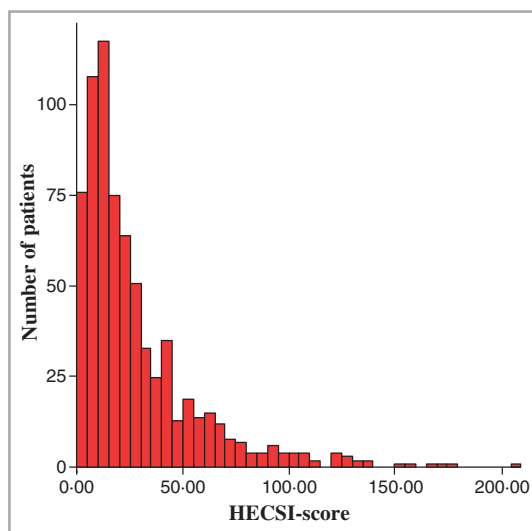


Fig 3. Histogram of the severity of hand eczema at baseline assessed by Hand Eczema Severity Index (HECSI) (n = 718).

dermatitis, frequent eruptions during the previous 12 months and one or more positive patch test(s).

In all, 719 patients (664 with a dermatological severity assessment, HECSI) answered the question about periods of

HE during the previous 12 months. In the group of patients with constant HE or with eruption  $\geq \frac{1}{2}$  time, the mean HECSI score was 19.2, and patients with symptoms  $< \frac{1}{2}$  time had a mean HECSI score of 12.8 points, i.e. 33.3% lower (independent samples t-test  $P < 0.001$ ).

### Follow-up data

We were unable to trace 21 (2.6%) patients from the initial cohort for follow-up. Of the remaining 778 patients, 609 (78.2%) completed the second questionnaire (Fig. 1). The self-administered photographic guide was returned by 579 (74.4%) patients, of whom 534 answered the question about present severity of HE (Fig. 2). Moderate to very severe HE was reported by 193 of 534 (36.1%) patients at follow-up, and a general improvement was documented when the paired self-rated assessments (n = 467) from baseline to follow-up were compared (Wilcoxon signed rank test  $P < 0.001$ ).

Of those invited, 406 (52.2%) underwent the follow-up clinical examination. A drop-out analysis of the attendees/nonattendees was performed on the group of patients with a completed HECSI at baseline. No differences regarding age or socioeconomic group were documented. There was a trend ( $P = 0.05$ ) for more women (53.8%) than men (45.8%) attending the follow-up examination. No statistically significant differences were found between the two groups in relation to HECSI at baseline (t-test  $P = 0.06$ ) or the present severity at follow-up recorded from the self-administered photographic guide (Mann-Whitney test  $P = 0.09$ ).

The mean HECSI score was 11.2 at follow-up as compared with 19.9 at baseline, a score improvement of 44%. In total, 366 patients had a severity assessment by HECSI performed both at baseline and at follow-up. A t-test of this group showed a statistically significant improvement ( $P < 0.001$ ). Clinical severity at baseline was found to be a predominant risk factor for the severity at follow-up ( $P < 0.001$ ), adjusted for sex and age group. For patients with severe HE at baseline, the OR of severe HE at follow-up was 7.62 (95% CI 3.53–16.45) adjusted for sex and age group; an OR of 1.98 (95% CI 0.84–4.62) was estimated for patients with moderate HE. Improvement was seen in 60.4% of patients. Risk factors for a poor prognosis, defined as unchanged/aggravated eczema assessed by HECSI, are given in Table 3. A poor prognosis was found to be associated with being an unskilled worker. Frequent eruptions during the previous 12 months were also related to a poor prognosis, as was wet work, although the wet work was not statistically significant (Table 3). With respect to morphology, the presence of fissures and scaling at baseline was associated with a poor prognosis (Table 4).

