Psoriasis: Epidemiology, clinical features, co-morbidities, and clinical scoring

Sunil Dogra, Rahul Mahajan

Department of Dermatology, Venereology and Leprology, Post-Graduate Institute of Medical Education and Research, Chandigarh, India

ABSTRACT

On the basis of current evidence derived from hospital-based studies, mostly from North India, the prevalence of psoriasis in adults varies from 0.44 to 2.8%, with a much lower prevalence in children. The peak age at onset in adults is in the third and fourth decade of life, with a slight male preponderance. It is recommended that population-based large epidemiologic studies should be undertaken in different parts of the country for estimating the correct prevalence of psoriasis in general population. Chronic plaque-type psoriasis is the most common morphologic presentation of psoriasis, accounting for more than 90% of all cases. Other morphologic variants that deserve special mention include palmoplantar psoriasis, pustular psoriasis, and recalcitrant psoriasis.For epidemiologic purposes, psoriasis can be classified into early and late onset psoriasis. Psoriasis can be classified on the basis of morphology and extent of involvement into localized and widespread disease.For the purpose of clinical trials, psoriasis may be classified as mild psoriasis, moderate psoriasis, and severe psoriasis. The literature shows that there is a significant risk of psoriatic arthritis (7–48%) in patients with plaque-type psoriasis. Hence, it is recommended to evaluate for its presence by detailed history taking and clinical examination, and if necessary, by appropriate radiological investigations. Evidence on the association between plaque-type psoriasis and cardiovascular disease risk factors and ischemic heart disease isinconsistent.On the basis ofavailable evidence, it is prudent to proactively look for metabolic syndrome, dyslipidemia, and obesity, especially in patientswith severe psoriasis (Level 1+ evidence based on systematic reviews and meta-analysis). Based on the current evidence, the psoriasis area severity index appears to be the most valid and reproducible clinical severity score in the management of adult patients with plaque-type psoriasis.

Key words: Co-morbidities, epidemiology, psoriasis, severity scoring

Access this article online
Website: www.idoj.in
DOI: 10.4103/2229-5178.193906
Quick Response Code:

Address for correspondence:
Dr. Sunil Dogra, Department of Dermatology, Venereology and Leprology, Post Graduate Institute of Medical Education and Research, Chandigarh - 160 012, India.
E-mail: sundogra@hotmail.com

INTRODUCTION

Psoriasis is a chronic inflammatory immune-mediated proliferative skin disorder that predominantly involves the skin, nails, and joints. Robert Willan, the father of modern dermatology, is credited with the first detailed clinical description of psoriasis, and hence, it is also termedas *Willan'slepra*.[1] The association between arthritis and psoriasis was described for the first time by Alibert in 1818, and the American Rheumatology Association recognized it as a separate entity in 1964.

Epidemiology

The worldwide prevalence of psoriasis is estimated to be approximately 2–3%.[2] Although the disease is known to have higher prevalence in the polar regions of the world, its burden in a tropical/subtropical country like India cannot be underestimated.In a diverse country such as India, the prevalence of psoriasis may vary from region to region due to variable environmental and genetic factors. We found only six studies, mostly in a hospital setting, from North India estimating the prevalence of disease among adult dermatologic patients [Table 1].[3-8] A higher prevalence in males has been reported with a peak age at onset is in the third and fourth decade of life.[9,10] In one of the larger studies from Northern India, point prevalence of pediatric psoriasis was estimated to be 0.0002%.[11] The peak age at onset among boys is in the

This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as the author is credited and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

Cite this article as: Dogra S, Mahajan R. Psoriasis: Epidemiology, clinical features, co-morbidities, and clinical scoring. Indian Dermatol Online J 2016;7:471-80.

Table 1: Epidemiologic studies of psoriasis in adults in India

	Okhandiar *et al.*; 196363	Bedi *et al.*; 1977	Kaur *et al.*; 1986	Bedi *et al.*; 1995	Kaur *et al.*; 1997	Asokan *et al.*; 2011
No. of patients	3573	162	782	530	1220	275
Prevalence (% of total dermatologic outpatients)	1.02	0.8	1.4	2.8	2.3	-
M:F	2.46:1	2.5:1	2.3:1	2.4:1	2.03:1	2.9:1
Peak age at onset	3rd and 4th decade	3rd and 4th decade	-	3rd and 4th decade	-	38.9±14.5 years
Mean age of males and females	Comparable	Lower in females	Lower in females	-	Lower in females	Males: 40.3±13.4 Females: 34.7±16.4

6–10 years age group compared to girls in 11–15 years age group.[12] A positive family history may be elicited in 9.8-28% of the children. The age at onset of psoriatic arthritis varies from 35 to 50 years with no sex predilection. Nearly 70% of the patients develop psoriasis before articular involvement; in another 15%, arthritis precedes the onset of psoriasis by more than 1 year, and in the remaining 15% of the cases, the two conditions occur within 12 months of each other.[13] The yearly estimated incidence and prevalence of psoriatic arthritis are, respectively, 3.0–23.1 cases/100,000 and 1–420 cases/100000 people,[14-21] with similar results in Western countries and in China. Prey *et al*. in their systematic review of literature concluded that psoriatic arthritis may affect upto 24% of patients with psoriasis.[14] Such data is lacking among Indian patients. In children, arthritis may precede psoriasis in 50% of cases. The mean age of onset in children is 9–10 years with female predominance.[22]

DEFINITIONS, CLASSIFICATION, AND CLINICAL PRESENTATION

Psoriasis

There is no clear definition or criteria proposed for the diagnosis of psoriasis as the diagnosis is essentially clinical. Based on the current understanding of its pathogenesis, psoriasis can be defined as a papulosquamous disorder characterized by disordered keratinization arising due to T cell-mediated immune dysregulaion. Epidemiologically, psoriasis has been classified into early onset and late onset psoriasis by Henseler and Christophers [Table 2].[23] Guinot *et al*. have recently classified psoriasis into six phenotypic types.[24]

