Scoring systems in dermatology

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Dermatologists have the privilege of examining the largest organ of the body. However, unlike other organs, there are hardly any tests of clinical significance that measure skin function. In dermatological practice, methods of evaluating the severity of skin diseases are often crude, subjective and not reproducible, which creates discrepancy in results and inter-individual variations. Hence, to maintain objectivity in observations, scores are used to evaluate the severity of skin diseases. This is particularly important for monitoring the response to therapy and for evaluating the efficacy of new drugs. Over the years scoring systems have been developed for a number of skin diseases. This has greatly helped the cause of clinical practice and clinical research.

This article deals with scores that are commonly used and uniformly accepted for the ease of assessment of common skin diseases.

ATOPIC DERMATITIS

Scores that are commonly used for objective assessment of atopic dermatitis are

1. SCORing Atopic Dermatitis (SCORAD)
2. The Six Area, Six Sign Atopic Dermatitis (SASSAD) severity score

SCORAD (SCORING ATOPIC DERMATITIS)[1]

Developed by the European Task Force on atopic dermatitis in 1993, it is the most commonly used scoring system for measuring the severity of atopic dermatitis. It is used to standardize the assessment of atopic dermatitis and to help in the interpretation of therapeutic studies.

The SCORAD Index is a composite score based on 3 subscores:
A = The extent score based on body surface area calculated using the 'Rule of 9'.
B = Intensity score based on 6 clinical findings in atopic dermatitis, namely erythema, edema or papulations, oozing or crusting, excoriation, lichenification, dryness, graded on a scale of 0 – 3 (0- absent, 1- mild, 2- moderate, 3- severe).
C = The score for pruritus and sleep loss graded on a visual analog scale of 0 to 10. The severity is based on the average extent for the last 3 days or nights.
Final formula for calculation of SCORAD is as follows:
$SCORAD = A/5 + 7(B/2) + C$

The disadvantage of this scoring system is the significant interobserver variation which makes subsequent assessment of the patient by the same observer necessary.

SASSAD[2]

The Six Area, Six Sign Atopic Dermatitis severity score has proved to be a simple and effective system for recording and monitoring disease activity in atopic dermatitis. The score is obtained by grading six signs

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(erythema, exudation, excoriation, dryness, cracking and lichenification), each on a scale of 0 (absent), 1 (mild), 2 (moderate), or 3 (severe), at each of six sites (arms, hands, legs, feet, head and neck, trunk). The maximum score is 108.

A modified version of the SASSAD known as the six-area 'total body severity assessment (TBSA)' has also been described. The TBSA, which has a maximum score of 108, differs from SASSAD in that it assesses infiltration and vesicles and/or papules, and excludes lichenification.[3]

Other scores in AD that are uncommonly used are listed in Table 1.

PSORIASIS

Psoriasis area severity index (PASI)[10]

This is currently the gold standard score for the assessment of extensive psoriasis, but has the limitation of interobserver variation. Four sites of affection, the head (h), upper limb (u), trunk (t) and lower limbs (l), are separately scored by using three parameters, erythema, induration and desquamation, each of which is graded on a severity scale of 0 to 4, where 0 = nil, 1 = mild, 2 = moderate, 3 = severe and 4 = very severe. The area-wise percentage involvement of the involved sites is calculated as: 1 = less than 10% area; 2 = 10-29%; 3 = 30-49%; 4 = 50-69%; 5 = 70-89%; and 6 = more than 90%.

The final formula for PASI score is:
PASI = 0.1 (Eh + Ih + Dh) Ah + 0.2 (Eu + Iu + Du) Au + 0.3 (Et + It+ Dt) At + 0.4 (El + Il + Dl) Al

The maximum score of PASI is 72. PASI 75 is a 75% reduction of baseline PASI score. It is commonly considered as a denominator for satisfactory results of any treatment modality for psoriasis.

Other scores that are used for psoriasis are stated in Table 2.

TOXIC EPIDERMAL NECROSIS (TEN)

The score commonly used for assessing the patients of TEN is SCORTEN.[14] Scoring is based on the evaluation of seven independent risk factors within the first 24 hours of admission.

