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Original research article

Prevalence of metabolic syndrome in patients of psoriasis and their correlation with disease severity.

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Abstract

Background: Psoriasis is a chronic inflammatory skin disorder associated with various comorbidities. Metabolic syndrome (MetS), a cluster of various clinical and biochemical parameters, is a significant predictor of the associated risk for cardiovascular events. While previous studies have suggested a link between psoriasis and MetS, limited research has investigated the prevalence of MetS in psoriasis and its potential correlation with disease severity.

Aim: This study was aimed to assess the prevalence of MetS in patients of psoriasis and to explore potential correlations between MetS and disease severity in psoriasis.

Methods: A cross-sectional analysis was conducted over a period of one year on a cohort of 30 patients diagnosed with psoriasis and equal number of age and sex matched controls. Clinical and metabolic parameters including blood pressure, waist circumference, fasting blood glucose and lipid profile were assessed. Disease severity was evaluated using established clinical scoring systems. Statistical analyses were performed to determine prevalence rates of MetS and associations between MetS and disease severity in psoriasis.

Results: Metabolic syndrome was significantly more common in psoriatic patients (43.3%) than in controls (13.3%) ($P<0.05$). Psoriatic patients also had a significantly higher prevalence of hypertriglyceridaemia (13/30 among cases vs 3/30 among controls), arterial hypertension (7/30 among cases vs 2/30 among controls) and decreased high density lipoproteins (19/30 among cases vs 7/30 among controls; $P<0.05$). Also there was a positive correlation between duration of disease and MetS. However there was no correlation of MetS with PASI score or BSA in our study. Chronic plaque type of psoriasis was significantly associated with MetS.

Conclusion: There is a significantly higher prevalence of metabolic syndrome in psoriasis patients as compared to controls with positive correlation with duration of disease. This study highlights a significant prevalence of MetS in patients of psoriasis and suggests that individuals with psoriasis may benefit from comprehensive cardiovascular risk assessment and management.

Keywords: Inflammatory states, metabolic syndrome, psoriasis, cardiovascular risk

Introduction

Psoriasis is a common Th-1 and Th-17 mediated chronic inflammatory skin disease that affects 1-3% of the population.[1] Comorbidities classically associated with psoriasis include psoriatic arthritis, Crohn's disease, psychological/psychiatric disorders and uveitis. In the recent years, the metabolic syndrome (MetS) as a whole and its individual components have been associated with psoriasis.[2] MetS is a constellation of cardiovascular risk factors including obesity, hypertension, dyslipidemia and insulin resistance. Epidemiological research has shown that hypertension, heart failure and diabetes are significantly more common in patients with psoriasis than in controls and an increased mortality from cardiovascular disease in patients with severe psoriasis has been documented.[3][4] Overlapping inflammatory pathways and genetic susceptibility may be potential biological links underlying this association. The association between psoriasis and MetS has important clinical implications for the comprehensive management of psoriasis: Patients with psoriasis should be routinely screened for MetS and treated accordingly to manage cardio-metabolic risk; and conventional systemic treatments should be used with caution in psoriatic patients with MetS because they could adversely affect the coexisting metabolic disorders, especially in the case of their chronic use.

Material and Methods

This was a hospital-based prospective case-control study carried out over a period of one year (2019 to 2020) at Norther Railway Divisional Hospital, Ambala. A total of 30 patients of psoriasis and equal number of age and sex matched controls were included in the study after obtaining written informed consent. Inclusion criteria for patients were:

1. Age more than 18 years
2. Disease duration of at least 6 months
3. Not receiving any systemic treatment for psoriasis for at least 3 months

Exclusion criteria were:

1. Patients of unstable psoriasis (Erythrodermic psoriasis or generalized pustular psoriasis)
2. Patients with isolated nail psoriasis
3. Patients on systemic treatment for psoriasis
4. Patients who are already a known case of hypertension, diabetes, dyslipidemia or coronary artery disease.
5. Patients who refused to give consent for the study

The control group comprised of healthy controls of similar age and sex chosen from the general population including colleagues, hospital staff and relatives or attendants of patients, who are not a known case of hypertension, diabetes, dyslipidemia or coronary artery disease. The source population for cases and controls was the same.

