Acta Dermatovenerol Croat 2005;3(4):219-224 CLINICAL ARTICLE

The New Scoring System for Evaluation of Skin Inflammation Extent and Severity in Patients with Atopic Dermatitis

Wojciech Silny, Magdalena Czarnecka-Operacz, Paweł Silny

Department of Dermatology and Allergic Diseases Diagnostic Center, University of Medical Sciences, Poznań, Poland

Corresponding author:
Assist. Prof. Magdalena Czarnecka-Operacz, MD, PhD
Allergic Diseases Diagnostic Center
Department of Dermatology
University of Medical Sciences
49 Przybyszewskiego Str.
60-355 Poznań,
Poland
czarneckam@op.pl

Received: January 24, 2005
Accepted: June 25, 2005.

SUMMARY The new scoring system for assessment of the extent and severity of skin inflammation index in atopic dermatitis patients, W-AZS, is presented. The system provides detailed assessment of both subjective and objective signs and symptoms of atopic dermatitis. With the use of W-AZS, acute and chronic skin manifestations of inflammatory process are appropriately evaluated and scored. It also enables the practitioner to assess various localizations of skin lesions at different time points. W-AZS is a relatively easy and rapid index to perform, and it seems very beneficial for clinicians. Other scoring systems used in atopic dermatitis are also presented, analyzed and compared, e.g., Atopic Dermatitis Area and Severity Index (ADASI), SCORing Atopic Dermatitis (SCORAD), Eczema Area and Severity Index (EASI), Six Area, Six Sign Atopic Dermatitis (SASSAD), and Three-Item Severity score (TIS). There is a strong necessity to standardize clinical evaluation of the extent and severity of skin diseases such as atopic dermatitis, as laboratory techniques and parameters are not really of great use for practitioners.

KEY WORDS atopic dermatitis; scoring system; skin inflammation; W-AZS

INTRODUCTION

Objective and detailed evaluation of the signs and symptoms of atopic dermatitis (AD) including extent and severity of skin inflammation is not an easy task. In order to verify the course of the disease depending on factors such as the treatment applied there is a strong necessity of having reliable severity scores. The importance of standardized and precise scoring systems is emphasized by the increasing need of multicenter trials carried out in different countries. Therefore, we should evaluate the same clinical parameters and minimize the interindividual differences of scoring that may invalidate the data obtained from the studies.

In general clinical practice, dermatologists rely on the screening methods of clinical evaluation of the extent and severity of skin inflammation that are by no means precise enough. In such cases clinical score is defined as mild, moderate or severe, and is definitely neither reliable, nor precise or objective. In 1978, Fredriksson and Pettersson proposed a specific scoring system for clinical evaluation of patients with psoriasis, Psoriasis Area and Severity Index (PASI) (1). It is a purely clinical method of calculating the score of extent and severity of psoriatic skin lesions. PASI score has been generally accepted by dermatologists

Acta Dermatovenerol Croat
2005;13(4):219-224

from both clinical and scientific standpoint, and is still active in practice.

In case of AD patients, the first two scoring systems were proposed by Rajka and Lageland (2) and Costa et al. (3), both in 1989. The former designed a very concise scheme based on the calculation of simple sum of three parameters (extension, course, and intensity). However, this scheme is neither precise nor objective. The extension, course and intensity are scored between 0 and 3 and based on this system AD could be classified as mild (total score 3-4), moderate (from >4 to <8) and severe (from >8 to -9). In this scoring system, data obtained from patient history are mixed up with the evaluation of itch and extent of skin lesions, so the validity of results is low. A more precise proposal was that by Costa *et al.* (3). This scoring system is much more complex, calculating the intensity of 10 signs and symptoms (from 0 to 7; 0=absence, 7=maximum), along with the involvement of 10 different symmetrical regions scored from 0 to 3 (0=absence of involvement, 3=complete involvement). The maximal total score is 100 (70 from signs and symptoms, and 30 from extension), obtained by simple addition of partial scores. The choice of severity criteria was not made according to strict evidence and skin lesions were evaluated regardless of the stage of inflammation they represented. Costa *et al*. also evaluated skin pruritus, however, using a very simplified scale. In 1991, Bahmer *et al.* (4) proposed a new score, Atopic Dermatitis Area and Severity Index (ADASI). It was based on determination of the involved skin surface by point counting. On special body diagrams, the areas involved by the inflammatory process were color coded according to the severity of inflammation (green for mild dermatitis, blue for moderate, and red for severe process). Then the result was evaluated by applying a transparent grid. To obtain final ADASI score, fractions all of the areas involved were weighted and multiplied by pruritus intensity score. Therefore, the final result was highly dependent on the subjective grade given for pruritus by the individual patient. Additionally, there were certain complications in the application of mathematical formulae in the process of calculating the final score.

