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Original Research Article

Prevalence of metabolic syndrome in patients with psoriasis: a cross-sectional study in a tertiary care hospital of North India

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ABSTRACT

Background: Psoriasis is a chronic inflammatory disorder of skin, which has been recently linked to metabolic syndrome (MetS) by studies worldwide. Paucity of Indian data in this regard led us to conduct the present study, which aimed to identify the prevalence of metabolic syndrome (and its components) in patients with psoriasis and to determine its association with disease severity and duration.
Methods: This was a hospital-based cross-sectional study conducted over 50 clinically diagnosed patients of chronic plaque psoriasis and 50 age- and sex-matched control subjects. Metabolic syndrome was diagnosed by the South Asian Modified National Cholesterol Education Program Adult Treatment Panel III criteria (SAM-NCEP criteria). Data was analyzed using SPSS (version 17, SPSS Inc. Chicago, Illinois, USA). Descriptive statistics (mean, standard deviation, percentage), student's t-test, and chi-square test were used.
Results: Metabolic syndrome was more prevalent in psoriasis patients than controls but the difference was not significant statistically (30% vs 16%, p=0.0979). Although psoriasis patients had higher prevalence of hypertriglyceridemia, hyperglycemia, hypertension and central obesity than controls, but the difference was statistically insignificant. The prevalence of low high-density lipoprotein (HDL) cholesterol was significantly higher in cases compared to controls (40% vs 18%, OR 3.0370, p=0.0159).
Conclusions: Metabolic syndrome and dyslipidemia are common in psoriasis patients, which signify the need for routine screening of metabolic syndrome in those patients.

Keywords: Psoriasis, Metabolic syndrome, Obesity, Hypertension, Dyslipidemia

INTRODUCTION

Psoriasis is a common skin disease with a variable prevalence across different regions of the world, depending upon racial, geographical and environmental factors. According to various published reports, its prevalence varies from 0.9 to 8.5%.[1] It usually manifests as raised, well demarcated, erythematous, oval plaques with adherent silvery scales, which may be limited or widespread in extent, having a profound effect on the quality of life of the patients.

The disease is believed to be multifactorial, with both genetic and environmental factors playing a role in its development. Currently, the disease is hypothesized to be an immune-mediated, systemic inflammatory disorder with Th_1 cells, Th_{17} cells and inflammatory cytokines contributing to its pathogenesis.[2,3]

Traditionally viewed as an inflammatory skin disorder of unknown etiology, recent advances have shifted the focus from a single organ disease confined to skin structures to a systemic inflammatory condition. More recently, psoriasis has also been reported to be associated with

metabolic disorders including obesity, hypertension, dyslipidemia and diabetes.[4,5] Metabolic syndrome (MetS), a conglomerate of various clinical and biochemical parameters, is a significant predictor of atherosclerotic disease and the associated risk for cardiovascular events in such patients. These risk factors include central obesity, atherogenic dyslipidemia, elevated blood pressure, and raised plasma glucose.[6] Moreover, an increased mortality from cardiovascular disease in patients with severe psoriasis may confer an independent risk of myocardial infarction, especially in young patients.[7]

The underlying pathophysiology linking psoriasis and metabolic syndrome may involve overlapping inflammatory pathways and genetic predisposition. Chronic Th_1 and Th_{17} mediated inflammation with dysregulation of cytokines, e.g. tumor necrosis factor- α and interleukin-6, not only promotes epidermal hyperplasia in psoriasis, but may also antagonize insulin signaling, alter adipokine expression, and mediate insulin resistance and obesity. Conversely, hyperinsulinemia in metabolic syndrome may promote psoriasis susceptibility or severity by facilitating chronic inflammation and angiogenesis.[8,9] A significant role is also played by lifestyle, including improper nutrition, physical inactivity, smoking, consummation of alcohol, stress, which leads to obesity and development of metabolic syndrome.[4,10]

Recent studies have estimated prevalence of metabolic syndrome to be 15-24% in general population and 30-50% among psoriasis patients. This increased frequency imposes a substantial burden on overall health of psoriasis patients, which needs to be appropriately addressed during the treatment of such patients.[11] However, there have been few studies documented, so far, on the risk factors and comorbidities associated with psoriasis in Indian population. Furthermore, there is insufficient information regarding the relationship of duration and severity of psoriasis with the development of metabolic syndrome

Aims and objectives

- To determine prevalence of metabolic syndrome in patients with psoriasis.
- To study the association between metabolic syndrome and duration of illness in psoriasis patients.
- To study the association between metabolic syndrome and severity of illness in psoriasis patients.