### Discussion

In this follow-up study of patients with HE including dermatologist-rated severity assessments, 60.4% of patients had improved when examined 6 months after the initial dermatological consultation, and 36.1% reported moderate to very

**Table 2** Severity of hand eczema (Hand Eczema Severity Index) and logistic regression analysis with the outcome of severe hand eczema at baseline (n = 718)

|                                              | Clinical severity |                   |                    |                  | Adjusted OR<br>(95% CI) <sup>a</sup> | P-value           |
|----------------------------------------------|-------------------|-------------------|--------------------|------------------|--------------------------------------|-------------------|
|                                              | Total             | No/mild,<br>n (%) | Moderate,<br>n (%) | Severe,<br>n (%) |                                      |                   |
| Total                                        | 718               | 231 (32.2)        | 241 (33.6)         | 246 (34.3)       |                                      |                   |
| Sex                                          |                   |                   |                    |                  |                                      | 0.88              |
| Men                                          | 252               | 70 (27.8)         | 92 (36.5)          | 90 (35.7)        | 1.00                                 |                   |
| Women                                        | 466               | 161 (34.5)        | 149 (32.0)         | 156 (33.5)       | 0.98 (0.70–1.36)                     |                   |
| Age group (years)                            |                   |                   |                    |                  |                                      | <b>&lt; 0.001</b> |
| 18–29                                        | 177               | 68 (38.4)         | 67 (37.9)          | 42 (23.7)        | 1.00                                 |                   |
| 30–39                                        | 158               | 47 (29.7)         | 67 (42.4)          | 44 (27.8)        | 1.24 (0.76–2.03)                     |                   |
| 40–49                                        | 154               | 49 (31.8)         | 52 (33.8)          | 53 (34.4)        | 1.69 (1.04–2.72)                     |                   |
| 50+                                          | 229               | 67 (29.3)         | 55 (24.0)          | 107 (46.7)       | 2.81 (1.82–4.34)                     |                   |
| Atopic dermatitis (n = 638)                  |                   |                   |                    |                  |                                      | <b>0.01</b>       |
| No                                           | 454               | 152 (33.5)        | 148 (32.6)         | 154 (33.9)       | 1.00                                 |                   |
| Yes                                          | 184               | 50 (27.2)         | 66 (35.9)          | 68 (37.0)        | 1.65 (1.11–2.46)                     |                   |
| Symptoms during the past 12 months (n = 644) |                   |                   |                    |                  |                                      | <b>0.02</b>       |
| < ½ the time                                 | 120               | 50 (41.7)         | 38 (31.7)          | 32 (26.7)        | 1.00                                 |                   |
| ≥ ½ the time                                 | 524               | 155 (29.6)        | 176 (33.6)         | 193 (36.8)       | 1.73 (1.10–2.72)                     |                   |
| Socioeconomic group (n = 717)                |                   |                   |                    |                  |                                      | 0.94              |
| Unskilled                                    | 65                | 17 (26.2)         | 25 (38.5)          | 23 (35.4)        | 1.00                                 |                   |
| Basic level                                  | 340               | 117 (34.4)        | 114 (33.5)         | 109 (32.1)       | 0.92 (0.52–1.62)                     |                   |
| Medium/high level                            | 167               | 53 (31.7)         | 58 (34.7)          | 56 (33.5)        | 0.99 (0.54–1.82)                     |                   |
| Outside the labour market                    | 145               | 44 (30.3)         | 43 (29.7)          | 58 (40.0)        | 1.04 (0.55–1.94)                     |                   |
| Wet work (n = 489) <sup>b</sup>              |                   |                   |                    |                  |                                      | 0.82              |
| No                                           | 268               | 84 (31.3)         | 96 (35.8)          | 88 (32.8)        | 1.00                                 |                   |
| Yes                                          | 221               | 78 (35.3)         | 74 (33.5)          | 69 (31.2)        | 1.05 (0.71–1.56)                     |                   |
| ≥ 1 positive patch test                      |                   |                   |                    |                  |                                      | <b>&lt; 0.001</b> |
| No                                           | 395               | 143 (36.2)        | 152 (38.5)         | 100 (25.3)       | 1.00                                 |                   |
| Yes                                          | 323               | 88 (27.2)         | 89 (27.6)          | 146 (45.2)       | 2.37 (1.71–3.30)                     |                   |

<sup>a</sup>Multivariable logistic regression analysis with the outcome odds ratio (OR) of severe hand eczema, adjusted by the variables sex and age group. CI, confidence interval. <sup>b</sup>Reports obtained among the 642 patients in employment. Significant P-values are shown in bold face.

severe HE. Factors associated with severe disease at baseline were high age, atopic dermatitis, frequent eruptions during the previous 12 months and ≥ 1 positive patch test. Factors associated with a poor prognosis were frequent eruptions during the previous 12 months and unskilled socioeconomic status. With respect to morphology, fissures and scaling were identified as risk factors for a poor prognosis.