Psoriatic arthritis

Psoriatic arthritis belongs to the broad group of spondyloarthropathies which is characterized by its association with psoriasis and seronegativity for rheumatoid factor.[25] The most accepted classification criteria has been published in 2006 by the Classification Criteria for Psoriatic Arthritis (CASPAR) study group [Table 2].[26] CASPAR classification is easy to use enabling psoriatic arthritis to be diagnosed in the presence of rheumatoid factor and absence of psoriasis, provided typical findings of psoriatic arthritis are present. It has high sensitivity in early psoriatic arthritis, and may, therefore, be used to classify patients early in the course of disease.[27]

Pustular psoriasis

Pustular psoriasisis characterized by appearance of macroscopic sterile pustules in a patient with psoriasis. On the basis of extent of involvement, it can be classified into localized or generalized disease [Table 2].

Chronic plaque-type psoriasis is the most common morphologic variety which manifests as circumscribed, well-demarcated, erythematous plaques involving particularly the extensor aspects of elbows and knees, buttocks, scalp, and lower back. The character of scaling varies from the typical silvery-white scales to waxy yellow or orange-brown scales. Other clinical patterns of psoriasis include guttate psoriasis, unstable psoriasis, hyperkeratotic psoriasis, erythrodermic, and pustularpsoriasis, uncommon variants such asfollicular psoriasis, eczematous psoriasis, flexural psoriasis, nail psoriasis, and photosensitive psoriasis. The Medical Advisory Board of the National Psoriasis Foundation has defined mild, moderate, and severe psoriasis based largely on quality-of-life (QOL) measures, with consideration also given to proportion of body surface area affected [Table 2].[31]

As in adult psoriasis, chronic plaque psoriasis with its variants is the most frequent type in infancy and childhood. Inverse psoriasis is more common in children than inadults. In infants, the disease may manifest as diaper dermatitis. In small children and adolescents, guttate psoriasis is another distinct presentation and has been reported in up to 44% of patients.[35] Pustularpsoriasis, although rare in children, can present with certain typical morphological patterns such as annular and circinate pustular psoriasis. Annular pustular psoriasis is characterized by gyrate lesions with erythema and a collarette of scales at the periphery. Psoriatic erythroderma and psoriatic arthritis are relatively less common. International Psoriasis

Table 2: Classification of psoriasis vulgaris, pustular psoriasis, and psoriatic arthritis

Psoriasis
Epidemiologic classification
Type I psoriasis or early onset psoriasis occurs at or before the age of 40 years, accounting for approximately 75% of patients. Patients are young, have a more aggressive course, and strong family history. Majority of the patients are HLA-Cw*0602 positive.
Type II psoriasis or late onset psoriasis presents after the age of 40 years, with a distinct peak at 55-60 years. Patients are older and have more stable psoriasis, with no family history. Nail involvement is more common in patients in this group who are HLA-Cw*0602 negative.[28]
Classification on basis of morphology, size of lesion and extent[29]
Stable/unstable
Thin (<0.75 mm)/thick (>0.75 mm)
Small plaque (<3 cm dia)/large plaque(>3 cm dia)
Localized - Flexural/intertriginous, facial/seborrheic, scalp psoriasis, palmoplantar psoriasis (nonpustular), psoriasis on limbs and trunk
Widespread - Guttate, generalized pustular, erythrodermic psoriasis
Less common varieties - Nail psoriasis, follicular psoriasis, hyperkeratotic psoriasis, photosensitive psoriasis, verrucous psoriasis
Classification on basis of age of onset, course of disease, extent of lesions, and associations[24]
Type 1 - late onset disease, few lesions involving mainly the scalp and elbows, without associated arthritis, atopy or sensitivity to environmental factors, a continuous evolution and without familial psoriasis
Type 2 - Late onset disease characterized by palmoplantar psoriasis regardless of the presence of pustules, frequent arthritis and more in smokers, less affected by environmental change, but contact dermatitis common
Type 3 - early onset of the disease, more in females, few pruritic nummular plaques present mainly the scalp and elbow, arthritis and atopy are common, ppt factors such as stress, koebner's and seasonal variation are frequent, associated contact dermatitis, and familial history of psoriasis common
Type 4 - Severe form involving all body sites, except the soles, palms and nails, not linked to the age of onset, guttate and mixed lesions, less frequent to koebner phenomenon, pruritus, atopy, personal, and familial history of arthritis and smokers
Type 5 - early onset widespread disease, less on the palms and soles, more frequent guttate and mixed lesions, arthritis, precipitating factors, atopy, pruritus, familial psoriasis, and more in smokers and alcoholics
Type 6 - characterized by skin lesions involving all body sites including the soles and palms, strongly associated with the metabolic syndrome, pustular exacerbation common, presence of mixed lesions, pruritus, sensitivity to environmental factors, smoking but less frequent atopy
Classification on basis of disease severity[30]
National Psoriasis Foundation
Mild psoriasis can be defined as a disease which generally involves <5% of body surface area. Disease does not alter the patient's quality of life (QOL) and the treatments have no known serious risks
Moderate psoriasis generally involves 2-20% of the body surface area. In addition, the disease alters the patient's QOL and the therapies used have minimal risks
Severe psoriasis generally involves >10% of body surface area. Disease alters the patient's QOL, does not have a satisfactory response to treatments that have minimal risk, and the patients are willing to accept life-altering sideeffects to achieve less disease or no disease
British Association of Dermatologists defines severe psoriasis as disease with PASI ≥10 and DLQI ≥10[9] (mild: PASI <3, moderate 3-10)
IADVL SIG Psoriasis: mild disease (PASI/BSA <10), moderate to severe disease (PASI/BSA >10). Patients having localized areas involvement but with significant functional disability or psychosocial morbidities such as severe palmoplantar psoriasis can also be considered for systemic therapy/phototherapy.[32,33]
One percent of BSA is approximately equal to the patient's open hand (from the wrist to the tips of fingers) with fingers tucked together and the thumb tucked to the side, as stated in the Koo-Menter Psoriasis Instrument.[34] In clinical trials, severe disease often is commonly defined as more than 10% affected BSA, and the US FDA has used 20% BSA to indicate severe disease.
Pustular psoriasis
Localized pustular psoriasis:
(a) palmoplantarpustulosis
(b) acrodermatitis continua
Generalized pustular psoriasis:
(a) acute
(b) of pregnancy
(c) infantile and juvenile
(d) circinate
(e) localized (not hands and feet)

Contd...