METHODS

This was a non-interventional hospital-based cross-sectional study, which was conducted over a period of 11 months between January and November 2017. The study was approved by the Institutional Ethical Committee. During the study period, fifty psoriasis patients satisfying the following inclusion criteria were enrolled: (i) diagnosed case of chronic plaque psoriasis for more than 6 months of duration of disease, (ii) patients aged between 18 to 75 yrs. Patients with atypical presentation of psoriasis (linear or zonal lesion, seborrheic psoriasis, mucosal and ocular lesions), with history of familial dyslipidemia, family history of diabetes and hypertension were excluded from the study. Fifty age- and sex-matched controls were also enrolled. The controls were patients with diseases other than psoriasis, attendants and staff members of the hospital.

An informed consent was taken from all the enrolled subjects and data like age, gender, disease duration, history of smoking and alcoholism, concomitant medications, past medications, weight, waist circumference, and blood pressure were systematically recorded on a standard proforma. Waist circumference was measured at the level of midpoint between lower margin of last palpable rib and the top of iliac crest at the end of normal expiration, as per WHO guidelines 2008. Blood pressure was recorded as the average of two measurements after the subjects rested for 5 minutes. Severity of skin involvement was assessed by the Psoriasis area and severity index (PASI) (mild to moderate ≤10, severe >10), and by percentage of body surface area (BSA) involved (mild to moderate ≤10%, severe >10%).[12] Body surface area was evaluated by the 'rule of nines' method.[13]

Venous samples were taken after the subjects had fasted overnight (at least 8 hours). Serum cholesterol and triglycerides were measured with enzymatic procedures and plasma glucose was measured using a glucose oxidase method. Metabolic syndrome was diagnosed by the presence of three or more of the following criteria of the South Asian Modified National Cholesterol Education Program Adult Treatment Panel III criteria (SAM-NCEP criteria) : i)waist circumference ≥90 cm (males), ≥80 cm (females), ii) fasting triglycerides ≥150 mg/dL or on specific medication, iii) fasting HDL cholesterol <40 mg/dl (males), <50 mg/dl (females) or on specific medication, iv) blood pressure ≥130 mmHg (systolic) or ≥85 mmHg (diastolic) or on specific medication, and v) fasting plasma glucose ≥100 mg/dl or on specific medication.[14]

Data was analyzed using SPSS (version 17, SPSS Inc. Chicago, Illinois, USA). Descriptive statistics (mean, standard deviation, percentage), student's t-test, and chi-square test were used.

RESULTS

The study included 50 cases and 50 controls with descriptive characteristics of each group given in Table 1. In both the groups, 34 were males and 16 were females. The mean age of the cases were 40.32±12.19 years with age ranging from 22 to 70 years. The mean age of the controls was 42.08±11.14 years (range 21-68 years). Psoriasis area and severity index (PASI) score ranged

from 4 to 36.6 (mean PASI 14.59± 9.24). Body surface area (BSA) involved ranged from 3 to 85% (mean BSA 35.22±27.48%). Thirty six patients had BSA involvement >10% while fourteen patients had BSA involvement ≤10%. Disease duration in cases ranged from 7 months to 30 years with a mean disease duration of 8.04± 6.89 years. Nineteen cases (38%) and 13 controls (26%) were chronic smokers, while 11 cases (22%) and 7 controls (14%) were chronic alcoholics.

Table 1: Descriptive characteristics of cases and controls.

