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A simple tool with which to study the course of chronic hand eczema in clinical practice: a reduced-item score

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Summary

Background. Physicians need a simple, disease-specific tool with which to assess disease severity and the effect of therapeutic intervention in patients with chronic hand eczema. The currently available clinical scoring systems include numerous items, which makes them laborious to complete and limit their use in daily practice.

Objective. To develop a simple tool with which to assess disease severity of patients with chronic hand eczema.

Methods. We evaluated two tools, the Hand Eczema Severity Index (HECSI) and the Hand Eczema Area and Severity score, to determine their ability to predict the Investigator's Global Assessment (IGA) of disease severity in patients with moderate to severe hand eczema. We used a stepwise reduction analysis to determine a minimal set of significantly contributing items for predicting IGA.

Results. A three-item score, based on the highest observed value of induration, fissuring, and scaling, predicted IGA with a correlation of 0.667. The HECSI predicted the IGA with a correlation of 0.675.

Conclusion. On the basis of this analysis, we propose a simple tool for clinical decision-making and evaluation of therapeutic intervention in daily practice.

Key words: chronic hand eczema, clinical severity, reduced item score.

Hand eczema is a common dermatological disease with a wide range of severity of symptoms within and among patients. Although hand eczema may be short term, in

many cases it may be chronic (1, 2). In severe cases, patients find hand eczema disabling for work and leisure activities, resulting in sick leave and sometimes leading to a permanent inability to work (3, 4). Severe hand eczema has a significant impact on the quality of life for many patients (1, 5).

Patients who avoid skin contact with irritants and/or allergens, and who receive topical and systemic treatment as well as proper skin care, usually see an improvement in their symptoms. Physicians need a tool with which to assess disease severity and to evaluate improvement after therapeutic intervention. Researchers, however, need an outcome measure with which to evaluate the effectiveness

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of interventions in clinical trials, and occupational physicians need a tool with which to quantify the early signs of hand eczema. A tool to meet these disparate demands would be a compromise. Therefore, Weistenhöfer proposed distinct tools, depending on the purpose: early detection, clinical practice, or research (6).

Our aim in this study was to develop a simple hand eczema tool for physicians to be used in an outpatient setting to study the course of the disease and to evaluate therapeutic intervention. For atopic dermatitis and psoriasis, simple tools are already available (7, 8).

For this purpose, a tool must be clear and simple to use, and accurately predict disease severity. The currently available tools for scoring hand eczema include numerous items, and are therefore too elaborate for use in daily clinical practice. Some items in these existing tools are redundant, or show interaction and overlap. A shortened list of items, without redundancy, would serve for severity assessment and a standardized evaluation of treatment results. The availability of such a simple scoring system would facilitate clinical decision-making. The purpose of this study was to develop a simple tool with which to assess disease severity of patients with chronic hand eczema.

Material and Methods

The present study is part of a randomized controlled trial to evaluate the effectiveness of an intervention programme for patients with hand eczema. For this study, baseline data, 26-week data and 52-week data were used to assess clinical activity. Data on the primary outcome measure of the trial, Hand Eczema Severity Index (HECSI) score, were complete for 196 patients at baseline. A detailed description of the study design can be found elsewhere (9).

Study population

We solicited the participation of consecutive patients visiting the dermatological departments of three university hospitals and two general hospitals, who were aged 16 years or older and had chronic (> 3 months) and moderate to severe hand eczema (Figs. 1 and 2) as assessed by the Investigator's Global Assessment (IGA). Patients with relatively mild disease at the time of evaluation who were on sick leave from work, or who scored at least four points on a visual analogue scale for perceived burden of disease in the last 3 months before inclusion in the study, were also eligible. In the randomized controlled trial we excluded patients with generalized eczema, with skin disease more relevant than hand eczema, who were applying topical pharmacotherapy or phototherapy treatments that differed from those used in the study, who were

Fig. 1. Moderate hand eczema.

Fig. 2. Severe hand eczema.

using systemic treatment affecting hand eczema, or who were unable to complete questionnaires written in Dutch.