The sex and age distributions in the present study cohort are in accordance with previous studies of patients with HE.<sup>21–24</sup> The finding of more women than men being employed in wet work occupations is in line with a previous study of occupational HE and is primarily a result of a high frequency of women in the healthcare sector and among cleaners and hairdressers.<sup>22</sup> The HE at baseline was assessed as moderate to very severe by 60.3% of the patients. In a recent study of HE in the Danish general population, 23.8% of the respondents rated their present HE as moderate to very severe using the same photographic guide.<sup>23</sup> The severity of HE was assessed by the dermatologist using the HECSI, with a mean score at baseline of 19.9, a result in accordance with the median score of 17.0 shown in a study including patients from different European patch test clinics.<sup>21</sup> A study based

on HE in the Danish general population showed a mean HECSI score of 12.0.<sup>9</sup>

The clinical assessment documents the severity at a certain time only and does not take into account HE as a fluctuating disease with changing symptoms over a given period of time. The present results show, however, a statistically significant association between severity assessment by HECSI and the number of eruptions during the past 12 months. This finding further establishes the role of HECSI as a valuable tool for severity scoring of HE.

The rate of improvement 6 months after the dermatological consultation was 60.4%. Using the photographic guide, 22.9% of patients rated their HE as clear at follow-up, and 36.1% assessed the symptoms as moderate to very severe. This documents HE both as a disease of a low clearance rate and, in many cases, as a disease with persistent, significant symptoms. In a recent Danish study of patients with HE from a private dermatological clinic, 43% of patients reported their HE to be improved or cleared after 1 year of follow-up.<sup>2</sup> Two previous studies of occupational HE, with a follow-up interval of 1 year and 1–5 years, reported an improvement rate based on questionnaire information of 41%<sup>25</sup> and 70%,<sup>26</sup> respectively.

**Table 3** Changes of severity of hand eczema (Hand Eczema Severity Index) at follow-up and multivariable logistic regression analysis with the outcome of unchanged/aggravated hand eczema (n = 366)

|                                              | Total | Improved,<br>n (%) | Unchanged/<br>aggravated, n (%) | OR (95% CI) <sup>a</sup> | P-value     |
|----------------------------------------------|-------|--------------------|---------------------------------|--------------------------|-------------|
| Total                                        | 366   | 221 (60.4)         | 145 (39.6)                      |                          |             |
| Sex                                          |       |                    |                                 |                          | 0.68        |
| Men                                          | 116   | 72 (62.1)          | 44 (37.9)                       | 1.00                     |             |
| Women                                        | 250   | 153 (61.2)         | 97 (38.8)                       | 1.12 (0.71–1.78)         |             |
| Age group (years)                            |       |                    |                                 |                          | 0.68        |
| 18–29                                        | 79    | 52 (65.8)          | 27 (34.2)                       | 1.00                     |             |
| 30–39                                        | 80    | 46 (57.5)          | 34 (42.5)                       | 1.43 (0.75–2.73)         |             |
| 40–49                                        | 83    | 48 (57.8)          | 35 (42.2)                       | 1.41 (0.75–2.67)         |             |
| 50+                                          | 124   | 75 (60.5)          | 49 (39.5)                       | 1.28 (0.71–2.32)         |             |
| Atopic dermatitis (n = 345)                  |       |                    |                                 |                          | 0.13        |
| No                                           | 233   | 156 (62.7)         | 87 (37.3)                       | 1.00                     |             |
| Yes                                          | 112   | 65 (58.0)          | 47 (42.0)                       | 1.47 (0.89–2.44)         |             |
| Symptoms during the past 12 months (n = 348) |       |                    |                                 |                          | <b>0.04</b> |
| < ½ the time                                 | 59    | 43 (72.9)          | 16 (27.1)                       | 1.00                     |             |
| ≥ ½ the time                                 | 289   | 171 (69.2)         | 118 (40.8)                      | 1.96 (1.05–3.66)         |             |
| Socioeconomic group (n = 365)                |       |                    |                                 |                          | <b>0.04</b> |
| Unskilled                                    | 29    | 11 (37.9)          | 18 (62.1)                       | 1.00                     |             |
| Basic level                                  | 161   | 94 (58.4)          | 67 (41.6)                       | 0.44 (0.20–1.00)         |             |
| Medium/high level                            | 95    | 64 (67.4)          | 31 (32.6)                       | 0.30 (0.12–0.71)         |             |
| Outside the labour market                    | 80    | 51 (63.8)          | 29 (36.3)                       | 0.36 (0.15–0.88)         |             |
| Wet work (n = 263) <sup>b</sup>              |       |                    |                                 |                          | 0.07        |
| No                                           | 147   | 96 (65.3)          | 51 (34.7)                       | 1.00                     |             |
| Yes                                          | 116   | 63 (54.3)          | 53 (45.7)                       | 1.61 (0.97–2.68)         |             |
| ≥ 1 positive patch test                      |       |                    |                                 |                          | 0.17        |
| No                                           | 187   | 120 (64.2)         | 67 (35.8)                       | 1.00                     |             |
| Yes                                          | 179   | 101 (56.4)         | 78 (43.6)                       | 1.35 (0.88–2.09)         |             |