One point is assigned to each variable. The value of the total number of points determines the predicted mortality: 0-1 points-3.2% mortality; 2 points-12.1%; 3-35.3%; 4-58.3%; ≥5-90%. [Table 3]

VITILIGO

Two scores designed for the assessment of vitiligo are vitiligo area severity index (VASI)[15] and vitiligo disease activity score (VIDA).[16]

Table 1: Scores in atopic dermatitis

Score	Remarks
ADASI (Atopic dermatitis area severity index score)[4]	Uses a three color-coding system of body charts and counting grid to measure the number of points falling on the different areas
The Leicester score for atopic dermatitis disease activity[5]	Forerunner to the SASSAD index. Involves assessing 10-body zones for erythema, excoriation, dryness, cracking, and lichenification, giving a maximum score of 150
Grading score of Rajka and Langeland for severity of atopic dermatitis	Most suitable for baseline assessment rather than for monitoring severity
Simple scoring system for atopic dermatitis of Costa *et al*[6]	Scores 10 severity criteria (0-7) and 10 topographic sites (0-3) giving a maximum score of 100
Basic clinical scoring system (BCSS)[5]	Simple score that assesses the presence or absence of disease in 5 body sites, giving a total score of 5
Atopic dermatitis severity index (ADSI)[7]	Assessment of erythema, pruritus, exudation, excoriation, and lichenification, each on a scale of 0 to 3 to give a maximum score of 15
Assessment measure for atopic dermatitis (ADAM)[8]	Most recently developed. Assessment of 6 body areas for scale and/or dryness, lichenification, erythema, and excoriations (0-3), and 4 further body areas for the presence or absence of eczema
Eczema area severity index (EASI)[9]	Composite index that includes an assessment of erythema, infiltration and/or papulation, excoriation and lichenification, each on a scale of 0-3

Table 2: Scores in psoriasis

Score	Remarks
Evaluation for prognosis with averaged PASI (E-PAP)[11]	New method for evaluating clinical symptoms of psoriasis during the observation period, by adding a parameter of time (the number of days of a disease) to PASI
Salford psoriasis index (SPI)[12]	Measures the current extent, psychosocial disability and past severity of the disease
Self administered psoriasis area and severity index (SAPASI)[13]	Consists of a silhouette of a body for patients to shade in affected areas and of three modified visual analog scales for recording the redness, thickness, and scaliness of an average lesion

Table 3: Scorten for ten

Variable	Value
Age	≥40 year
Concurrent illness (malignancy)	Present
Heart rate	≥120 per minute
Body surface area involved at day 1	≥10%
Serum blood urea nitrogen	> 28 mg/dl (>10 mmol/L)
Serum bicarbonate	< 20 mEq/L (<20 mmol/L)
Serum glucose	> 252 mg/dl (>14 mmol/L)

Vitiligo area severity index

The percentage of vitiligo involvement is calculated in terms of hand units. One hand unit (which encompasses the palm plus the volar surface of all digits) is approximately equivalent to 1% of the total body surface area. The degree of pigmentation is estimated to the nearest of one of the following percentages: 100% - complete depigmentation, no pigment is present; 90% - specks of pigment present; 75% - depigmented area exceeds the pigmented area; 50% - pigmented and depigmented areas are equal; 25% - pigmented area exceeds depigmented area; and 10% - only specks of depigmentation present.

The VASI for each body region is determined by the product of the area of vitiligo in hand units and the extent of depigmentation within each hand unit measured patch.

Total body VASI = Σ All body sites [Hand Units] $\times$ [Residual depigmentation]

Vitiligo disease activity score (VIDA)

The VIDA is a six-point scale for assessing vitiligo activity. Scoring is based on the individual's own opinion of the present disease activity over time. Active vitiligo involves either expansion of existing lesions or appearance of new lesions. Grading is as follows: VIDA Score +4 – Activity of 6 weeks or less duration; +3 – Activity of 6 weeks to 3 months; +2 – Activity of 3 - 6 months; +1 – Activity of 6 - 12 months; 0 - Stable for 1 year or more; and -1 - Stable with spontaneous repigmentation since 1 year or more. A low VIDA score indicates less activity.

