ORIGINAL ARTICLE

# Prevalence of metabolic syndrome in patients with psoriasis: A prospective, observational, descriptive study from a tertiary health-care center in South India

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**ABSTRACT**

***Background:*** *Psoriasis is a chronic inflammatory disorder which of late has been significantly linked with metabolic syndrome (MS).* ***Objective:*** *To assess the association between psoriasis and MS and evaluate specific disease characteristics predisposing for the development of MS.* ***Materials and Methods:*** *We performed a prospective, observational, descriptive study with 207 adult patients with various types of psoriasis.* ***Results:*** *MS was found in 49.8% of psoriatic patients. It was more prevalent after 40 years of age with a female preponderance (P = 0.000). Smoking (P = 0.0320) and alcohol consumption (P = 0.025) were significant contributing factors for the development of MS in our study population. No association for the same was reflected with parameters such as psoriasis type, lifestyle behavior, family history, and other associated systemic disease.* ***Conclusion:*** *A definite association does exist between psoriasis and MS. Patients with psoriasis should be periodically screened for MS and managed appropriately utilizing an interdisciplinary approach.*

**Key Words:** *Inflammation, metabolic syndrome, psoriasis*

## Introduction

Psoriasis is a chronic immune-mediated inflammatory disorder affecting 1%–3% of the general population. Metabolic syndrome (MS) which encompasses the following, namely, central obesity, atherogenic dyslipidemia, hypertension, and glucose intolerance, is considered to arise from insulin resistance and abnormal adipose tissue function.[1] Chronic inflammation with persistent elevation of proinflammatory cytokines forms the crux of MS. Various immune mediators such as leptin, adiponectin, tumor necrosis factor-alpha (TNF-$\alpha$), and interleukin (IL)-6 have been regarded to play an important role in insulin resistance and therefore in psoriasis pathogenesis associated with MS.[2] Currently, whether psoriasis is purely a cutaneous disorder or a systemic disease encompasses one of the most recent topics for debate. Of late, there has been a rapid surge in the number of reports linking psoriasis to MS. This increased association possesses serious implications in the health profile of psoriatic patients, which demands an appropriate interdisciplinary approach while managing these patients.

### Study design

This was a prospective, observational, descriptive hospital-based study conducted at Sri Ramachandra

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University, Chennai, Tamil Nadu, India, from January to December 2013.

### Aim

This study was conducted to assess the association between psoriasis and MS and to evaluate specific disease characteristics for the risk of developing MS, thereby initiating an interdisciplinary approach for screening and management of its comorbidities.

### Study population

This was a hospital-based prospective study in which 207 patients with different types of psoriasis were evaluated with reference to the occurrence of MS. Criteria for including patients in the study included patients who were freshly diagnosed cases of psoriasis in both sexes, age >18 years, and willingness of the patients to participate in the study. Patients <18 years of age and those unwilling to participate were excluded from the study.

## Materials and Methods

All patients were thoroughly evaluated after obtaining an informed consent. A detailed history regarding participant demographics, his/her past medical and medication history, a thorough documentation with regard to smoking, tobacco, and alcohol consumption, and his/her level of physical activity were recorded. Clinical examination with reference to the type and extent of psoriasis was performed along with measurements of height, weight, body mass index, waist circumference, and blood pressure (BP) of the participants. Waist circumference was measured using a measuring tape snugly fit around the abdomen at level with the uppermost part of the pelvic bone without resulting in any form of skin compression. BP was recorded in a sitting posture and was calculated after the participants had rested for 10 minutes. Laboratory parameters, namely fasting blood sugar (FBS) levels, postprandial blood sugar levels, and fasting lipid profiles, were documented.

MS in our study was assessed based on the National Cholesterol Education Program Adult Panel-III criteria which include:

- Waist circumference >102 cm in males and >88 cm in females
- Hypertriglyceridemia >150 mg/dl or if the patient was under treatment for the same
- High-density lipoproteins <40 mg/dl in males and <50 mg/dl in females or if patients were under treatment for the same
- BP >130/85 mm Hg or if patients were under treatment for the same
- FBS >100 mg/dl or if patients were under treatment for the same.