<sup>a</sup>Multivariable logistic regression analysis with the outcome odds ratio (OR) of unchanged/aggravated hand eczema, adjusted by the variables sex and age group. CI, confidence interval. <sup>b</sup>Reports obtained among the 642 patients in employment. Significant P-values are shown in bold face.

**Table 4** Morphological signs at baseline, changes of severity of hand eczema at follow-up and multivariable logistic regression analysis with the outcome unchanged/aggravated hand eczema (n = 366)

|                         | No. of patients<br>at baseline (%) | Improved,<br>n (%) | Unchanged/<br>aggravated, n (%) | OR (95% CI) <sup>a</sup> | P-value          |
|-------------------------|------------------------------------|--------------------|---------------------------------|--------------------------|------------------|
| Total                   | 366 (100.0)                        | 221 (60.4)         | 145 (39.6)                      |                          |                  |
| Erythema                | 339 (92.6)                         | 205 (60.5)         | 134 (39.5)                      | 0.97 (0.44–2.16)         | 0.94             |
| Papules                 | 305 (83.3)                         | 181 (59.3)         | 124 (40.7)                      | 1.31 (0.73–2.35)         | 0.36             |
| Vesicles                | 185 (50.5)                         | 109 (58.9)         | 76 (41.1)                       | 1.13 (0.74–1.73)         | 0.56             |
| Fissures                | 238 (65.0)                         | 130 (54.6)         | 108 (45.4)                      | 2.00 (1.26–3.19)         | <b>&lt; 0.01</b> |
| Scaling                 | 327 (89.3)                         | 190 (58.1)         | 137 (41.9)                      | 2.92 (1.29–6.27)         | <b>0.01</b>      |
| Oedema                  | 210 (57.4)                         | 126 (60.0)         | 84 (40.0)                       | 1.03 (0.67–1.58)         | 0.89             |
| Large area <sup>b</sup> | 112 (30.6)                         | 60 (53.6)          | 52 (46.4)                       | 1.48 (0.93–2.33)         | 0.10             |

<sup>a</sup>Multivariable logistic regression analysis with the outcome odds ratio (OR) of unchanged/aggravated hand eczema, adjusted by the variables sex and age group. CI, confidence interval. <sup>b</sup>Reference: The pooled group of small and moderate area of hand eczema. Significant P-values are shown in bold face.

A Swedish study of HE in the general population estimated the improvement rate to be 74% after 15 years.<sup>1</sup> The result of the current study is interesting because the prognosis is based on assessments by dermatologists.

The association between atopic eczema and severe HE at baseline is in accordance with previous cross-sectional studies.<sup>4,27</sup> A higher prevalence of positive patch test results was found in the hospital sector, reasonably explained by the

application of a larger test panel. A positive patch result was related to severe eczema at baseline, a result supported by a former study<sup>27</sup> in the Swedish general population. In a recent Danish study, irritant HE was associated with more severe symptoms determined by a medicolegal assessment.<sup>4</sup> No assumption was made regarding present relevance of the individual allergens as no validated methods to assess exposure have been established. Including such estimation could therefore lead to classification bias. The present study confirms a previous finding<sup>4</sup> that older persons often have severe HE.

