

The Dyshidrotic Eczema Area and Severity Index – A Score Developed for the Assessment of Dyshidrotic Eczema

E. Vocks^a S.G. Plötz^b J. Ring^a

^aDepartment of Dermatology and Allergology Biederstein, Technical University München, and

^bResearch Center Borstel, Center for Medicine and Bioscience, Borstel, Germany

Key Words

Severity index · Dyshidrotic eczema · Pompholyx · Treatment study

Abstract

Background: Dyshidrotic eczema of the palms and soles is a common condition, which can be rather resistant to treatment. Therapy studies and their comparability are of clinical importance. **Objective:** As standardized assessment methods for the severity of this particular form of eczema are lacking, we developed a severity index for dyshidrotic eczema. **Methods:** The Dyshidrotic Eczema Area and Severity Index (DASI) is based on the severity grade of single items – number of vesicles per square centimetre (V), erythema (E), desquamation (S) and itch (I) – and the extension of the affected area (A) and is calculated with defined score points (p) as: $DASI = (p_V + p_E + p_S + p_I) \times p_A$. **Results:** In two treatment studies on dyshidrotic hand eczema, the DASI was found to be a simple and useful tool to assess the severity of dyshidrotic eczema and the effect of therapy. **Conclusion:** The DASI needs to be further validated in larger cohorts.

Dyshidrotic eczema of the palms and soles is a rather common disease [1]. Etiologically, it is a non-specific reaction pattern in response to a number of different provoking

factors, such as atopic eczema, contact allergy or mycosis, but many cases are also classified as idiopathic [1–3]. As it can be very resistant to treatment [4], studies with regard to new therapeutic modalities in dyshidrotic eczema are important. The evaluation of therapeutic effects is carried out by different methods. In most studies global assessment methods like grading of improvement [5–8] are used. Hand eczema scoring systems which are applied to eczema on the palmar and dorsal hands are not specific for the distinct features of dyshidrotic eczema [9]. Since the assessment methods for dyshidrotic eczema are not standardized, therapeutic studies are not comparable and data cannot be utilized for epidemiologic purposes. As there is no specific scoring system existing, we developed a severity index for dyshidrotic eczema on the occasion of a half-side treatment study with tap water iontophoresis [10].

Dyshidrotic Eczema Area and Severity Index: Description

The Dyshidrotic Eczema Area and Severity Index (DASI) is based on the severity grading of single items and the extension of the affected area.

Severity Grading

Four items were selected for severity grading: (a) number of vesicles, (b) erythema, (c) desquamation, (d) itching.

Each item has to be assessed according to an arbitrary scale of 0–3 (0 = absent, 1 = mild, 2 = moderate, 3 = severe). The grading of the items must be representative for all affected areas (average intensity of the affected areas, table 1).

Number of Vesicles per Square Centimetre. As the dyshidrotic vesicles mostly occur in crops and at the same time some affected areas are lacking vesicles, the distribution of vesicles is irregular, a representative area with an 'average' density of vesicles can hardly be constituted for the assessment. Therefore the examiner should estimate the total number of vesicles and divide them by the total size of affected areas (in square centimetres).

By evaluating the number of vesicles in relation to the total eczematous area size and, in a second step, multiplying this 'average grade of vesiculation' by the affected area score points (DASI calculation, see below), a distinction between localized mild cases (low DASI), localized severe cases (medium DASI) and largely affected severe cases (high DASI) is provided.

If multiple dense vesicles become confluent and larger bullae occur in rare severe cases, the examiner should estimate the numbers of underlying dyshidrotic vesicles, which are not bigger than 1–2 mm in diameter. They are easy to be calculated and meet the significance of bullae as a maximum variant of vesicle density in the most proper way.

The calculation of average vesicle density implies a mean number of vesicles per square centimetre, which is in general lower than the visible focal density of vesicles in the afflicted zones, as the distribution is never totally diffuse. Thus in mild cases of dyshidrotic eczema a mean number of vesicles per square centimetre between 0 and 1 can result, and in severe cases with multifocal eruption of maximally dense vesicles (about 20–30/cm²), the mean number of vesicles per square centimetre would be lower too, by a factor which is determined by the portion of non-vesiculate eczema areas.

With regard to this arithmetic lowering and on the background of clinical experience, as corresponding data in the literature are lacking, we settled on the following grading: grade 0 = no vesicles at all; grade 1 = > 0–<2 vesicles/cm² affected area; grade 2 = 2–8 vesicles/cm² affected area; grade 3 = >8 vesicles/cm² affected area (affected area = total area size of lesional skin).

Erythema. Grading of erythema is done according to the common criteria also used in other dermatologic scoring systems for inflammatory skin diseases.