In 1992, Sowden *et al.* (5) presented their proposal. This score evaluated 6 selected skin regions and basic skin lesions. The extent of skin inflammation was evaluated according to “the rule of nines” on a scale of 0, 3, 6 or 9; the severity of skin lesions was graded from 0 to 3. Skin pruritus was measured on the visual analogue scale (0-100 mm). This particular method seems to be an easy one but evaluates only selected skin areas and cannot represent the global clinical assessment of the patient.

In 1993, after more than 3 years of work, a special task force consisting of selected experts published another scoring system, SCORing Atopic Dermatitis (SCORAD) (6). This system considers both objective signs (severity and extension) and subjective symptoms (pruritus and loss of sleep). On extent evaluation, “the rule of nines” was used on a 0-100% scale dividing the whole skin area into 11 regions (A). The severity of skin lesions (B) was graded from 0 to 3 for 6 selected lesions for the representative skin region. This region was defined as representing moderate severity of the evaluated symptoms in comparison with the remaining skin areas. Both pruritus and loss of sleep (C) were scored on a 0-10 scale and the values obtained from all three parts of evaluation were then processed mathematically according to SCORAD specific formula (SCORAD A/5+7B/2+C). This score is freely available from an internet site and a dedicated software authored by Pelosi and Tripodi has been introduced to make the calculation quicker. The basic difficulty in appropriate evaluation of AD patients by SCORAD system is the issue of so-called representative region. In many scientific studies we follow patients over various time periods and therefore the representative region for the evaluated skin symptoms will obviously vary. We will then end up with some definitely confusing clinical score, and building up conclusions on such a basis is absolutely uncertain. This is our opinion, perhaps different from other authors because this score seems to be still rather popular and has been validated in many trials. For some authors, SCORAD was too complicated and time-consuming for routine clinical use. Therefore, a simplified version, the Three-Item Severity Score (TIS) (7) was produced. It seems to be suitable for general practice but not for research studies. This scoring system evaluates erythema, edema/papulation and excoriation on a 0-3 scale.

In 1996, Berth-Jones (8) established the Six Area, Six Sign Atopic Dermatitis system (SASSAD) evaluating 6 signs in 6 body regions with a scale from 0 to 3. This is a simple and effective tool for recording and monitoring disease activity in daily practice but it does not include important parameters such as pruritus or loss of sleep. It is also characterized by significant intraobserver variation, low reliability and objectivity.

Acta Dermatovenerol Croat
2005;13(4):219-224

Finally, in 1998, an American group proposed the Eczema Area and Severity Index (EASI) scoring system (9). This system first multiplies the percentage of the affected area of four skin regions by a coefficient (head/neck 0.1; trunk 0.3; upper limbs 0.2; lower limbs 0.4), and then adds this number to the severity scores of four signs measured with a scale from 0 to 3. EASI ignores pruritus, which seems to be a cardinal symptom of AD and therefore it does not provide a complete clinical scoring method. At present, a modified EASI has been introduced. This system includes a visual analogue scale for pruritus (but not for loss of sleep) evaluation. Another variant of EASI named SA-EASI has been developed in order to allow self-administered assessment of the child to the caregivers (10). This is obviously a very specific type of evaluation proposed for selected situations. EASI score was then modified to mEASI and a new variant Self-Administered EASI (SA-EASI).