Table 2: Contd...

Psoriatic arthritis
Classification Criteria for Psoriatic Arthritis (CASPAR) criteria for diagnosis of PSA
Major criteria
Established inflammatory articular disease (joint, spine, or entheseal) and
Minor criteria
A score of at least 3 based on the following categories:
1. Current psoriasis (assigned a score of 2; all other features assigned a score of 1)
2. A history of psoriasis (unless current psoriasis was present)
3. A family history of psoriasis (unless current psoriasis was present or there was a history of psoriasis),
4. Dactylitis
5. Radiographic evidence of juxta-articular new bone formation
6. A negative test for rheumatoid factor, and
7. Typical psoriasis nail dystrophy
Moll and Wright classification
Distal interphalangeal arthritis,
Asymmetrical oligoarthritis,
Symmetrical polyarthritis,
Spondylitis, and
Arthritis mutilans

IADVL SIG: Indian Association of Dermatologists, Venereologists and Leprologists Special Interest Group

Council has put forward a new classification thatincludes various clinical phenotypes of psoriasis and may be relevant to clinical practitioners and researchers.[30]

Psoriatic arthritis: Clinical features

Three different clinical patterns of psoriatic arthritis can be recognized, namely, oligoarticular (≤4 involved joints) or polyarticular (≥5involved joints), peripheral disease, and axial disease with or without peripheral arthritis. Various studies have shown peripheral psoriatic arthritis to be the most frequent pattern with asymmetric knee involvement to be the most common presentation in 40% of the patients.[36] The DIP arthritis has been reported to account for 1–59% of cases in various studies, although it is not very specific for psoriatic arthritis and may be seen in other spondyloarthropathies. It is often associated with dactylitis and nail dystrophy.[37] Variables that predict the severity of disease include polyarticular involvement at the onsetincluseraised erythrocyte sedimentation rate, late onset disease, HLA-B27 positivity for psoriatic arthritis spondylitis, and presence of TNF-α-308 and TNF-β-252 gene polymorphism.[38] Nail involvement occurs in nearly 75% of psoriatic patients with arthritis. Axial psoriatic arthritis is seen in 5–36% of the patients with psoriatic arthritis; axial involvement may be in the form of sacroiliitis or limited to only one tract of the spine with or without concomitant peripheral arthritis.[39] Axial psoriatic arthritis may only affect the cervical spine with sparing of other tracts of the axial skeleton.[40] It is characterized by a better prognosis and minor functional damage compared to ankylosingspondylitis.

Enthesitis represents a hallmark of the clinical spectrum of psoriatic arthritis, and it is usually defined in the presence of tenderness and swelling in an enthesis site. Plantar fasciitis and Achille'senthesitis are very common. Dactylitis or the "sausage-shaped digit"is defined as a diffuse swelling of the entire digit and is seen in 5.6–53% of reported cases.[38,39] The swelling is believed to be due to a combination of flexor tenosynovitis and interphalangeal joint synovitis. Distal extremity swelling with pitting edema is not infrequently observed in psoriatic arthritis (in nearly 21% patients). When distal edema involves the dorsum of the hand a"boxing glove"appearance is seen.

CO-MORBIDITIES ASSOCIATED WITH PSORIASIS

Psoriasis has been associated with numerous dermatologic and non-dermatologic diseases [Table 3].[41-46] In recent years, there has been an enormous interest on the association of psoriasis with conventional cardiovascular risk factors (e.g., metabolic syndrome, obesity, low physical activity, smoking, alcohol, lipid abnormalities, hypertension), nonconventional cardiovascular risk factors such as deranged homocysteine metabolism, cardiovascular comorbidities, and increased risk of myocardial infarction and myocardial infarction.[47,48] However, the data supporting the occurrence of such an association is not consistent. The prevalence of metabolic syndrome in the developed countries varies from 15 to 35%.[49] Two Indian studies that differed in their definition of obesity reported the prevalence of 13 and 41% in general population.[50,51] The third