Desquamation. This item takes into account that scaling in dyshidrotic eczema is usually less severe than in some other palmoplantar hyperkeratotic conditions, like hyper-

Table 1. DASI – severity grading (mean severity grade of affected areas)

V Vesicles n/cm ²	E Erythema	S Desquamation	I Itch grading	PAS points	P Score points
0	absent	absent	absent	0	0
>0–<2	mild	mild	mild	1–3	1
2–8	moderate	moderate	moderate	4–7	2
>8	severe	severe	severe	8–10	3

Table 2. DASI – affected area scoring

A Affected area, % of total palm/sole	0	1–20	21–40	41–60	61–80	81–100
P Score points	0	1	2	3	4	5

keratotic palmar eczema, psoriasis or in some erythrodermic diseases.

Itch. The subjective item pruritus can only be assessed by the patient. He has to choose between one of the 4 severity grades 0 (absent), 1 (mild), 2 (moderate) or 3 (severe). If a visual analogue scale (VAS) is used, on which the patient must indicate the severity between 0 and 10 points, the examiner then grades the itch intensity as follows: grade 0 = 0 VAS points; grade 1 = 1–3 VAS points; grade 2 = 4–7 VAS points; grade 3 = 8–10 VAS points.

Affected Area

The extension of the affected area is scored on a 6-point scale and discriminates between no, up to 20, 40, 60, 80 or 100% affection of the palm/sole (table 2).

Dyshidrotic Eczema Area and Severity Index

The total score of the DASI results from the sum of severity grade score points of each of the four items (V = vesicles, E = erythema, S = desquamation, I = itch) multiplied by the affected area (A) score points:

$$\text{DASI} = (p_V + p_E + p_S + p_I) \times p_A$$

The maximum possible score is 60. By the DASI, the dyshidrotic eczema is graded as: mild (0–15), moderate (16–30) and severe (31–60).

Hands and feet have to be scored separately. In cases of asymmetric involvement also each side must be assessed by an individual score. If a global classification of a palmo-plantar dyshidrotic eczema is wanted, the mean value of the DASIs of hands and feet can be calculated, even though in a given case this could be rather inaccurate.

DASI Application in Clinical Trials

The DASI was first applied to 20 patients with mainly mild to moderate dyshidrotic hand eczema to evaluate the effect of tap water iontophoresis in a randomized half-side study [10]. The median DASI before therapy was 16, with a minimum of 8 and a maximum of 40. After 3-week iontophoresis therapy the median DASI had decreased to 8 (min. 3, max. 20). The median DASI of the untreated control side showed no significant difference before and after the 3 weeks (before: median 16, min. 5, max. 45; after: 15, min. 0, max. 45). The difference between treated and untreated sides was statistically significant ($p = 0.001$). A detailed analysis of severity items showed significant reduction of vesicles and itch, but not of erythema and scaling [10].

In another study [11], the DASI was used to verify the efficacy of medium-dose UVA1 irradiation therapy in chronic vesicular dyshidrotic hand eczema. In this uncontrolled study on 12 patients, the mean DASI before therapy was 19.83 (left hand, min. 10, max. 36) and 20.41 (right hand, min. 10, max. 36), respectively. After UVA1 irradiation therapy it decreased to 4.25 (min. 1, max. 8; $p = 0.002$) and 3.50 (min. 1, max. 15; $p = 0.002$).

Although in such cases of dyshidrotic eczema with symmetric bilateral involvement and therapy the assessment of each side by an individual DASI would not be necessary, this trial with separate assessment of each hand side by the DASI can be taken for a kind of quality control of the DASI: in 9 of 12 patients, the bilateral assessment resulted in identical DASI values on right and left hand sides. This refers to a good intra-observer reproducibility on the one hand and to the relevance of the DASI on the other hand, since by the DASI the symmetry of severity is reproduced correctly, despite usually existing minor differences in single item intensities between right and left hand side.

The mean values of the pretreatment DASI were similar in the two studies. The differences in baseline DASI between the two studies are due to the selection of cases, as in the iontophoresis study (median DASI 16) mild to moderate cases were treated; in the UVA1 study (mean DASI 20) the cases were described as 'acutely exacer-

bated chronic dyshidrotic hand eczema', associable with cases of medium severity. After therapy the DASI was more markedly decreased in the UVA1 study. This is in coincidence with a generally supposed higher therapeutic efficacy of phototherapy compared to tap water iontophoresis therapy which is only an adjunctive therapeutic measure [10].

Thus the assessment of dyshidrotic eczema by the DASI appears to be relevant and to show low interobserver variations.