### Statistical analysis

Analysis of data was carried out using Statistical Package for Social Sciences version 16 (Chicago, USA). $P < 0.05$ was considered statistically significant.

## Observation and Results

The study had 207 participants, of which 94 were males and 113 were females. The age of the patients in this study varied from 19 to 75 years with mean age being 46.46 years. The most common form of psoriasis encountered in the study was psoriasis vulgaris seen in 121 patients followed by palmoplantar psoriasis in 49 patients, scalp psoriasis in thirty patients, and guttate psoriasis in seven patients. 45.9% of patients had waist circumference greater than the values designated in the criteria for MS while 54.1% of patients had waist circumference below the above-mentioned circumference. The FBS was >100 mg/dl in 49.3% of patients in the study with 50.7% of patients depicting normal values. 46.4% of patients had BP >130/85 mmHg whereas 53.6% of the participants were normotensive. In 37.7% of patients, the level of triglycerides was >150 mg/dl, and in 62.3% of patients, the level was <150 mg/dl. An underlying cardiovascular disease was present in only 4.3% of the psoriatic patients examined. Alcohol consumption and smoking were witnessed in 13% and 9.2% of psoriatic patients, respectively. Of the study population, 66.7% of patients had a physically active lifestyle whereas the remaining 33.3% were sedentary. MS was seen in 103 patients of the 207 psoriatic patients in our study. These descriptive features have been summarized in Table 1.

On comparing various descriptive variables in all our psoriasis patients with MS and without MS, the following findings were obtained and have been described in Table 2.

On associating the link between intrinsic factors and other external factors with the occurrence of MS in psoriatic patients as well as the association of MS in various types of psoriasis, the observations obtained have been summarized in Table 3.

### Limitation

Our study did not have a control group which was the limitation factor of our study.

## Discussion

The pioneering description of MS dates back to 1988 when Gerald Reavan, an endocrinologist from Stanford University, elucidated this entity. MS was then

**Table 1: Descriptive features of all patients as a whole in our study**

| Patient characteristics | Values |
|---|---|
| Age, mean±SD | 46.46±13.534 |
| Sex | |
| Females | 113 |
| Males | 94 |
| BMI (kg/m$^2$), mean±SD | 23.40±4.721 |
| Smokers | 19 |
| Alcoholics | 27 |
| Waist circumference (cm), mean±SD | 92.72±11.410 |
| Triglyceride (mg/dl), mean±SD | 142.69±80.126 |
| HDL (mg/dl), mean±SD | 43.49±9.607 |
| LDL (mg/dl), mean±SD | 116.16±33.710 |
| SBP (mmHg), mean±SD | 125.69±14.397 |
| DBP (mmHg), mean±SD | 80.77±10.378 |
| Patients with an active lifestyle | 138 |
| Patients with a sedentary lifestyle | 69 |

SD = Standard deviation; BMI = Body mass index; HDL = High-density lipoprotein; LDL = Low-density lipoprotein; SBP = Systolic blood pressure; DBP = Diastolic blood pressure