Table 3: Disease associations with psoriasis

Organ system involved	Disease associations
Hepatobiliary	Frequency of nonalcoholic steatohepatitisis (NASH) and non-alcoholic fatty liver disease (NAFLD) has been found to be significantly greater in psoriasis patients vs. matched controls.
	Such patients are at an increased risk for methotrexate-induced hepatotoxicity and develop liver fibrosis at a lower cumulative methotrexate dose.
	Madanagobalane *et al*. found the occurrence of NAFLD to be higher in psoriasis patients than in controls (17.4 vs 7.9%; P=0.002).[41] NAFLD patients in the psoriasis group (n=58) were more likely to have diabetes (P=0.02) than those with psoriasis alone (n=254).
	Another recent cross-sectional study observed that elderly patients (55 years or older) with psoriasis are 70% more likely to have NAFLD than those without psoriasis independent of common NAFLD risk factors.[42]
Genitourinary	Erectile dysfunction occurs more commonly in patients with psoriasis, in part due to incipient atherosclerosis.[43]
Gastroinstestinal	Prevalence of celiac disease is greater in patients with psoriasis than in controls.[44]
Musculoskeletal, excluding psoriatic arthritis	Osteoporosis has been linked to palmoplantar pustular psoriasis particularly in females.[45]
	Onychopachydermoperiostitis has been rarely reported. It is considered as a subtype of psoriatic arthritis.
Pulmonary	Prevalence of chronic obstructive pulmonary disease is significantly higher in patients with psoriasis, and both are related to metabolic syndrome.[46]
	Rare association of apical pulmonary fibrosis with psoriatic spondylitis and chronic plaque psoriasis with or without peripheral arthropathy has been reported.
Ocular	Range from blepharitis, meibomian gland dysfunction, chronic nonspecific conjunctivitis, punctuate epithelial keratitis, superficial or deep opacities, stromal infiltrates, neovascularization, erosions, scarring, and even stromal melts. Involvement of uvea, particularly anterior uveitis, has been associated with the arthropathic form of psoriasis.
	Corticosteroid therapy and PUVA therapy may predispose to development of cataract.
	Psoriatic arthritis clinical course may be complicated by iridocyclitis in 2-25% patients.
Dermatologic associations	Psoriasis may be associated with various dermatoses such as bullous pemphigoid, pemphigus, and vitiligo.
Associations with palmoplantarpustulosis	Palmoplantarpustulosis has been associated with autoimmune thyroid disease, type 2 diabetes mellitus.
	An association between palmoplantar pustulosis, osteitis, and hyperostosis of the clavicular and costosternal joints in SAPHO syndrome (synovitis-acne-pustulosis-hyperostosis-osteomyelitis syndrome) is well documented.
Miscellaneous systemic diseases	Amyloidosis, IgA nephopathy and aortic valve disease have been rarely described in psoriatic arthritis.

Indian study reported a prevalence of 11.2% for metabolic syndrome.[52]

In one of the largest and well-conducted meta-analysis, it was concluded that, based on information, mostly from hospital-based studies, psoriasis is associated with cardiovascular disease and its risk factors, and not with cerebrovascular disease.[53] The association is stronger with psoriatic arthritis compared to psoriasis. However, Prey *et al*. in their systematic review of epidemiologic studies studying the cardiovascular risk factors in chronic plaque psoriasis concluded that there is an increased risk of obesity and metabolic syndrome in psoriasis, although no consistent results were found with hypertension, diabetes, and dyslipidemia.[48] Armstrong *et al*. in their systematic review alsofound similar results, especially in severe psoriasis.[54] In another recent systematic review and meta-analysis, Samarasekera *et al*. noted that increased cardiovascular risk was identified only in individuals with severe psoriasis (requiring systemic therapy or hospital admission).[55] They also observed that uncertainty remains about whether cardiovascular risk is directly attributable to psoriasis, as the majority of studies failed to adequately adjust for key traditional risk factors. In the landmark population-based Rotterdam study, the risk of incident cardiovascular disease was not increased in psoriasis.[56] Although, the patient population in this study was younger, smoked more, had higher diastolic blood pressure and body mass index levels compared to controls, there was no significant difference in the adjusted carotid intima-media thickness, crude and adjusted ankle-brachial index, pulse-wave velocity, and coronary artery calcium scores. Table 4 summarizes the results of Indian studies evaluating association between psoriasis and metabolic syndrome.[57-66]

CLINICAL SCORES IN PSORIASIS

A variety of scoring systems have been used to assess the severity of plaque-type psoriasis. These include the clinical severity scores and quality of life scores, which are enumerated in Table 5. The clinical scores incorporate and grade the typical clinical features of psoriasis, i.e., erythema, scaling, infiltration, and extent of body surface area involved. Few scores, such asSPI, also include the psychosocial impact of the disease.

Table 4: Indian studies estimating the risk of cardiovascular disease risk factors in psoriasis