SCLERODERMA

Scores used for scleroderma are summerized in Table 4.

HIRSUTISM

The Ferriman and Gallwey score[22] measures hirsutism in women by the degree of hair growth in 11 body regions, out of which the forearm and hand, lower leg and feet are not included in the "hormonal" score. This is a time consuming and apparently complex semiquantitative scoring system for hirsutism. [Table 5]

Even if hirsutism is present bilaterally on the

Table 4: Scores in scleroderma

Score	Remarks
Hidebinding/Tethering skin score of Furst *et al.* for scleroderma[17,18]	Sites examined include the face, back, chest, abdomen, arms, forearms, hands, thighs, legs, and feet. The grading of tethering is: 0 - skin not tethered or bound down; 1 - mild tethering; 2 - moderate tethering; and 3 - severe tethering. The skin score is the total of all points for all sites. The maximum score is 30
Rodnan skin score in scleroderma[17]	Examination of 26 sites and grading on a scale of 0 to 4. Involved maximum score is 104. Too extensive and tedious
Modified Rodnan skin score in scleroderma using 17 sites[19]	Involves evaluation of fewer sites (17 rather than 26) and fewer grades (0 to 3 instead of 0 to 4)
Modified Rodnan skin score in scleroderma using 5 sites[20]	Simple score of 5 sites and grading of 0 to 2. Maximum score is 10.
Kahaleh skin score in scleroderma[21]	Measures skin thickening at 22 sites and a grading of 0 to 3

Table 5: Semiquantitative scoring system for hirsutism

Grades	Upper lip	Chin	Chest	Upper back	Lower back	Upper abdomen	Lower abdomen	Upper arm and thigh	Forearm and legs
1	Few hairs at the outer margin	Few scattered hairs	Circumareolar hairs	Few scattered hairs	sacral tuft of hair	Few midline hairs	Few mid-line hairs	Sparse growth affecting not more than a quarter of the limb surface	-
2	Small moustache at outer margin	Scattered hairs with small concentrations	Circumareolar hairs with mid-line hair	More than a few scattered hairs but still scattered	Sacral tuft of hair with some lateral extension	Rather more but still mid-line	Mid-line streak of hair	More than a quarter coverage but still incomplete	-
3	Moustache extending halfway from outer margin	Complete cover, light	Fusion of circumareolar hairs with mid-line hair, giving three quarter cover	Complete cover, light	Three-quarter cover	Half cover	Mid-line band of hair	Complete cover light	-
4	Moustache extending to the midline	Complete cover, heavy	Complete cover	Complete cover, heavy	Complete cover	Complete cover	An inverted V-shaped growth	Complete cover, heavy	Complete cover, heavy

extremities (upper arms, forearms, thighs and lower legs), only a single value is entered.

Ferriman Gallwey hormonal hair score = Sum of all scores.

The minimum score is zero and the maximum is 36. Obviously, the higher the score, the more hirsute is the woman. A score of less than 8 is considered as non hirsute, 8-16 as mild hirsutism, 17-25 as moderate hirsutism, and more than 25 as severe hirsutism. A score of more than 6 in Caucasian women indicates abnormal hair distribution. Each ethnic group may have a different upper limit of the normal value.

PEMPHIGUS VULGARIS[23]

Pemphigus area and activity score (PAAS) is a specific scoring system that has been suggested by Agarwal *et al*[23] for the clinical assessment of severity and progression of pemphigus vulgaris. PAAS is calculated separately for cutaneous and mucus membrane lesions [Tables 6 and 7]. Total score is calculated by adding up the cutaneous score and the mucous membrane score.

MELASMA

Melasma area severity index (MASI) is developed by Kimbrough-Green *et al* for the assessment of melasma.[24] The severity of the melasma in each of the four regions (forehead, right malar region, left malar region and chin) is assessed based on three variables: percentage of the total area involved (A), darkness (D), and homogeneity (H).