Characteristics	Cases	Controls
Male/female	34/16	34/16
Age range in years (mean ±SD)	22-70 (40.32±12.19)	21-68 (42.08±11.14)
Smoker N (%)	19 (38)	13 (26)
Alcoholic N (%)	11 (22)	7 (14)

Table 2: Distribution of clinical and laboratory findings in cases and controls (n=50).

Clinical/ laboratory findings	Cases (n=50)	Controls	Odds ratio	P value
Triglycerides ≥150 mg/dl	21	12	-	0.056
HDL <40 mg/dl (M)*, <50 mg/dl (F)†	20	9	3.037	0.0159‡
Fasting blood sugar ≥ 100 mg/dl	21	14	-	0.1442
Waist circumference ≥90 cm (M), ≥80 cm (F)	19	17	-	0.6785
Blood pressure ≥130/85 mm Hg	14	10	-	0.3514
Metabolic syndrome	15	8	-	0.0979

*Male, †Female, ‡significant

Table 3: Comparison of clinical and laboratory findings among cases and controls

Clinical/ lab findings	Cases	Controls	P value
Triglycerides (mg/dl)	150.06±74.56	125.9± 46.07	0.0541
HDL (mg/dl)	49.26±15.62	52.76±11.41	0.2038
LDL (mg/dl)	108.8±41.35	112.02±35.94	0.9841
VLDL (mg/dl)	24.02±4.68	26.24±9.74	0.1495
Fasting blood sugar (mg/dl)	99.3±20.88	93.94±17.93	0.1716
Systolic blood pressure (mm Hg)	123.8±11.87	125.32±13.26	0.5473
Diastolic blood pressure (mm Hg)	78.92±8.30	80.8±8.15	0.2559
Waist circumference (cm)	82.79±15.07	85.4±11.04	0.3256

Table 4: Descriptive features, clinical and laboratory findings of psoriasis patients with and without MS.

Characteristics	With MS* (n=15)	Without MS (n=35)	P value
Male/female	10/5	25/10	
Age (years)	44.07±10.55	38.71±12.63	0.1563
Disease duration (years)	9.9±9.53	7.25±5.36	0.2157
Smoker	6 (40%)	13 (37.14%)	0.8501
Alcoholic	4 (26.67%)	7 (20%)	0.6055
PASI† ≥ 10	*11 (73.3%)*	18 (51.42%)	0.1550
BSA‡ >10%	12 (80%)	24 (68.57%)	0.4142
Mean PASI	17.39±10.19	13.39±8.68	0.1629
Mean BSA (%)	42.07±2.71	32.29±27.25	0.1743
Triglycerides (mg/dl)	190.93±84.14	132.54±63.60	0.02§
HDL (mg/dl)	40.87±9.24	52.86±16.49	0.002§
LDL (mg/dl)	133.4±36.5	98.26±39.14	0.004§
VLDL (mg/dl)	24.47±4.79	23.83±4.69	0.701
Fasting blood sugar (mg/dl)	118.93±22.19	90.89±13.50	0.000§
Systolic blood pressure (mm Hg)	134.6±11.69	119.17±8.56	0.000§
Diastolic blood pressure (mm Hg)	87.07±7.32	75.43±5.95	0.000§
Waist circumference (cm)	97.3±13.17	76.57±11.10	0.000§

*Metabolic syndrome, †Psoriasis Area and Severity Index, ‡Body surface area, § significant

We observed a higher prevalence of MetS in cases (15/50=30%) than in controls (8/50=16%), but the difference was not significant on statistical analysis (p=0.0979, NS). The prevalence of various components of MetS in cases and controls along with odds ratio and p value are given in Table 2. Hypertriglyceridemia, low HDL cholesterol, hyperglycemia, hypertension, and central obesity were more prevalent in cases than in controls. However, statistically significant difference was noted in case of low HDL cholesterol among both the groups.

The various components of MetS were compared among psoriasis patients and controls (Table 3). Fasting triglycerides were higher among patients with psoriasis than controls, but the difference was not significant on statistical analysis. Similarly, there were no statistically significant differences between HDL, low-density lipoproteins (LDL), very low-density lipoproteins (VLDL), blood sugar and blood pressure (systolic and diastolic) on comparing the cases and controls.