Authors	Study design	Number of patients	Results
Kumar *et al.*[66] 2016	Case-control study to study the association between psoriasis and metabolic syndrome as per NCEP ATP III with Asian modification for waist circumference.	30 patients and 30 controls	Prevalence of metabolic syndrome, elevated blood glucose, higher waist circumference, and higher triglyceride levels were more common in psoriatic patients than in controls, however, the difference was statistically insignificant The prevalence of low HDL levels was significantly higher in cases compared to controls (86.7% vs. 60%, *P*=0.02).
Kothiwala *et al.*[65] 2016	Cross-sectional study to study the association between psoriasis and metabolic syndrome as per NCEP ATP III criteria.	140 patients and 140 controls. 30 patients and 30 controls were selected for cardiac evaluation.	The prevalence of metabolic syndrome, hypertension, abdominal obesity, and diabetes was significantly more in psoriatic patients than in controls. Patients with psoriasis had significantly higher carotid intima-media thickness (mean 0.61 mm±0.01 mm vs. 0.37 mm±0.01 mm) than controls
Sharma *et al.*[64] 2016	Case-control study to study the association between psoriasis and metabolic syndrome as per NCEP and IDF criteria	100 patients and 100 controls	Metabolic syndrome (38%:12%), hypertriglyceridemia (53%:25%), impaired glucose tolerance (38%:16%) (*P*<0.001) and low HDL (*P*=0.002) were significantly more in cases versus controls as were the mean values of triglycerides and fasting blood sugar. Mean age of patients and duration of disease strongly correlated with the presence of metabolic syndrome. IDF and NCER were significantly divergent in their disease definition (*P*<0.001).
Ali *et al.*[63] 2014	Case-control study to study the association between psoriasis and metabolic syndrome as per IDF criteria	Not mentioned	Hypertriglyceridemia (59% vs. 31%), abdominal obesity (45% vs. 39%), and hypertension (39% vs. 34%) were significantly more common in cases, whereas diabetes mellitus (23% vs. 29%) (*P*>0.05) was more common among the controls.
Sharma *et al.*[62] 2013	Cross-sectional study to assess the prevalence of metabolic syndrome in Indian patients with psoriatic arthritis according to the Adult Treatment Panel (ATP) III criteria and the IDF consensus definition of metabolic syndrome for adult Asian patients	100	58 and 59 patients had metabolic syndrome according to the ATP III criteria and the IDF consensus definition, respectively. Patients with metabolic syndrome were older (*P*<0.001), with longer duration of psoriasis (*P*=0.017), and higher Bath Ankylosing Spondylitis Activity Index (*P*=0.016)
Karoli *et al.*[61]	Case-control study to assess the prevalence of metabolic syndrome in Indian psoriasis and to assess endothelial dysfunction by brachial artery flow mediated dilatation (FMD) and carotid intima-media thickness (CIMT)	96 patients and 100 matched controls	Higher prevalence of hypertension, hypertriglyceridemia, diabetes mellitus, and metabolic syndrome in patients with psoriasis than in controls. FMD was lower in patients with psoriasis than in controls (5.6±2 vs7.5±2.8, *P*=0.02). mean CIMT was significantly increased (0.78±0.12 vs 0.62±0.08, *P*=0.001) in patients with psoriasis compared with controls.
Khunger *et al.*[60] 2013	Case-control study	50 patients and 50 controls	Dyslipidemia in 16% of psoriasis patients vs. 4% in controls (*P*<0.05) Hypertension in 26% of cases vs. 10% of controls (*P*<0.05) Central obesity in 38% of cases vs. 14% of controls, (*P*<0.01) Diabetes in 16% of cases vs. 6% of controls, which was not significantly higher (*P*<0.1) metabolic syndrome in 30% of cases vs. 8% of controls (*P*<0.005).
Madanagobalane *et al.*[59] 2012	Case-control study to assess the prevalence of metabolic syndrome in Indian psoriasis as per south Asian modified NCEP criteria	118 psoriasis patients and 120 controls	Metabolic syndrome was significantly more common in psoriatic patients than in controls (44.1% vs. 30%, *P*=0.025) with a higher prevalence of triglyceridemia (33.9% vs. 20.8%), abdominal obesity (34.7% vs. 32.5%), and elevated blood sugar.

Contd...

Table 4: Contd...

Authors	Study design	Number of patients	Results
Pereira *et al.*[58] 2011	Cross-sectional study	77	The prevalence of impaired fasting glucose, impaired glucose tolerance, and diabetes mellitus in psoriasis patients was 5.2, 9.1, and 32.5, respectively, as compared to 6.5, 3.3, and 15.2%, respectively, in the controls. There was no association between psoriasis and dyslipidemia.
Nisa *et al.*[57] 2010	Case-control study	150	Metabolic syndrome: 28% vs 6%; arterial hypertension: 49.3% vs 16%; hypertriglyceridemia: 48.6% vs 16%; impaired fasting glucose levels: 18% vs 2.6%

Table 5: Various clinical severity scores and quality of life impairment scores employed in assessing psoriasis severity

Assessing clinical severity	Assessing quality of life
Psoriasis area severity index (PASI)	Short form 36 (SF36)
Psoriasis log based area and severity index (PLASI)	World organization quality of life (WHOQOL)
Body surface area (BSA)	Euro Qol 5D5 (EQ5D)
Physician global assessment (PGA)	Dermatology life quality index (DLQI)
Lattice system Physician global assessment (LS-PGA)	Skindex 29, Skindex 17
Self-assessment Psoriasis area severity index (SAPASI)	Dermatology quality of life scale (DQOLS)
Salford psoriasis index (SPI)	Psoriasis disability index (PDI)
Response to treatment score (RT)	Impact of psoriasis questionnaire (IPSO)
Dermatology index of disease severity (DIDS)	Psoriasis index of quality of life (PSORIQOL)
Copenhagon psoriasis severity index (CoPSI)	Psoriasis quality of life questionnaire (PQLQ)
Beer-Sheva psoriasis severity index (BPSS)	Impact of chronic skin disease on daily life (ISDL)
National psoriasis foundation psoriasis score index (NPF-PS)	Salford psoriasis index (SPI)
	Psoriasis life stress inventory (PLSI)
	Family dermatology life quality index (FDLQI)
	Illness perception questionnaire (IPQ)
	Patients global psoriasis assessment (PGA)
	Psoriasis symptom assessment (PSA)
	Itching visual analog scale (IVA)

Puzenat *et al*. in their systematic review identified 44 clinical severity scores, of which only 6 were correctly defined and validated.[67] Tables 6 and 7 summarize the salient features of these clinical severity scores. All scores except SAPASI are assessed by physicians. Although PASI, BSA, and PGA have been approved by FDA for use in clinical trials, all have certain pitfalls. The most widely used scale is PASI as it is the most extensively validated, however, it lacks sensitivity for mild disease and does not evaluate quality of life impairment and comorbidities. A 75% reduction in the PASI score (PASI 75) is the current benchmark of primary endpoints for most clinical trials of psoriasis. However, Carlin *et al*. concluded that PASI of 50 equates to a clinically meaningful improvement in psoriasis. They observed that PASI score is not linearly reflective of psoriasis severity and that an improvement in quality of life exists at PASI 50.[68] British Association of Dermatologists defined adequate response to treatment as either attainment of PASI 50 and decrease in ≥5 points in DLQI or attainment of PASI 75.[69]

Psoriasis has a significant negative impact on patients' health related quality of life. Lower quality of life in psoriasis patientsis due to its physical symptoms such as pruritus, scaling and joint pains, financial and psychosocial impact leading to problems of self-esteem, stigmatization, feeling of shame and embarrassment, and maladaptive coping responses. Bronsard *et al*. in their systematic review of quality of life scores in psoriasis identified 21 questionnaires, of which 8 satisfied the validation criteria.[70] The advantages and the shortcomings of each of these scores are summarized in Table 7. Bronsard *et al*. concluded that DLQI is the easiest to use in clinical trials due to its brevity and simplicity.