An overall improvement from baseline to follow-up should be expected due to regression towards the mean. However, this principle does not explain the course variability of the different subgroups. Patients with severe HE at baseline had a high OR of severe symptoms at follow-up. A poor prognosis was found in patients with scaling and fissures. In the interpretation of the clinical process of HE, fissures and scaling may reflect a more chronic stage of the disease, which is difficult to treat. However, a treatment with oral alitretinoin was launched in 2008 and showed promise for patients with chronic HE refractory to topical steroids.<sup>28</sup> In a Swedish study with 15 years of follow-up, the prognosis of HE in relation to extent and morphology at baseline was evaluated. Meding *et al.* found that the extent of HE was the best predictor of its course, whereas a high morphological diversity was shown not to add significant information. The presence of vesicles or erythema was the only morphological sign that had a negative influence on the prognosis.<sup>29</sup> This study was based on HE in the general population as reflected by a different severity profile at baseline. The different study populations and follow-up intervals might explain the divergent findings of morphological signs as predictive factors.

A positive patch test result did not influence the prognosis. The influence of contact allergy on the course may depend on the type of intervention and the information given to patients about avoidance of allergens. There may also be differences in the nature of the individual allergens and some may be related to a poor prognosis. This will be the subject of a separate paper.

A socioeconomic classification as 'unskilled' was a risk factor for a poor prognosis, as was wet work, although it was not statistically significant. Direct contact with water/detergents, frequent hand washing or the use of occlusive gloves and probably a low influence on one's own tasks with limited possibilities of changing unfavourable work procedures may well explain this finding. Various social backgrounds could also be related to compliance. In a study of patients with HE with contact allergy to preservatives and fragrances, Noiesen *et al.*<sup>30</sup> showed that individuals from a lower social position had more difficulty in reading cosmetic ingredient labels and, accordingly, more difficulty in complying with the medical instructions. The filaggrin null alleles have been shown to be major predisposing factors to atopic dermatitis<sup>31</sup> and have subsequently been associated with irritant HE.<sup>32</sup> The factor of filaggrin gene mutations was not included in the present study but could theoretically have an independent effect on both the severity observed at baseline and the prognosis.

To our best knowledge, the present study is the first epidemiological study of HE using a validated scoring system for the dermatological assessment at both baseline and follow-up. The benefit of a published scoring system diminishes the risk of observer bias, and standardized rating makes it more meaningful to compare different studies.<sup>33,34</sup> The self-administered photographic guide was used for the self-rated clinical severity assessments. In follow-up studies of HE, two main outcomes for self-rated clinical assessment have been used:<sup>35</sup> (i) the healing rate, indicating the proportion of respondents reporting that their HE had cleared,<sup>1</sup> and (ii) the improvement rate, a self-rated comparative assessment of the clinical severity, which may contribute to a more adequate impression of the prognosis<sup>26</sup> but must also be considered vulnerable to recall bias. The photographic guide is designed to assess the clearance rate but offers a more specific picture of the residual group. The measurement of the clinical severity of HE was the primary objective; however, a previous study showed a correlation between the severity assessment using HECSI and the patient's quality of life by the Dermatology Life Quality Index.<sup>21</sup> Additionally, a good correlation was found in a study that evaluated the severity assessment using the self-administered photographic guide and a visual analogue scale to make a global assessment.<sup>16</sup>

The data collection at baseline had a complex set-up with a HECSI form, a self-administered questionnaire and a photographic guide. Some cases are therefore represented by an incomplete dataset. Patients not attending the second examination are a potential source of selection bias. However, analyses made on the photographic guide showed no differences between attendees and nonattendees in terms of the main outcomes of the investigation.

In conclusion, the overall severity of HE had improved 6 months after the first dermatological examination; nevertheless, many patients continued to have considerable symptoms. In cases with a poor prognosis, particular dermatological attention should be paid to those characterized by frequent eruptions during the previous 12 months and to those who are unskilled workers. Among clinical findings, severe HE at the initial consultation was an indicator of severe symptoms 6 months later, and among the individual morphological signs, fissures and scaling were predictors of a poor prognosis. A positive patch test was associated with severe HE at the initial consultation but not at follow-up, which may be due to the instructions given by the dermatologist as part of the standard operating procedure. Special attention should therefore be paid to this group of patients too.

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