After taking an informed written consent, the study groups were evaluated by a dermatologist and the demographic profile and clinical characteristics were recorded on a predesigned proforma. Demographic data included age, gender, height, weight, smoking and alcohol consumption habits. Body mass index (BMI) was calculated as weight in kilograms/height^2 in meters.

Data regarding disease characteristics including age of onset, duration of disease, severity and associated arthritis were collected. Psoriasis was classified as of short (<1 year), intermediate (1–3 years) or long (>3 years) duration. Patients were classified as having mild, moderate or severe psoriasis based on the psoriasis area and severity index (PASI) score (<10, 10-14 and >14 respectively). PASI was calculated as given below:[5]

Four sites of affection, the head (h), upper limb (u), trunk (t) and lower limbs (l), were separately scored by using three parameters, erythema (E), infiltration (I) and desquamation (D), each of which was graded on a severity scale of 0-4, where 0 = nil, 1 = mild, 2 = moderate, 3 = severe and 4 = very

severe. The area-wise percentage involvement of the involved sites was calculated as: 1 ≤ 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: PASI = 0.1 (Eh + Ih + Dh) Ah + 0.2 (Eu + Iu + Du) Au + 0.3 (Et + It + Dt) At + 0.4 (El + Il + Dl) A1.
For MetS, following parameters were assessed: waist circumference, triglyceride level, high density lipoprotein (HDL) cholesterol level, blood pressure and fasting glucose. The diagnosis of metabolic syndrome was made based on the presence of ≥3 criteria of the National Cholesterol Education Program's Adult Treatment Panel III (NCEP/ATP III criteria):[13] waist circumference >102 cm in men or >88 cm in women, hypertriglyceridemia ≥150 mg/dL, high-density lipoprotein (HDL) cholesterol <40 mg/dL in men or <50 mg/dL in women, blood pressure ≥130/ 85 mmHg and fasting plasma glucose ≥100 mg/dL.
To determine the waist circumference, measuring tape was placed around the abdomen at the level of uppermost part of the pelvic bone, while ensuring that the tape measure remained horizontal and was snug without causing compression on the skin. Blood pressure was recorded as the average of two measurements after subjects have been sitting for five minutes. A venous blood sample was taken in all patients and controls, after overnight fasting (at least 8 h) to estimate the fasting blood sugar (enzymatic method) and fasting lipid profile (enzymatic method).
All the data was properly coded and entered in Microsoft Excel and analyzed using SPSS software. Appropriate tests of significance were applied wherever required.

Results

A total of 30 cases of psoriasis and 30 controls were included in the study. The demographic profile of cases and controls are presented in Table.1 below:

Characteristic	Cases	Controls
Age in years (mean)	19-62 (36.53)	18-64 (37.43)
Male/female ratio	2:1	2.24:1
BMI (mean± SD)	24.02 ± 4.22	23.94 ± 5.3
Smoker, *n* (%)	4 (13.3)	3 (10)
Alcoholic, *n* (%)	8 (2.7)	6 (2)

The mean age of cases was 36.53 years (±12.14), with age ranging from 19 to 62 years. Of the 30 cases, 20 were males and 10 were females. There was no statistically significant difference in age, sex or BMI between the cases and controls.