A numerical value assigned for the corresponding percentage area involved is as follows: 0=no involvement; 1=<10% involvement; 2=10-29% involvement; 3=30-49% involvement; 4=50-69% involvement; 5=70-89% involvement; and 6=90-100% involvement. The darkness of the melasma (D) is compared to the normal skin and graded on a scale of 0 to 4 as follows: 0=normal skin color without evidence of hyperpigmentation; 1=barely visible hyperpigmentation; 2=mild hyperpigmentation; 3=moderate hyperpigmentation; 4=severe

Table 6: Pemphigus area and activity score for cutaneous lesions

Clinical markers	Clinical scores						
	0	1	2	3	4	5	6
A: Activity							
a. No. of new blisters/day	0	1-5	6-10	11-20	>20	-	-
b. Peripheral extension of existing blisters	Nil	Mild	Moderate	Extensive	-	-	-
c. Nikolsky's sign	Negative	Perilesional	Distant	-	-	-	-
B: Area (%)	Nil	0-15	16-30	31-50	51-70	71-90	>90

Head score (H) = [(a+b+c)× score of area] × 0.1, Trunk score (T) = [(a+b+c)× score of area] × 0.3, Upper limbs score (UL) = [(a+b+c)× score of area] × 0.2, Lower limbs score (LL) = [(a+b+c) × score of area] × 0.4, Total cutaneous score = H + T + UL + LL

Table 7: Pemphigus area and activity score for lesions on mucous membranes

	Clinical scores			
Markers	0	1	2	3
Area	Nil	1 site	2 sites	>2 sites
Severity	Nil	Mild	Moderate	Severe

Mucous membrane score (MM) = Area score + Severity score

hyperpigmentation. Homogeneity of the hyperpigmentation (H) is also graded on a scale of 0 to 4 as follows: 0=normal skin color without evidence of hyperpigmentation; 1=specks of involvement; 2=small patchy areas of involvement <1.5 cm diameter; 3=patches of involvement >2 cm diameter; 4=uniform skin involvement without any clear areas).

To calculate the MASI score, the sum of the severity grade for darkness (D) and homogeneity (H) is multiplied by the numerical value of the areas (A) involved and by the percentages of the four facial areas (10-30%).

Total MASI score: Forehead 0.3 (D+H)A + right malar 0.3 (D+H)A + left malar 0.3 (D+H)A + chin 0.1 (D+H)A

ACNE VULGARIS

Scoring systems for assessment of acne vulgaris are used in some clinical trials. Salient features of some of these scoring systems like Modified Cook's method,[25] Leeds technique[26] and severity index described by Michaelsson,[27] are described here [Table 8].

URTICARIA

Urticaria activity score (UAS)

The UAS consisted of the sum of the wheal number score and the itch severity score.[28] The wheal numbers are graded from 0 to 3 as follows: 0 - less than 10 small wheals (diameter, < 3 cm); 1- 10 to 50 small wheals or less than 10 large wheals (diameter, > 3 cm); 2 - greater than 50 small wheals or 10 to 50 large wheals; and 3 - almost the whole body is covered. The severity of the itching is graded from 0 to 3 (0, none; 1, mild; 2, moderate; and 3, severe).

ALOPECIA AREATA

In a study comparing efficacy of azelaic acid and anthralin for patchy alopecia areata, Sansaz *et al* used terminal hair regrowth score (RGS) which encompasses a scale ranging from 0 (inadequate response) to 2 (complete response).[29]

National Alopecia Areata Foundation working committee has devised "Severity of Alopecia Tool score" (SALT score).[30] Scalp is divided into 4 areas