Discussion

With this newly developed DASI score a semi-objective and comparable assessment of dyshidrotic eczema is possible.

Up to now there existed no specific index for the assessment of dyshidrotic eczema. In former studies investigators assessed the item 'improvement' of dyshidrotic eczema using either only one mark (clearing/clearing time [6, 8]) or different graduations of improvement ('bad, moderate, good, excellent'), in some cases globally defined by various combinations of criteria, including grade of erythema, scaling, size of plaques and/or number of vesicles [5, 7]. A more exact and reproducible scoring system was developed by Grattan et al. [9] to assess the improvement of 'vesicular hand eczema' with palmar and dorsal manifestation. It is composed by scoring of vesicles, erythema and scaling and global ratings of improvement by the investigator and the patient. Apart from the fact that with this system the difference in clinical morphology and course between dyshidrotic and dorsal hand eczema is not considered, the key symptom itch is missing. Beyond it the composed assessment method is rather complicated and time-consuming. Universal scoring systems for all kinds of eczemas do not exist. The best standardized eczema scoring systems are those for atopic eczema. The European Task Force on Atopic Dermatitis developed with the scoring index of atopic dermatitis (SCORAD), a composite index regarding the extent and the severity of lesions and the subjective symptoms in atopic eczema [12], which proved to be a useful method [13]. But none of rating and scoring parameters of the SCORAD would allow an adequate evaluation of dyshidrotic eczema; not even the list of severity items (erythema, oedema/papulation, oozing/crusts, excoriations, lichenification and dryness) would be appropriate, as the morphology of dyshidrotic eczema differs from atopic eczema lesions. Some former scoring systems for atopic eczema are more simple, but most of them also consider

clinical parameters, which do not have the same relevance or are absent in dyshidrotic eczema, like oedema, lichenification, dryness or excoriation [14, 15] or the assessment concerning lesional severity items is too global [16–18]. Thus, it makes no sense to fall back upon one of these experienced atopic eczema scores to assess dyshidrotic eczema.

General scoring systems for inflammatory skin disease activity have not yet been developed. They would simplify and unify the clinical assessment and promote its wide use for quality standards. The existing and frequently used disease-specific indices PASI [19] or SCORAD showed to be not suitable as general dermatologic scoring systems [20]. Up to now diagnosis-specific differences between the indices provide a better reflection of the particular disease [20].

Therefore it is evident that also for dyshidrotic eczema a specific severity index is necessary, as the disease has specific and unique features.

Dyshidrotic eczema exclusively occurs on the palms and soles. The acute attack is characterized by the sudden onset of crops of dyshidrotic vesicles. This primary lesion is a clear vesicle, which appears deeply seated and 'sago-like'. Secondly eczema develops with erythema, infiltration, hyperkeratosis and scaling [1]. Compared to other forms of dermatitis, which also start with (papulo)vesicles, the vesicles in dyshidrotic eczema tend to persist longer during the subacute phase of the eczema [1]. The typical and unique morphology of the dyshidrotic vesicles, their longer duration and the severe burning, itching and pain they mostly cause may be due to the specific anatomy of the glabrous skin of the palms and soles characterized by a thick epidermis with a compact stratum corneum [21]. Possibly an early rupture and dissolution of the vesicles is inhibited by that.

Thus the four severity items chosen in our score system, vesicles, erythema, scaling and itch, are the key signs and symptoms of dyshidrotic eczema [22]. Especially vesicles are not accentuated as a single parameter in most of the other eczema scoring systems.

As the localization of dyshidrotic eczemas on the palms and soles means an impairment of highly sensitive and though only small portion of the total body surface, yet functionally very important anatomic sites, subtle ranking of the involved area size is decisive for the grade of disease severity. Therefore we developed a 6-point scale for the assessment of extension. Because dyshidrotic vesicles can cause troublesome burning pruritus already in small affected areas, we decided to multiply also the itch score points with the area score points for the calculation of the DASI, to evaluate the difference in disease severity, if small or large areas cause itch of a certain intensity.

Hands and feet have to be assessed by the DASI separately, to make allowance for exact description of the disease. In most cases of dyshidrotic palmoplantar eczema the severity as well as the occurrence are different on hands and feet [1, 6, 7]. For the evaluation the assessment of one side is sufficient, if the affection is, as in most cases, symmetric [1, 3].

The DASI designed above was found to be a simple and useful tool to assess the severity of dyshidrotic eczema and the effect of therapy [10, 11]. An evaluation by means of correlation studies to other forms of assessment is impossible, as other validated methods for the assessment of dyshidrotic eczemas do not exist. To affirm the DASI validity, its intra- and interobserver reliabilities need to be further tested in larger cohorts.

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