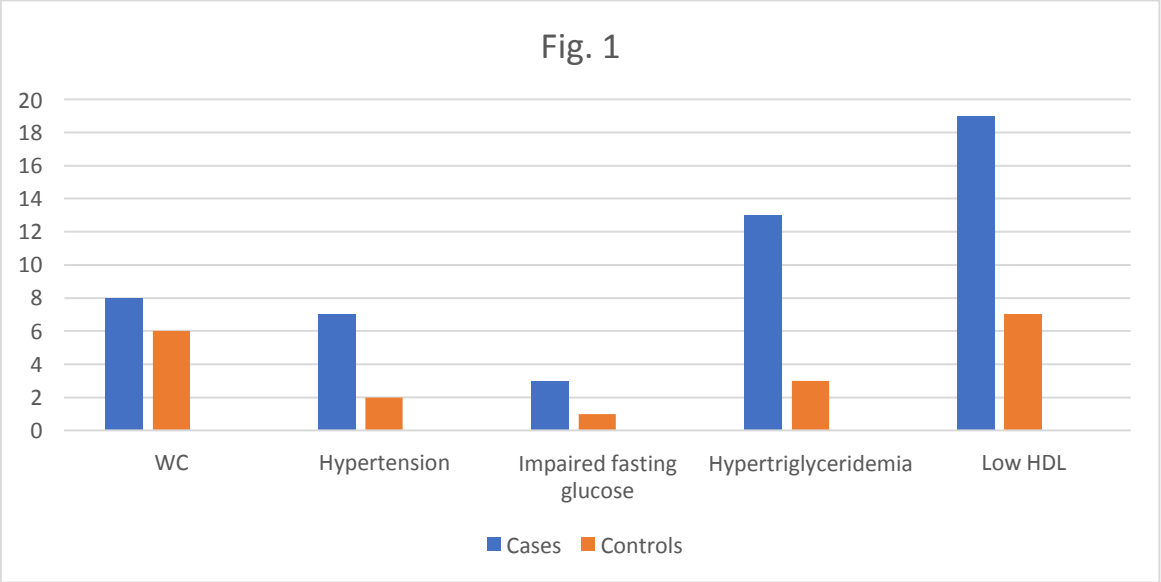
Disease characteristics

Type of psoriasis: All forms of psoriasis were seen including chronic plaque type, guttate type, inverse psoriasis, palmoplantar type and scalp psoriasis. Chronic plaque type was the most commonly seen being present in 17 out of the 30 cases (56.7%) which was followed by palmoplantar (20%), scalp (16.7%) and guttate psoriasis (6.7).
Age of onset: Age at the onset of psoriasis in patients with MetS was 38.15 (±13.71) years and in those without MetS was 35.98 (±11.73) years. The difference was statistically not significant (p=0.53).
Duration of psoriasis: Disease duration in cases ranged from 8 months to 35 years with a mean disease duration of 8.27 years. 6 patients had disease duration less than 1 year, 10 had disease duration of 1-3 years; and in 14 patients, the duration of psoriasis was more than 3 years. Psoriatic patients with metabolic syndrome had mean disease duration of 10.62±12.78 years against 1.48±8.90 years in those without metabolic syndrome. The difference was statistically highly significant (p<0.001)
Severity: Body surface area (BSA) involved ranged from 3% to 80%, with a median BSA involvement of 25. Psoriasis area and severity index (PASI) score ranged from 2.6 to 50.3 (median

PASI=12.05). 17 patients had > 10% BSA involvement while 13 patients had < 10% BSA involvement.
Associated arthritis: Psoriatic arthritis was seen in 1/30 patients, involving knee joint.

Psoriasis and metabolic syndrome: According to the above tabulations by applying the NCEP ATP III criteria, metabolic syndrome was present in 13 out of the 30 psoriatic patients (43.3%). In the control group, four patients (13.3%) met the NCEP ATP III. This difference was statistically highly significant (p <0.001)

Individual components of metabolic syndrome
The prevalence of individual components of MetS among cases and controls are depicted in fig.1



Correlation
Correlation of duration of the disease and MetS: Of the 13 patients with metabolic syndrome 89.84% of the patients had a duration of > 3 years; thus occurrence of metabolic syndrome showed an increasing trend with the duration of the disease. This was statistically significant (p<0.01).
Correlation of MetS and PASI Score: Out of 13 patients with MetS, 5 (38.5%) had PASI <10; 2 (15.4%) had PASI score of 10-14 and 6 (46.1%) had PASI>14. Thus there was no correlation between presence of MetS and PASI score.
Correlation of MetS with BSA involvement: Out of the total 13 patients with metabolic syndrome, psoriasis involved >10% of BSA in 7 cases (53.8%), whereas < 10% of BSA was affected in 6 cases (46.1%) which was statistically not significant (p=0.19)
Type of Psoriasis affected by MetS: MetS was seen in 10 patients with chronic plaque psoriasis (58.8%), 2 patients with palmoplantar psoriasis (33.3%) and 1 patient of scalp psoriasis (20%). This difference was statistically significant (p=0.03)