Measurements

Investigator Global Assessment. The IGA has been validated and has shown high inter-rater reliability and re-test reproducibility (10). In this study, we used the IGA as a reference for validating the performance of the (reduced) HECSI and Hand Eczema Area and Severity (HEAS). The IGA is based on a five-point intensity scale (clear, almost clear, moderate, severe, and very severe), and uses photographs for severity rating.

Hand Eczema Severity Index. The HECSI is a tool for the assessment of clinical severity that incorporates both the extent and intensity of hand eczema (11). Both hands are divided into five areas: fingertips, fingers (except tips), palms, back of hands, and wrists. For each

area, the intensity of the six clinical signs – erythema, induration/papulation vesicles, fissuring, scaling, and oedema – was graded as 0 (no skin changes), 1 (mild disease), 2 (moderate disease), and 3 (severe disease). For each specific area, the total affected area for both hands was scored from 0 to 4 for the extent of clinical symptoms (0 = 0%, 1 = 1–25%, 2 = 26–50%, 3 = 51–75%, and 4 = 76–100%). Finally, the score given for the extent of clinical symptoms at each location was multiplied by the total sum of the intensity of each clinical feature and summated. The HECSI score ranges from 0 to 360 points.

Hand Eczema Area Severity. The HEAS scoring system is also a tool used to assess clinical severity, corrected for the percentage of affected skin area (12). The hand is divided into seven areas: the palm, the back of the hand, and each finger. The percentage of the area affected is indicated on a scale of 0–4 (0 = 0%, 1 = 1–25%, 2 = 26–50%, 3 = 1–75%, and 4 = 76–100%). For each area, the intensity of the clinical signs, including erythema, vesicles, papules, dryness, scaling, and hyperkeratosis, is scored on a 0–3 scale (0 = none, 1 = slight, 2 = moderate, and 3 = severe). The palm and the back of a hand contribute 25% to the total score and a single finger contributes 10%. The HEAS score is calculated by multiplying the score of the percentage of affected skin area by the sum of the intensity of the symptoms, corrected for the relative contribution (palm and back 0.25, and fingers 0.10) of the area. The final score is calculated by adding all the scores of the areas for both hands. The HEAS score ranges from 0 to 96 points.

Analysis

In the randomized controlled trial, data were collected on several occasions. To validate the performance of a reduced item set, we used baseline, 26-week and 52-week data.

First, means and standard deviations were calculated for the HECSI and HEAS at baseline. Next, we calculated Pearson correlations between the IGA and the two scales. The HEAS uses separate evaluation of the hands, in contrast to the HECSI. We calculated correlations for both hands separately, but also combined the scores of each hand by using the average scores of the left and right hand, and by using the maximum scores (either for the total scores or for the separate scores). Although this approach slightly improved the correlation of the HEAS with the IGA, the correlation did not reach the correlation of the HECSI with the IGA (see Table 1, where the HEAS data for the separate hand scores are shown). Therefore, the HECSI items were used for deriving the reduced item set.

Table 1. Mean scores and standard deviations (SDs) and correlations of clinical scores for the Hand Eczema Severity Index (HECSI) and the Hand Eczema Area and Severity (HEAS) with the Investigator's Global Assessment (IGA) at baseline

	Mean (n)	SD	Correlation with the IGA	Sign (two-tailed)
IGA	3.04 (185)	0.86	–	–
HECSI	39.62 (192)	33.39	0.657	<0.001
HEAS	11.45 (192)	11.14	0.594	<0.001

n, number of scores.

Working with the baseline data, we used a backward selection in a regression model to assess which of the six clinical items of the HECSI could be omitted without loss of correlation. Moreover, we studied the contribution of correcting for the extent of the affected skin area.

For this latter purpose, we used three approaches: most affected lesion as defined by the highest sum score, the sum score of the greatest affected skin area, and the summation of the highest item score for induration, fissuring, and scaling (as independently observed from the lesion for the obtained score). In this way, we defined simplified severity scores.

As a backward selection procedure is likely to result in an overfit, and thus a too optimistic correlation between the new reduced item scales, we used the 52-week data to validate the findings.