None of the scoring systems mentioned above is perfect and herewith we present our proposal of clinical scoring in AD patients, named W-AZS (in Polish terminology: ***W**skaźnik dla **A**topowego **Z**apalenia **S**kóry*; Index for Atopic Dermatitis). It is based on our observations and analysis of previous scoring systems, and has been efficiently implemented in various trials performed at our Department of Dermatology and Allergic Diseases Diagnostic Center.

THE EXTENT AND SEVERITY OF SKIN INFLAMMATION INDEX FOR ATOPIC DERMATITIS PATIENTS: W-AZS

This score consists of two basic parts, i.e. evaluation of subjective elements (part I) and objective symptoms (part II). The global value of W-AZS is a simple sum of results obtained in part I and part II.

W-AZS = I + II
I – pruritus and sleep disturbances
II – extent and severity of skin inflammation

The score for pruritus is related to the extent, frequency and severity of itching (Table 1). Depending on pruritus characteristics, patient's score may range from 0 to 22 points. Sleep disturbances are evaluated on a scale from 0 to 12 points (Table 1). The final score for part I of W-AZS may range from 0 to 34 points.

Table 1. I – Evaluation of pruritus and loss of sleep in patients with atopic dermatitis

A. PRURITUS EVALUATION	POINTS
No pruritus	0
Pruritus is present:	
Extent:	
1. Single or multiple localization of pruritus	2
2. Extensive pruritus involving the whole body surface	6
Frequency:	
1. Short episodes of pruritus - less than 30 minutes	2
2. Longlasting pruritus episodes	4
3. Constant pruritus	8
Severity:	
1. Scratching is not necessary	2
2. Scratching is necessary	4
3. Anxiety and irritation caused by pruritus	8
B. LOSS OF SLEEP EVALUATION	
1. No loss of sleep	0
2. Problems in falling asleep	3
3. Night awakening caused by pruritus	6
4. Sleeplessness	12

I = A + B

Acta Dermatovenerol Croat
2005;13(4):219-224

Part II of this scoring system evaluates severity of skin lesions (Table 2, B), each on a scale of 0 (absent), 1 (mild), 2 (moderate) or 3 (severe) at 12 sites of the body surface (face and neck; scalp and nucha; trunk – anterior surface; trunk – posterior surface; right arm; right forearm and hand; left arm; left forearm and hand; right thigh; right shank and foot; left thigh; left shank and foot). Coefficient 3 is applied for acute skin lesions (erythema/edema; vesicles/erosions), coefficient 2 for crusts and scaling, and coefficient 1 for chronic skin lesions (lichenification and pigmentation). Therefore, this system has an advantage of differentiating acute and chronic types of inflammatory skin lesions. The extent of skin lesions (Table 2, A) is measured on a scale of 0 (absent), 1 (1%-10%), 2 (11%-30%) and 3 (31%-100% of skin surface involved). For precise evaluation there is a specific coefficient calculated for each region in relation to the surface of the particular site: coefficient 1 for 4.5%; 2 for 9%, and 4 for 18% of the whole body surface. Multiplication of the results calculated for the extent and severity of skin inflammation yields a value for each particular region (A x B). This value is then divided by 10, representing the score for the region [(A x B):10]. Finally, summing up 12 results indicates overall extent and severity of skin inflammation. The maximum score is 178 points. The final step is to sum up the results of part I and part II.