Table 6: Salient features of clinical severity scores in psoriasis

Score	Features
PASI	Gold standard content validity; good overall internal consistency; good overall intraobserver variation; acceptable overall interobserver variation; acceptable overall sensitivity to change
BSA	Good overall content validity; good overall intra-observer variation; unacceptable overall inter-observer variation
PGA	Good overall content validity; good overall intraobserver variation; acceptable overall inter-=observer variation
LS-PGA	Good overall content validity, good overall internal consistency; good overall intraobserver variation; good overall interobserver variation
SPI	Good overall content validity; good overall intraobserver variation; acceptable overall interobserver variation
SAPASI	Acceptable overall content validity; good overall intraobserver variation; good overall interobserver variation; acceptable overall sensitivity to change

Table 7: Salient features of quality of life impairment scores in psoriasis

Scores	Features
SF 36	Good construct validity, content validity, internal consistency, reproducibility, acceptability, responsiveness, interpretability, and translation
	Acceptable dimensionality
DLQI	Good construct validity, content validity, internal consistency, reproducibility, acceptability, responsiveness, and translation
	Acceptable interpretability, Poor dimensionality and item bias
PDI	Good construct validity, content validity, internal consistency, acceptability, responsiveness, and translation
	Poor dimensionality and item bias
SKINDEX 29	Good construct validity, content validity, internal consistency, reproducibility, and responsiveness
	Acceptable acceptability and dimensionality, poor item bias
SKINDEX 17	Good construct validity, content validity, internal consistency, reproducibility, acceptability, dimensionality, item bias
	Acceptable translation
IPSO	Good internal consistency, reproducibility, dimensionality, and item bias
	Acceptable translation
PSORIQOL	Good construct validity, content validity, internal consistency, reproducibility, dimensionality, and item bias
	Acceptable acceptability and translation
DQOLS	Good construct validity and content validity
	Acceptable reproducibility, dimensionality and translation

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Glickman FS. Lepra, psora, psoriasis. J Am Acad Dermatol 1986;14:863-6.
2. Pariser DM, Bagel J, Gelfand JM, Korman NJ, Ritchlin CT, Strober BE, *et al*. National Psoriasis Foundation Clinical Consensus on Disease Severity. Arch Dermatol 2007;143:239-24.
3. Okhandiar RP, Banerjee BN. Psoriasis in the tropics: An epidemiological survey. J Indian Med Assoc 1963;41:550-6.
4. Bedi TR. Psoriasis in north India. Geographical variations. Dermatologica 1977;155:310-4.
5. Kaur I, Kumar B, Sharma VK, Kaur S. Epidemiology of psoriasis in a clinic from north India. Indian J Dermatol Venereol Leprol 1986;52:208-12.
6. Bedi TR. Clinical profile of psoriasis in North India. Indian J Dermatol Venereol Leprol 1995;61:202-5.
7. Kaur I, Handa S, Kumar B. Natural history of psoriasis: Astudy from the Indian subcontinent. J Dermatol 1997;24:230-4.
8. Asokan N, Prathap P, Ajithkumar K, Betsy A, Binesh VG. Pattern of psoriasis in a tertiary care teaching hospital in south India. Indian J Dermatol 2011;56:118-9.
9. Lal S.Clinical pattern of psoriasis in Punjab. Indian J Dermatol Venereol Leprol 1966;35:5-12.
10. Mehta TK, Shah RN, Marquis L. A study of 300 cases of psoriasis. Indian J Dermatol Venereol Leprol 1976;42:67-74.
11. Dogra S, Kumar B. Epidemiology of Skin Diseases in School Children: A Study from Northern India. Paed Dermatol 2003;20:470-3.
12. Kumar B, Jain R, Sandhu K, Kaur I, Handa S. Epidemiology of childhood psoriasis: A study of 419 patients from northern India. Int J Dermatol 2004;43:654-8.
13. Leonard DG, O'Duffy JD, Rogers RS. Prospective analysis of psoriatic arthritis in patients hospitalized for psoriasis. Mayo Clin Proc 1978;53:511-8.
14. Prey S, Paul C, Bronsard V, Puzenat E, Gourraud PA, Aractingi S, *et al*. Assessment of risk of psoriatic arthritis in patients with plaque psoriasis: A systematic review of the literature. J Eur Aacd Dermatol Venereol 2010;24:31-5.
15. Hukuda S, Minami M, Saito T, Mutsui H, Matsui N, Komatsubara Y, *et al*. Spondyloarthropathies in Japan: Nationwide questionnaire survey performed by the Japan Ankylosing Spondylitis Society. J Rheumatol 2001;28:554-9.
16. Alamanos Y, Papadopoulos NG, Voulgari PV, Siozas C, Psychos DN, Tympanidou M, *et al*. Epidemiology of psoriatic arthritis in northwest Greece, 1982–2001. J Rheumatol 2003;30:2641-4.
17. Wilson FC, Icen M, Crowson CS, McEvoy MT, Gabriel SE, Kremers HM. Time trends in epidemiology and characteristics of psoriatic arthritis over 3 decades: A population-based study. J Rheumatol 2009;36:361-7.
18. Gelfand JM, Gladman DD, Mease PJ, Smith N, Margolis DJ, Nijsten T, *et al*. Epidemiology of psoriatic arthritis in the population of the United States. J Am Acad Dermatol 2005;53:573.
19. Madland TM, Apalset EM, Johannessen AE, Rossebo B, Brun JG. Prevalence, disease manifestations, and treatment of psoriatic arthritis in Western Norway. J Rheumatol 2005;32:1918-22.
20. Love TJ, Gudbjornsson B, Gudjonsson JE, Valdimarsson H. Psoratic arthritis in Reykjavik, Iceland: Prevalence, demographics, and disease course. J Rheumatol 2007;34:2082-8.
21. Zeng QY, Chen R, Darmawan J, Xiao ZY, Chen SB, Wigley R, *et al*. Rheumatic diseases in China. Arthritis Res Ther 2008;10:17.
22. Stoll ML, Lio P, Sundel RP, Nigrovic PA. Comparison of Vancouver