Finally, we compared the sensitivity for change of the HECSI and this simplified score (using the highest item scores) as compared with the change of the IGA by using the baseline scores, the 26-week data and the 52-week data by calculating the correlation between difference scores.

Results

Table 1 shows the correlations of the HEAS and HECSI with the IGA (gold standard). The HECSI score performed better than the HEAS score. Table 2 shows the mean score and standard deviation of the HECSI with separate items and correlations with the IGA.

Backward selection in the regression model with the six features (items) of the HECSI showed that induration, fissuring and scaling contributed significantly to the correlation with the IGA, in contrast to vesicles, erythema, and oedema. The sum scores of the three items (induration, fissuring, and scaling) predicted the IGA well with a minimum loss of correlation (Table 3).

Surprisingly, vesicles did not contribute to the correlation with the IGA. When we added vesicles to these three items, the correlation ($r = 0.668$) of these

Table 2. Mean scores, standard deviations (SDs) and correlations of clinical scores for the Hand Eczema Severity Index (HECSI) with the Investigator's Global Assessment (IGA) at baseline

	Mean (n)	SD	Correlation with the IGA
IGA	3.04 (185)	0.86	NA
HECSI	39.62 (192)	33.39	0.675
Erythema	4.92 (194)	3.00	0.42
Induration/papulation	2.33 (194)	2.44	0.56
Vesicles	1.37 (194)	2.10	0.13
Fissuring	2.08 (194)	2.04	0.54
Scaling	3.96 (194)	2.50	0.60
Oedema	1.21 (192)	1.21	0.21

n, number of scores; NA, not applicable.

Table 3. Correlations between simplified clinical scores (backward selection in a regression model) and the Investigator's Global Assessment (IGA) at baseline

	Correlation with the IGA	Sign (two-tailed)
Six items (erythema, oedema, induration, fissuring, scaling, and vesicles) (HECSI)	0.675	<0.001
Five items (erythema, oedema, induration, fissuring, and scaling)	0.675	<0.001
Four items (oedema, induration, fissuring, and scaling)	0.673	<0.001
Three items (induration, fissuring, and scaling)	0.667	<0.001

HECSI, Hand Eczema Severity Index.

four items with the IGA became only slightly better than with the three items induration, fissuring, and scaling, but this improvement was not significant ($p = 0.782$). Without correcting for the extent of affected skin, the correlation coefficients of the simplified (three items) score with the IGA were 0.582, 0.680, and 0.667, respectively. Thus, a simplified score based on induration, scaling, and fissuring, without correction for the extent of affected skin area, performed as well as the HECSI score in predicting the IGA. We decided to use the

Table 4. Mean scores and standard deviations (SDs) at 52 weeks of the study and correlations of the Hand Eczema Severity Index (HECSI) and the reduced item score with the Investigator's Global Assessment (IGA) scores

	Mean (n)	SD	Correlation with the IGA	Sign (two-tailed)
IGA	2.46 (143)	0.90	–	–
HECSI	20.18 (167)	22.45	0.680	<0.001
Three-item score*	2.47 (167)	1.80	0.664	<0.001

n, number of scores.

*Using summation of the highest scores for induration, fissuring, and scaling.

third combination strategy – ‘determine for each of these clinical signs: induration, scaling and fissuring’ the area of the hands that is most affected, and then rate the severity of the problem on a four-point scale’ – because this approach maximally reduced a physician's work.

The 52-week mean IGA, HECSI and three-item score and correlations with the IGA are shown in Table 4. The correlation of the mean three-item score at 52 weeks with the IGA at 52 weeks was 0.664 and similar to the baseline correlation of 0.667, indicating good temporal validation.

The correlations between the difference scores of the HECSI and the three-item score with the IGA were 0.701 and 0.675 at 26 weeks and 0.628 and 0.594 at 52 weeks, respectively, indicating a similar sensitivity to change of the HECSI and the three-item score (Table 5).