Table 8: Scoring systems for assessment of acne vulgaris

Score	Salient features
Modified Cook's method	Reliable method since photographic reference standard is required. Used only for facial lesions. Grading, ranging from 0-9, is used for one group that includes comedones, papules and macules. Overall severity is graded on another scale of 0-8 that also includes pustules, nodules and cysts.
Leeds technique	Complex score but also includes assessment of lesions over face as well as over back and chest. No photographic reference is required. Face is divided into right and left halves and counting is done on both sides.
Severity index [Michaelsson]	Simple score, by counting the number of open or closed comedones, papules, pustules and infiltrated lesions. Severity index is 0.5 for comedones, 1 for a papule, 2 for a pustule, 3 for infiltrated lesion and 4 for cystic lesions. Multiplying each type of lesion with its severity index and adding them together calculated the total severity score.

namely, Vertex - 40% (0.4) of scalp surface area; right profile of scalp - 18% (0.18) of scalp surface area; left profile of scalp - 18% (0.18) of scalp surface area; Posterior aspect of scalp - 24% (0.24) of scalp surface area. Percentage of hair loss in any of these areas is percentage hair loss multiplied by percent surface area of the scalp in that area. SALT score is the sum of percentage of hair loss in all above mentioned areas. For e.g., if the percentage hair loss in vertex, right profile, left profile and posterior aspect is 20, 30, 40 and 50% respecively; then, SALT score = $(20 \times 0.4) = (30 \times 0.18) + (40 \times 0.18) + (50 \times 0.24) = 8+5.4+7.2+12 = 32.6$

DYSHIDROTIC ECZEMA

Dyshidrotic eczema area and severity index (DASI) is proposed for dyshidrotic eczema.[31]

Dyshidrotic eczema area and severity index (DASI)
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 = $(pV + pE = pS + pI) \times pA$. DASI was found to be a simple and useful tool to assess the severity of dyshidrotic eczema and the effect of therapy.

Thus application of mind helps to design scores for semi-objective assessment of skin diseases. Till better objective parameters are developed, scores will continue to remain the gold standard for assessing the severity of dermatological diseases in clinical research.

REFERENCES

1. European Task Force on Atopic Dermatitis. Severity scoring of atopic dermatitis: The SCORAD Index. Dermatology 1993;186:23-31.
2. Jones B. 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.
3. Van Joost TH, Heule F, Korstanje M, Van den Broek MJ, Stenveld HJ, Van Vloten WA. Cyclosporin in atopic dermatitis: A multicentre placebo-controlled study. Br J Dermatol 1994;130:634-40.
4. Bahmer FA, Schubert HJ. Quantification of the extent and severity of atopic dermatitis: The ADASI score. Arch Dermatol 1991;127:1239-40.
5. Charman C, Williams H. Outcome measures of disease severity in atopic eczema. Arch Dermatol 2000;136:763-9.
6. Costa C, Rilliet A, Nicolet M, Saurat JH. Scoring atopic dermatitis: The simpler the better? Acta Derm Venereol (Stockh) 1989;69:41-5.
7. Van Leent EJ, Gräber M, Thurston M, Wagenaar A, Spuls PI, Bos JD. Effectiveness of the ascomycin macrolactam SDZ ASM 981 in the topical treatment of atopic dermatitis. Arch Dermatol 1998;134:805-9.
8. Charman D, Varigos G, Horne DJ, Oberklaid F. The development of a practical and reliable assessment measure for atopic dermatitis (ADAM). J Outcome Meas 1999;3:21-34.
9. Cherill R, Graeber M, Hanifin J, Omoto M, Thurston M, Tofte S. Eczema area and severity index (EASI): A new tool to evaluate atopic dermatitis [abstract]. J Eur Acad Dermatol Venereol 1998;11:48.
10. Fredriksson T, Pettersson U. Severe psoriasis – Oral therapy with a new retinoid. Dermatologica 1978;157:238-44.
11. Sugai J, Ozawa A, Kawakubo Y, Izuka M, Miyahara M, Okhido M. New method for determining prognosis of patients with psoriasis (E-PAP). J Dermatol Sci 1998;16:165-9.
12. Kirby B, Fortune DG, Bhushan M, Chalmers RJ, Griffiths CE. The Salford Psoriasis Index: An holistic measure of psoriasis. Br J Dermatol 2000;142:728-32.
13. Fleischer AB Jr, Rapp SR, Reboussin DM, Vanarthos JC, Feldman SR. Patient measurement of psoriasis disease severity with a structured instrument. J Invest Dermatol 1994;102:967-9.
14. Bastuji-Garin S, Fouchard N, Bertocchi M, Roujeau JC, Revuz J, Wolkenstein P. SCORTEN: A Serverity-of-Illness Score for Toxic Epidermal Necrolysis. J Invest Derm 2000;115:149-53.
15. Hamzavi I, Jain H, McLean D, Shapiro J, Zeng H, Lui H. Parametric modeling of narrowband UV-B phototherapy for vitiligo using a novel quantitative tool: The Vitiligo Area Scoring Index. Arch Dermatol 2004;140:677-83.
16. Njoo MD, Das PK, Bos JD, Westerhof W. Association of the Koebner phenomenon with disease activity and therapeutic responsiveness in Vitiligo Vulgaris. Arch Dermatol 1999;135:407-13.
17. Pope JE, Baron M, Belamy M, Campbell J, Carette S, Chalmers I, *et al*. Variability of skin scores and clinical measurements in scleroderma. J Rheumatol 1995;22:1271-6.
18. Clements PJ, Lachenbruch PA, Ng SC, Simmons M, Sterz M, Furst DE. Skin Score. A semiquantitative measure of cutaneous involvement that improves prediction of prognosis in systemic sclerosis. Arthritis Rheum 1990;33:1256-63.
19. Clements P, Lachenbruch P, Seibold J, White G, Weiner S, Martin R, *et al*. Inter and intraobserver variability of total skin thickness score (modified Rodnan TSS) in systemic sclerosis. J Rheumatol 1995;22:1281-5.
20. Silman A, Harrison M, Brennan P. Is it possible to reduce observer variability in skin score assessment of scleroderma. J Rheumatol 1995;22:1277-80.
21. Kahaleh MB, Sultany GL, Smith EA, Huffstutter JE, Loadholt CB, LeRoy EC. A modified scleroderma skin scoring method. Clin Exp Rheumatol 1986;4:367-9.
22. Ferriman D, Gallwey JD. Clinical assessment of body hair growth