Discussion
In the present study, the most common type of psoriasis seen was chronic plaque psoriasis (58 %). This is in consistent with the literature, which says that chronic plaque psoriasis is seen in 90% of patients.[5] We observed a higher prevalence of metabolic syndrome among psoriatic patients than the controls (p<0.001) which is similar to the results of a cross-sectional study by Gisondi *et al.* (30.1% vs 20.6%, OR 1.65, p=0.005).[6] Furthermore, Sommer *et al.* also found higher prevalence of MetS among hospitalized psoriatic patients as compared to hospitalized melanoma patients but the

study instead of ATP III criteria adopts a modified version of the WHO definition of MetS.[7] Similarly, Zindancı *et al*., after studying 115 plaque type psoriasis patients and 140 healthy individuals found a higher prevalence of MetS in cases (53%) compared to controls (39%), (p<0.001 using International Diabetes Federation criteria).[8] Nisa and Qazi studied 150 patients with the chronic plaque psoriasis and 150 healthy individuals and found the prevalence of MetS as 28% in cases and 6% in controls, (p<0.05).[9] Baeta *et al.* reported that 80 patients (44.9%) met the criteria for the diagnosis of MetS according to the NCEP-ATP III (42.6% of men and 47.2% of women).[10] In another study conducted by Khunger *et al.*, a diagnosis of metabolic syndrome was made in 30% of cases and 8% of controls, which was statistically significant (p<0.005).[11] Mebazaa *et al*. studied 164 psoriasis patients and 216 controls and showed a marginally higher prevalence of MetS in psoriatic patients (35.5%) compared to controls (30.8%).[12] However, Pearce *et al*. in a study on 77 patients with chronic plaque psoriasis and Lakshmi *et al*. in a study of 40 patients with chronic plaque psoriasis from South India were not able to demonstrate any significant association between MetS and psoriasis in comparison to controls.[13][14] Kim *et al*. also have studied 490 patients with psoriasis and 682 controls and found no statistical difference in MetS between patients with psoriasis and controls (p=0.2).[15]

Our study also showed a higher prevalence of individual components of metabolic syndrome like triglyceride levels >150 mg/dl (13/30 *vs* 3/30), blood pressure >130/85 (7/30 *vs* 2/30) and decreased high density lipoproteins (HDL) (19/30 *vs* 7/30; P<0.05) in patients of psoriasis than in controls. Such an association prompts one at looking upon atherosclerotic and psoriatic plaques as related closely to each other but the conclusion awaits establishment of a common or at least closely related etiopathogenetic mechanism.

In our study, psoriatic patients with MetS had mean disease duration of 10.62±12.78 years against 1.48±8.90 years in those without MetS; and this difference was statistically highly significant (p<0.001). The occurrence of metabolic syndrome showed an increasing trend with the duration of the disease. Sommer *et al*. reported that metabolic syndrome is related to the duration of the disease, psoriasis starts in young ages in patients with metabolic syndrome and duration of the disease is longer in patients with metabolic syndrome.[7] Gisondi *et al.* reported that psoriatic patients with metabolic syndrome were older and had a longer disease duration compared with psoriatic patients without MetS.[6] However, Zindanci *et al*. observed that psoriasis started at advanced age in their patients with MetS and MetS was not related to the duration of the disease.[16]

In our study, no correlation between presence of MetS and PASI score was seen. The results were similar to study conducted by Lakshmi *et al*., who observed that prevalence of MetS was independent of PASI.[14] Similar results were obtained by Gisondi *et al*. and Nisa and Qazi.[6][9] However, Kim *et al*. found that MetS was associated with severe forms of psoriasis (p=0.048).[15]

In our study, out of the total 13 patients with MetS, psoriasis involved >10% of BSA in 7 cases (53.8%), whereas < 10% of BSA was affected in 6 cases (46.1%) and the difference was statistically not significant (p=0.19). Similar results were seen by Nisa and Qazi.[9] However, Joel M. Gelfand and Howa Yeung found a direct relation between body surface area affected and MetS.[17]

Conclusion:

This study underscores the importance of assessing MetS in patients of psoriasis. The observed correlations between MetS components and disease severity highlight the need for comprehensive patient care that addresses both dermatological and metabolic aspects. Further research, including longitudinal studies, can provide deeper insights into the complex interplay between various pathways driving the interrelationship between both disorders, potentially guiding more effective therapeutic interventions.

Limitations: (i) Small sample size. (ii) Cross-sectional design does not take into account the directionality of the association to be set. (iii) Limited generalizability due to the specific population studied.

Conflict of interest: None to declare

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