and International League of Associations for rheumatology classification criteria for juvenile psoriatic arthritis. Arthritis Rheum 2008;59:51-8.
23. Hanseler T, Christopher E. Psoriasis of early and late onset: Characterization of two types of psoriasis vulgaris. J Am AcadDermatol 1985;13:450-6.
24. Guinot C, Latreille J, Perrussel M, Doss N, Dubertret L; French Psoriasis Group. Psoriasis: Characterization of six different clinical phenotypes. Exp Dermatol 2009;18:712-9.
25. Moll JM, Wright V. Psoriatic arthritis. Semin Arthritis Rheum 1973;3:55-78.
26. Taylor W, Gladman D, Helliwell P, Marchesoni A, Mease P; CASPAR study group. Classification criteria for psoriatic arthritis. Arthritis rheum 2006;54:2665-73.
27. Chandran V, Schentag CT, Gladman DD. Sensitivity of the classification of psoriatic arthritis criteria in early psoriatic arthritis. Arthritis Rheum 2007;57:1560-3.
28. Gudjonsson JE, Karason A, Runarsdottir EH, Antonsdottir AA, Hauksson VB, Jonsson HH, *et al*. Distinct clinical differences between HLA-Cw*0602 positive and negative psoriasis patients-An analysis of 1019 HLA-C- and HLA-B-typed patients. J Invest Dermatol 2006;126:740-5.
29. Griffiths CE, Christophers E, Barker JN, Chalmers RJ, Chimenti S, Krueger GG, *et al*. A classification of psoriasis vulgaris according to phenotype. Br J Dermatol 2007;156:258-62.
30. Pariser DM, Bagel J, Gelfand JM, Korman NJ, Ritchlin CT, Strober BE, *et al*. National Psoriasis Foundation Clinical Consensus on Disease Severity. Arch Dermatol 2007;143:239-24.
31. Smith CH, Anstey AV, Barker JN, Burden AD, Chalmers RJ, Chandler DA, *et al*. British Association of Dermatologist's guidelines for biologic interventions for psoriasis 2009. Br J Dermatol 2009;161:987-1019.
32. Janagond AB, Kanwar AJ, Handa S. Efficacy and safety of systemic methotrexate vs. acitretin in psoriasis patients with significant palmoplantar involvement: A prospective, randomized study. J Eur Acad Dermatol Venereol. 2013;27:e384-9.
33. Feldman SR, Koo JY, Menter A, Bagel J. Decision points for the initiation of systemic treatment for psoriasis. J Am Acad Dermatol 2005;53:101-7.
34. Gupta SK, Singh KK, Lalit M. Comparative therapeutic evaluation of different topicals and narrow band ultraviolet B therapy combined with systemic methotrexate in the treatment of palmoplantar psoriasis. Indian J Dermatol 2011;56:165-70.
35. Cordoro KM. Management of Childhood Psoriasis. Adv Dermatol 2008;24:125-69.
36. Marsa S, Armadans-Gil L, Martinez M, Gallardo D, Ribera A, Lience E. Clinical, radiographic and HLA associations as markers for different patterns of psoriatic arthritis. Rheumatology 1999;38:332-7.
37. Veale D, Rogers S, Fiztgerald O. Classification of clinical subsets in psoriatic arthritis. Br J Rheumatol 1994;33:133-8.
38. Balding J, Kane D, Livingstone W, Mynett-Johnson L, Bresnihan B, Smith O, *et al*. Cytokine gene polymorphisms: Association with psoriatic arthritis susceptibility and severity. Arthritis Rheum 2003;48:1408-13.
39. Chandran V, Barrett J, Schentag CT, Farewell VT, Gladman DD. Axial psoriatic arthritis: Update on a long term prospective study. J Rheumatol 2009;36:2744-50.
40. Russell EB, Hunter JB, Pearson L, McCarty DJ. Remitting, seronegative, symmetrical synovitis with pitting edema – 13 additional cases. J Rheumatol 1990;17:633-9.
41. Madanagobalane S, Anandan S. The increased prevalence of non-alcoholic fatty liver disease in psoriatic patients: A study from South India. Australas J Dermatol 2012;53:190-7.
42. van der Voort EA, Koehler EM, Dowlatshahi EA, Hofman A, Stricker BH, Janssen HL *et al*. Psoriasis is independently associated with nonalcoholic fatty liver disease in patients 55 years old or older: Results from a population-based study. J Am Acad Dermatol 2014;70(3):517-24.
43. Goulding JM, Price CL, Defty CL, Hulangamuwa CS, Bader E, Ahmed I. Erectile dysfunction in patients with psoriasis: Increased prevalence, an unmet need, and a chance to intervene. Br J Dermatol 2011;164:103-9.
44. Birkenfeld S, Dreiher J, Weitzman D, Cohen AD. Coeliac disease associated with psoriasis. Br J Dermatol 2009;161:1331-4.
45. Dreiher J, Weitzman D, Cohen AD. Psoriasis and osteoporosis: A sex-specific association? J Invest Dermatol 2009;129:1643-9.
46. Dreiher J, Weitzman D, Shapiro J, Davidovici B, Cohen AD. Psoriasis and chronic obstructive pulmonary disease: Acase-control study. Br J Dermatol 2008;159:956-60.
47. Menter A, Griffiths CEM, Tebbey PW, Horn EJ, Sterry W. Exploring the association between cardiovascular and other disease-related risk factors in the psoriasis population: The need for increased understanding across the medical community. J Eur Aacd Dermatol Venereol 2010:24:1371-7.
48. Prey S, Paul C, Bronsard P, Puzenat E, Gourraud PA, Aractingi S, *et al*. Cardiovascular risk factors in patients with plaque psoriasis: A systematic review of epidemiological studies. J Eur Aacd Dermatol Venereol 2010,24:S: 23-30.
49. Cameron AJ, Shaw JE, Zimmet PZ. The metabolic syndrome: Prevalence in worldwide populations. Endocrinol Metab Clin North Am 2004;33:351-75.
50. Ramachandran A, Snehalatha SC, Satyavani K, Sivasankari S, Vijay V. Metabolic syndrome in urban Asian Indian adults-Apopulation study using modified ATP III criteria. Diabetes Res Clin Pract 2003;60:199-204.
51. Gupta A, Gupta R, Sarna M, Rastogi S, Gupta VP, Kothari K. Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. Diabetes Res Clin Pract 2003;61:69-76.
52. Deepa R, Shanthirani CS, Premalatha G, Sastry NG, Mohan V. Prevalence of insulin resistance syndrome in a selected south Indian population-The Chennai urban population study-7 [CUPS-7]. Indian J Med Res 2002;115:118-27.
53. Miller IM, Ellervik C, Yazdanyar S, Jemec GB. Meta-analysis of psoriasis, cardiovascular disease, and associated risk factors. J Am Acad Dermatol 2013;69:1014-24.
54. Armstrong AW, Harskamp CT, Armstrong EJ. Psoriasis and metabolicsyndrome: A systematic review and meta-analysis of observational studies.J Am AcadDermatol 2013;68:654-62.
55. Samarasekera EJ, Neilson JM, Warren RB, Parnham J, Smith CH. Incidence of cardiovascular disease in individuals with psoriasis: A systematic review and meta-analysis. J Invest Dermatol 2013;133:2340-6.
56. Dowlatshahi EA, Kavousi M, Nijsten T, Ikram MA, Hofman A, Franco OH, *et al*. Psoriasis is not associated with atherosclerosis and incident cardiovascular events: The Rotterdam Study. J Invest Dermatol 2013;133:2347-54.
57. Nisa N, Qazi MA. Prevalence of metabolic syndrome in patients with psoriasis. Indian J Dermatol Venereol Leprol 2010;76:662-5.
58. Pereira RR, Amladi ST, Varthakavi PK. A study of the prevalence of diabetes, insulin resistance, lipid abnormalities, and cardiovascular risk factors in patients with chronic plaque psoriasis. Indian J Dermatol 2011;56:520-6.
59. Madanagobalane S, Ananda S. Prevalence of metabolic syndrome in South Indian patients with psoriasis vulgaris and the relation between disease severity and metabolic syndrome: A hospital-based case-control study. Indian J Dermatol 2012;57:353-7.
60. Khunger N, Gupta D, Ramesh V. Is psoriasis a new cutaneous marker for metabolicsyndrome? A study in Indian patients. Indian J Dermatol 2013;58:313-4.
61. Karoli R, Fatima J, Shukla V, Dhillon KS, Khanduri S, Maini S, *et al*. A study of cardio-metabolic risk profile in patients with psoriasis. J Assoc Physicians India 2013;61:798-803.
62. Sharma A, Gopalakrishnan D, Kumar R, Vijayvergiya R, Dogra S. Metabolicsyndrome in psoriatic arthritis patients: A cross-sectional study. Int J Rheum Dis 2013;16:667-73.
63. Ali NM, Kuruvila M, Unnikrishnan B. Psoriasis and metabolic