We observed higher prevalence of MetS among cases than controls in the age groups 21-30 years (4% vs 0%), 31-40 years (2% vs 0%) and 41-50 years (18% vs 8%), equal prevalence in the age group of 51-60 years (6% each), and lower prevalence among cases than controls (0% vs 2%) in 61-70 years. Although, majority of cases (80%) and all the controls (100%) who had MetS were more than 40 years of age, early onset of MetS was noted in patients of psoriasis (Figure 1).

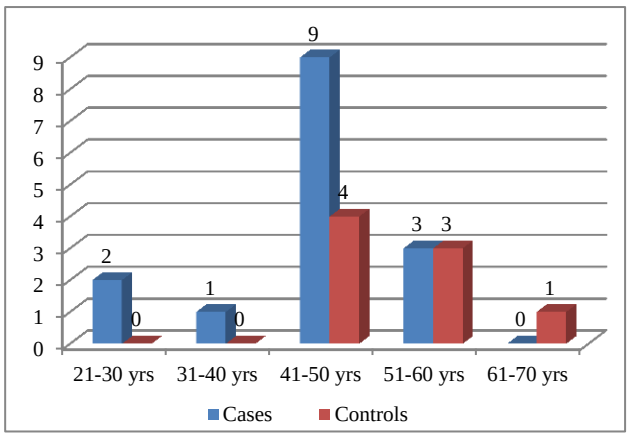

Figure 1: Comparison of prevalence of metabolic syndrome among different age groups of cases and controls.

On comparing psoriasis patients with and without MetS (Table 4), we found higher mean age and disease duration in patients with MetS but the difference was statistically insignificant. It was observed that patients with MetS had significantly higher mean triglycerides, LDL cholesterol, fasting blood sugar, blood pressure (systolic and diastolic) and waist circumference, but significantly lower mean HDL on statistical analysis. There was no statistically significant difference regarding gender, prevalence of smoking and alcoholism, psoriasis severity by BSA and PASI, or VLDL levels.

DISCUSSION

Psoriasis is an immune mediated, chronic inflammatory disease, where genetic and environmental factors play significant roles in determining the clinical manifestations. Recently, it has been conceptualized that psoriasis is not merely a disease limited to skin and joints, rather, it has been shown to be associated with metabolic syndrome, which is a cluster of risk factors such as diabetes mellitus, hypertension, obesity and dyslipidemia. Although, the exact etiopathogenetic link is yet to be elucidated, certain proinflammatory cytokines, angiogenic factors and immunological mediators, which are shared by the pathogenetic mechanisms of the two diseases, have been identified.

Several studies have found that metabolic syndrome is associated with psoriasis. Gisondi et al studied 338 psoriasis patients as well as 334 controls and found significantly higher prevalence of MetS in psoriasis patients (30.1%) compared with the controls (20.6%) on statistical analysis.[15] Similarly, Nisa et al evaluated 150 psoriasis patients and 150 healthy individuals and found the prevalence of MetS as 28% in cases and 6% in controls, which was statistically significant.[10]

Lakshmi et al observed a higher prevalence of MetS in cases (32.5%) compared to controls (30%), but the difference was not statistically significant.[11] Similarly, in the present study, MetS was found in 15/50 psoriasis patients (30%) and 8/50 controls (16%), using SAM-NCEP ATP III criteria and the difference was not statistically significant. The difference between the results of the various studies can be partly explained by geographical and ethnic differences, different characteristics of the investigated patients with psoriasis, and differences in the applied diagnostic criteria of MetS.

On comparing the prevalence of MetS among different age groups of cases and controls, we observed higher prevalence among cases than controls in the age groups 21-30 years (4% vs 0%), 31-40 years (2% vs 0%) and 41-50 years (18% vs 8%), equal prevalence in the age group of 51-60 years (6% each), and lower prevalence among cases than controls (0% vs 2%) in 61-70 years. Nisa et al documented a higher prevalence of MetS in psoriasis patients than controls right from the late second decade (12.9% vs 0% in the age group 18-30 years, 29.7% vs 2% in 31-40 years, 44.4% vs 7.1% in 41-50 years, 37.5% vs 9% in 51-60 years and 50% vs 42% in >60 years).[10] In contrast, Gisondi et al documented the higher prevalence of MetS in psoriasis patients than controls after the age of 40 years.