in women. J Clin Endocrinol 1961;21:1440-7.
23. Agarwal M, Walia R, Kochar AM, Chander R. Pemphigus Area and Activity Score (PAAS) – A novel clinical scoring method for monitoring of pemphigus vulgaris patients. Int J Dermatol 1998;37:158-60.
24. Kimbrough-Green CK, Griffiths CE, Finkel LJ, Hamilton TA, Bulengo-Ransby SM, Ellis CN, *et al*. Topical retinoic acid (tretinoin) for melasma in black patients. A vehicle-controlled clinical trial. Arch Dermatol 1994;130:727-33.
25. Cook CH, Centner RL, Michaels SE. An acne grading method using photographic standards. Arch Dermatol 1979;115:571-5.
26. Burke BM, Cunliffe WJ. The assessment of acne vulgaris-The Leeds technique. Br J Dermatol 1984;111:83-92.
27. Michaelsson G, Juhlin L, Vahlquist A. Effect of oral zinc and Vitamin A in acne. Arch Dermatol 1977;113:31-6.
28. Erbagci Z. The leukotriene receptor antagonist montelukast in the treatment of chronic idiopathic urticaria: A single-blind, placebo-controlled, crossover clinical study. J Aller Clin Immunol 2002;110:484-8.
29. Sasmaz S, Arican O. Comparison of azelaic acid and anthralin for the therapy of patchy alopecia areata: A pilot study. Am J Clin Dermatol 2005;6:403-6.
30. Olsen EA, Hordinsky MK, Price VH, Roberts JL, Shapiro J, Canfield D, *et al*. National Alopecia Areata Foundation. Alopecia areata investigational assessment guidelines. part II. National Alopecia Areata Foundatin. J Am Acad Dermatol 2004;51: 440-7.
31. Vocks E, Plotz SG, Ring J. The Dyshidrotic Eczema Area and Severity Index - A score developed for the assessment of dyshidrotic eczema. Dermatology 1999;198:265-9.