DISCUSSION

An objective and precise clinical scoring system for AD patients was one of our aims in the complex project on AD launched at the Department of Dermatology and Allergic Diseases Diagnostic Center in Poznań. In 1983, the first proposal was released (11). It was a simple method based on evaluation of the extent of skin lesions scored between 0 and 3, and severity of skin inflammation graded from 0 to 4. This system, although relatively simple, was not objective enough and created certain interindividual variabilities. Therefore it could not be freely applied in scientific projects. Further investi-

Table 2. II – Evaluation of extent and severity of skin inflammation in patients with atopic dermatitis

Extent of skin	lesions A	Severity of skin inflammation erythema edema	vesicles erosions	crusts scaling	lichenification pigmentation B	AxB 10
1. Face and neck	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
2. Scalp and nucha	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
3. Trunk (anterior surface)	( )x4=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
4. Trunk (posterior surface)	( )x4=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
5. Right arm	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
6. Right forearm and hand	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
7. Left arm	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
8. Left forearm and hand	( )x1=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
9. Right thigh	( )x2=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
10. Right shank and foot	( )x2=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
11. Left thigh	( )x2=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
12. Left shank and foot	( )x2=	( )x3 +	( )x3 +	( )x2 +	( ) = ...	.....
					TOTAL	.....

- Score extent of skin lesions from 0 to 3:
  - 0 = absent
  - 1 = 1%-10% of skin surface involved
  - 2 = 11%-30% of skin surface involved
  - 3 = 31%-100% of skin surface involved

- Score severity of skin inflammation from 0 to 3:
  - 0 = absent
  - 1 = mild
  - 2 = moderate
  - 3 = severe

Total W-AZS : **I** + **II**

gations were inspired by PASI score published by Fredriksson and Pettersson (1). While working on the scoring system we aimed to create an evaluating method both for subjective and objective signs and symptoms for patients with AD. It is obvious that a reliable clinical index is absolutely necessary to study a disease using the quality criteria required by the modern evidence-based medicine. It is also important that the scoring method enables the clinician to describe the inflammatory process involving all skin regions as well as to compare the clinical picture of selected patients at various time points. According to W-AZS, clinical evaluation of patients is divided into two separate parts: I subjective elements and II objective features. Therefore, depending on the study design, prospective part I or part II may also be implemented to the project independently. In case of skin pruritus and loss of sleep we always rely on patient's opinion and this score is generally difficult and "truly subjective". Our scoring system presents a detailed evaluation of itch graded from 0 to 22 points. For loss of sleep scoring we applied values from 0 to 12, from absence of loss of sleep to sleeplessness, respectively. It seems that evaluation of subjective features in AD requires a complex approach while no objective tools are available. In evaluation of the extent of skin lesions we used "the rule of nines", dividing the overall body surface into 12 regions (Table 2). The percentage of skin surface involved by inflammation was scored as it was done in the proposal published in 1983 (11).The most important difference has been made in grading the severity of skin inflammation. We evaluate the following skin lesions that are related to the inflammatory process: erythema/edema; vesicles/erosions; crusts/scaling; and lichenification/pigmentation. We assumed that various skin lesions correspond to different stages (acute, subacute or chronic) of the skin inflammatory process and therefore we introduced a corresponding coefficient (from 0 to 3) to the evaluated lesions in calculation of the skin inflammation severity. Such an approach has never been proposed before and in our opinion it improves considerably the validity of the scoring system. Especially in terms of scientific research differentiation of acute and chronic skin lesions as representation of the inflammatory process seems to be crucial for appropriate clinical scoring. W-AZS may at the first glance be a relatively complicated method but when applied in practice it appears to be easy and rather simple. In our opinion it is a thorough and comprehensive system indicated for research purposes. It is relatively little time-consuming, training of the staff is easy, and therefore it may be applied to large-scale epidemiological studies. At the Department of Dermatology and Allergic Diseases Diagnostic Center, W-AZS has been used for various clinical trials for 6 years now and we did not record any significant interindividual differences of the evaluations performed (data in press). Therefore, we believe that W-AZS meets the criteria of an objective scoring system for AD patients.

If we compare W-AZS with other scoring systems applied in AD evaluation on theoretical basis, the result is favorable for our index. Obviously further studies, especially comparative trials, will be performed in the future. We are planning evaluation of the objectivity and reliability of W-AZS scoring system at our center and in multicenter studies. We hope to present the results of these projects for publication soon.