There was no significant association between gender and presence of MetS on statistical analysis, which was in agreement with most of the studies. Similarly, Nisa et al,

Gisondi et al and Kim et al found no gender difference in the prevalence of MetS.[10,15,16] In contrast, Zindanci et al observed that influence of female gender on the occurrence of MetS in psoriasis was significant and that female gender increased the risk of MetS by 3.195-fold compared to males.[17]

Although, duration of disease was longer in patients with MetS (9.9±9.53 years) than without MetS (7.25±5.36 years), no statistically significant difference was noted. This finding was similar to most of the studies done in India and abroad.[11,15,17] However, Nisa et al reported that psoriasis patients with MetS had longer mean disease duration (13.67±11.87 years) than patients without MetS (6.46±5.80 years) which was significant statistically.[10]

In the present study, mean PASI and mean BSA involvement were higher in psoriasis patients with MetS than without MetS, but the difference was not statistically significant. Further, PASI >10 was seen in higher percentage in psoriasis patients with MetS than without MetS (73.3% vs 51.42%). Similarly, 80% of psoriasis patients with MetS had BSA involvement more than 10% as compared to 68.57% of psoriasis patients without MetS. However, statistically, no significant association was found between presence of metabolic syndrome and severity of psoriasis. Similarly, MetS was independent of severity of psoriasis in the studies done by Nisa et al, Zindancı et al and Lakshmi et al.[10,11,17] However, Kim et al and Salihbegovic et al reported that there was significant association between MetS and severity of psoriasis.[16,18] As our study was cross-sectional, it was not possible to assess the true correlation between prevalence of MetS and severity of the disease, since the disease is known to have remissions and relapses and no follow up of patients was made in our study.

In agreement to studies by Zindanci et al and Nisa et al, presence of MetS in psoriasis patients was independent of smoking.[10,17] Similar to the observation by Girisha et al, alcoholism did not influence occurrence of MetS in psoriasis patients.[19]

Results from studies worldwide regarding association of psoriasis with individual components of MetS are varied and inconsistent. In our study, higher prevalence of all the components of MetS was seen in cases than controls. However, statistically significant difference was observed only in prevalence of low HDL cholesterol among cases and controls (40% vs 18%, OR= 3.0370, P=0.0159). The difference in prevalence of other risk factors was not significant statistically. Further, on analyzing psoriasis patients with and without MetS, the mean triglycerides, blood pressure, waist circumference and fasting blood glucose were higher and mean HDL was lower in psoriasis patients with MetS than patients without MetS. The differences were significant statistically.

Nisa et al documented statistically significant higher prevalence of all individual components of MetS in psoriasis patients than controls.[10] Similarly, Niemann et al found higher rates of diabetes mellitus (DM), hypertension, hyperlipidemia and obesity in patients with psoriasis than in controls.[4] Gisondi et al did not find any difference between psoriasis patients and controls with respect to low levels of HDL, DM and hypertension, but observed increased prevalence of hypertriglyceridemia in psoriasis patients than controls.[15] Such an association indicates the close relation between atherosclerotic and psoriatic plaques but a common etiopathogenetic mechanism is yet to be established.

The results from the present and previous studies support the possibility of a benefit from regular screening for metabolic syndrome and its components among all adults with psoriasis when visiting their general practitioner or dermatologist, regardless of age and severity, in order to reduce their risk of secondary diabetes and cardiovascular disease. The high prevalence of hypertension, diabetes, dyslipidemia and obesity among psoriasis patients reiterates the need for counselling of patients regarding healthy dietary habits and regular exercise, and the need for large- scale, community-based programs for health awareness and lifestyle modification.

The major limitations of the present study were a small sample size and a time bound study. By increasing the sample size and the time duration of the study, a more definite conclusion about the association between psoriasis and metabolic syndrome may be arrived at.

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