syndrome: A case control study. Indian J Dermatol Venereol Leprol 2014;80:255-7.
64. Sharma YK, Prakash N, Gupta A. Prevalence of metabolic syndrome as per the NCEP and IDF definitions vis-a-vis severity and duration of psoriasis in a semi-urban Maharashtrian population: A case control study. Diabetes Metab Syndr 2016 [Epub ahead of print].
65. Kothiwala SK, Khanna N, Tandon N, Naik N, Sharma VK, Sharma S, *et al*. Prevalence of metabolic syndrome and cardiovascular changes in patients with chronic plaque psoriasis and their correlation with disease severity: A hospital-based cross-sectional study. Indian J Dermatol Venereol Leprol 2016;82:510-8.
66. Praveenkumar U, Ganguly S, Ray L, Nanda SK, Kuruvila S. Prevalence of Metabolic Syndrome in Psoriasis Patients and its Relation to Disease Duration: A Hospital Based Case-Control Study. J Clin Diagn Res 2016;10:WC01-5.
67. Puzenat E, Bronsard V, Prey S, Gourraud PA, Aractingi S, Bagot M, *et al*. What are the best outcome measures for assessing plaque psoriasis severity? A systematic review of the literature J Eur Aacd Dermatol Venereol 2010;24:S10-6.
68. Carlin CS, Feldman SR, Krueger JG, Menter A, Krueger GG. A 50% reduction in the Psoriasis Area and Severity Index (PASI 50) is a clinically significant endpoint in the assessment of psoriasis. J Am Acad Dermatol 2004;50:859-66.
69. Smith CH, Anstey AV, Barker JN, Burden AD, Chalmers RJ, Chandler DA, *et al*. British Association of Dermatologist's guidelines for biologic interventions for psoriasis 2009. Br J Dermatol 2009;161:987-1019.
70. Bronsard V, Paul C, Prey S, Puzenat E, Gourraud PA, Aractingi S, *et al*. What are the best outcome measures for assessing quality of life in plaque type psoriasis? A systematic review of the literature J Eur Aacd Dermatol Venereol 2010;24:S17-22.