In conclusion, W-AZS is a relatively objective clinical scoring system for AD patients. It contains evaluation of both objective and subjective features in all stages of the disease, describes inflammatory process in all skin regions, and enables us to monitor the course of the disease at different time points. W-AZS appeared to be a reliable tool in our trials (13-17), and considering the fact that none of the systems presented above is perfect, we advise to consider this index for further investigations.

References

1. Fredriksson T, Pettersson U. Severe psoriasis – oral therapy with a new retinoid. Dermatologica 1978;157:238-40.
2. Rajka G, Lageland T. Grading of the severity of atopic dermatitis. Acta Derm Venereol (Stockh) 1989;144:13-4.
3. Costa C, Rilliet A, Nicolet M. Scoring atopic dermatitis: the simpler the better? Acta Derm Venereol (Stockh) 1989;69:41-5.
4. Bahmer FA, Schäfer J, Schubert HJ. Atopic dermatitis area and severity index: the ADASI score. Arch Dermatol 1991;127:1239-40.
5. Sowden JM, Berth-Jones J, Ross JS, Motley RJ, Marks R, Finlay AY, *et al.* Double-blind, controlled, crossover study of cyclosporin in adults with severe refractory atopic dermatitis. Lancet 1991;338:137-9.
6. Stalder JF, Taieb A, Atherton DJ, Bieber T, Bonifazi E, Broberg A, *et al.* Severity scoring of atopic dermatitis: the SCORAD index. Consensus report of the European Task Force on atopic dermatitis. Dermatology 1993;186:23-31.

7. Wolkerstorfer A, De Waard van Der Spek FB, Glazenburg EJ, Mulder PG, Oranje AP. Scoring the severity of atopic dermatitis: three item severity score as rough system for daily practice and as a pre-screening tool for studies. Acta Derm Venereol 1999;79:356-9.
8. Berth-Jones J. Six Area, Six Sign Atopic Dermatitis (SASSAD) severity score: a simple system for monitoring disease activity in atopic dermatitis. Br J Dermatol 1996;135:25-30.
9. Hanifin JM, Thurston M, Omoto M, Cherill R, Tofte SJ, Graeber M. The eczema area and severity index (EASI): assessment of reliability in atopic dermatitis. EASI Evaluator Group Exp Dermatol 2001;10:11-8.
10. Housman TS, Patel MJ, Camacho F, Feldman SR, Fleischer AB Jr, Balkrishnan R. Use of self-administered eczema area and severity index by parent caregivers: results of a validation study. Br J Dermatol 2002;147:1192-8.
11. Silny W. Chemotaksja leukocytów, immunoglobulina E oraz niektóre subpopulacje limfocytów u chorych na atopowe zapalenie skóry. Praca na stopień doktora habilitowanego nauk medycznych, Poznań, 1983.
12. Silny W, Czarnecka-Operacz M, Gołębka E, Silny P. Punktowy wskaźnik oceny stanu klinicznego chorych na atopowe zapalenie skóry. Przeg Derm 1999;86:215-22.
13. Czarnecka-Operacz M. Total IgE and antigen specific IgE in patients with atopic dermatitis and airborne allergy treated with specific immunotherapy. Int Rev Allergol Clin Immunol 2001;7:16-26.
14. Czarnecka-Operacz M, Silny W, Sobieska M. Serum levels of IFN-γ, IL-2, IL-4, IL-5 and IL-10 in the course of specific immunotherapy of patients with atopic dermatitis. Int Rev Allergol Clin immunol 2001;7:27-33.
15. Silny P, Czarnecka-Operacz M, Silny W. Znaczenie reakcji alergicznej typu natychmiastowego wywołanej przez alergeny powietrznopochodne w atopowym zapaleniu skóry. Pol Merk Lek 2004;93:245-50.

With Nivea cream on air and sun!
From the Nivea collection of Zlatko Puntijar