Discussion

Many scoring systems for hand eczema are available (6). However, these scoring systems are often laborious, requiring detailed scoring of many clinical features per unit skin area. In this study, we evaluated two scoring systems (HECSI and HEAS) for their ability to predict the investigator's overall assessment of severity. The HECSI turned out to be the best predictor of the IGA. Next, we studied whether the HECSI scoring system could be simplified to meet the requirements for use in daily clinical practice.

Table 5. Means and standard deviations (SDs) of the difference scores (baseline minus 26 weeks and baseline minus 52 weeks) and correlations of the Hand Eczema Severity Index (HECSI) and the three-item score with difference in Investigator's Global Assessment (IGA) scores

	Mean difference (SD) at 26 weeks	Correlation with the IGA	Sign (two-tailed)	Mean difference (SD) at 52 weeks	Correlation with the IGA	Sign (two-tailed)
IGA	0.53 (1.02)	–	–	0.57 (1.12)	–	–
HECSI	18.64 (34.83)	0.701	<0.001	21.21 (35.18)	0.628	<0.001
Three-item score*	1.29 (2.34)	0.675	<0.001	1.53 (2.34)	0.594	<0.001

*Using summation of the highest scores for induration, fissuring, and scaling.

The HECSI is based on the following primary features: erythema, induration/papulation, vesicles, fissuring, scaling, and oedema. These features can be observed across a spectrum from acute (vesicles, oedema, and induration), to subacute (papules and induration) to chronic eczema (fissuring, scaling, and induration). The lesions reflect the eczematous reaction pattern, namely the inflammatory response in the skin (erythema, induration, and oedema) and the changes in epidermal proliferation and differentiation (fissuring, scaling, and induration). The scoring is performed for the finger tips, fingers, palm, back and pulse for both hands together (11). The lesions reflecting the same phase of the eczematous response may be highly correlated, and therefore (partly) redundant, or features may be underrepresented in a population of patients with chronic hand eczema. Moreover, scoring various parts of the hands may be superfluous in predicting the investigator's assessment of overall severity.

Indeed, this study showed that the number of primary lesions can be reduced from six to three without significant loss of correlation ($r = 0.675$ versus $r = 0.667$). We can simplify the scoring system even more (without loss of correlation with the IGA) by eliminating the scoring of various skin areas as well as the separate scoring of both hands. The sensitivity for change of this simplified score was only slightly reduced as compared with the HECSI.

It may be surprising that vesicles, although carefully evaluated, did not significantly contribute to the correlation with the IGA. However, in our experience, recurrent vesicular hand eczema is uncommon in a population visiting a tertiary referral centre, and mostly vesicular eruptions are not often encountered in chronic hand eczema (13).

Therefore, the proposed simplified instrument for chronic hand eczema would probably not be appropriate for patients with dyshidrotic (recurrent vesicular)

eczema, because the score does not include erythema or vesicles. For these patients, a separate instrument, the Dyshidrotic Eczema Area and Severity Index, developed by Vocks et al., can be used (14). The three-item score can easily be expanded with vesicles, although, at least in our population, this does not contribute to a significantly improved correlation with the IGA.

On the basis of the results of our study, we propose restriction of the evaluation of the severity of chronic hand eczema to scoring induration (inflammatory response and epidermal changes), fissuring, and scaling (epidermal changes).

Although the HECSI scoring system performs well and has been validated in several studies, this study shows that scoring six clinical primary lesions is redundant in patients with chronic hand eczema.

For reasons of uniformity and simplicity, we propose a reduced-item score composed of a limited set of features to be scored (induration, scaling, and fissuring) for evaluating the disease severity of chronic hand eczema. We propose using the highest scores observed, independently of the scored lesion. Selection of these scores can be obtained by observation, and does not require calculation.

Because of its simplicity, the reduced-item score can easily be used in daily practice for evaluating clinical intervention. Its numeric nature makes the test complementary to the well-validated severity rating based on photographs (10).

For atopic dermatitis, a comparable, simplified tool is available. This tool is a three-item score, which also does not account for the area of affected skin (7).

The proposed reduced-item tool for the assessment of clinical activity of chronic hand eczema can be used in daily practice for clinical decision-making, and serves the purpose of standardizing the evaluation of treatment results in daily practice.

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