**Table 2: Comparison of characteristics in psoriatic patients with and without metabolic syndrome**

| Parameters | Mean±SD | |
|---|---|---|
| | Psoriatic patients with metabolic syndrome | Psoriatic patients without metabolic syndrome |
| Sex | | |
| Males | 32 | 62 |
| Females | 71 | 42 |
| Age in years | 50.23±10.56 | 42.73±15.09 |
| Height (cm) | 161.47±8.79 | 165.29±10.29 |
| Weight (kg) | 65.92±12.35 | 58.42±11.62 |
| Waist in circumference (cm) | 98.04±10.55 | 87.46±9.70 |
| BMI (kg/m$^2$) | 25.30±4.67 | 21.52±3.98 |
| SBP (mmHg) | 132.12±14.03 | 119.33±11.72 |
| DBP (mmHg) | 84.17±10.62 | 77.40±8.99 |
| Fasting blood sugar (mg/dl) | 118.23±44.39 | 92.96±17.08 |
| Postprandial blood sugar (mg/dl) | 167.18±71.57 | 120.09±42.54 |
| Total cholesterol (mg/dl) | 200.96±40.44 | 181.33±40.07 |
| LDL (mg/dl) | 124.04±32.73 | 108.36±32.99 |
| HDL (mg/dl) | 41.67±8.10 | 45.30±10.63 |
| Triglyceride (mg/dl) | 170.59±93.85 | 115.05±50.68 |
| Age of onset (years) | 45.91±10.97 | 38.02±15.25 |
| Duration of disease (years) | 53.37±52.40 | 57.44±65.64 |

SD = Standard deviation; BMI = Body mass index; HDL = High-density lipoprotein; LDL = Low-density lipoprotein; SBP = Systolic blood pressure; DBP = Diastolic blood pressure

described in relationship to increased occurrence of cardiovascular diseases.[3] Of late, chronic inflammatory dermatoses such as psoriasis have demonstrated a strong association with MS. Whether psoriasis precedes or succeeds the development of MS cannot be ascertained with certainty at present. There are two schools of thought for the same. Owing to depression and stress following psoriasis, there could be release of inflammatory mediators that favor obesity development.[4] Moreover, obesity *per se* is considered a proinflammatory state with the adipocytes serving as a rich source of mediators such as adipocytokines, TNF-$\alpha$, and IL-6 that could trigger the pathogenesis of psoriasis.[5] Leptin, a hormone specifically released from adipose tissue, may have a proinflammatory role and is found to be elevated in psoriatic patients. Hyperleptinemia may further enhance the development of MS in patients with psoriasis.[6] There definitely has been a surge these days in the number of reports linking MS to psoriasis.

Our study demonstrated a 49.8% association of psoriasis to MS. This exceeded the values of all preceding studies done in India and abroad. Of the seven studies linking psoriasis and MS conducted in India, the highest prevalence recorded was 44%, in a study performed on a Chennai based population.[3] Comparative salient features of these studies, including ours have been summarized in Table 4.[3,7-12] The authors feel that racial factors and genetics may have a definitive role for this increased predisposition because in other studies done in India and abroad the prevalence was ≤40%.

We witnessed an increased female preponderance of MS in psoriasis, which was statistically significant. This association was also seen in two other Indian studies done at Puducherry and West Bengal.[9,10] Similarly, a Tunisian study[13] also demonstrated female preponderance and this feature was also elaborated by Zindanci *et al*.,[14] wherein the association of female psoriatic patients with MS had statistical significance. However, this observation was refuted by Nisa and Qazi,[7] Gisondi *et al*.,[15] and Kim *et al*.[16]

Smoking and alcohol consumption were two other factors that played an important role in linking psoriasis with MS, in our study. Two other studies from India done by Malhotra *et al*.[12] and Ali *et al*.[11] also substantiated the above linkage. However, Nisa and Qazi[7] and Khunger *et al*.[8] negated this relationship. Similarly, Gisondi *et al*.[15] also did not link smoking and alcohol consumption with psoriasis and MS.

The association of a sedentary lifestyle with psoriasis and MS was not considered significant in our study. Even in the study from Puducherry,[9] similar findings were recorded. Other studies however did not comment on this aspect.

Across the various age groups, MS was maximally prevalent in the age group of 41–60 years. This was consistent with the studies done by Sommer *et al*.,[17] Gisondi *et al*.,[15] Cohen *et al*.,[18] and Lakshmi *et al*.[9] Nisa and Qazi[7] however demonstrated a higher prevalence in the 18–30 years age group.

Taking the various types of psoriasis into consideration in our study, MS was seen mainly in palmoplantar psoriasis (63.27%), followed by psoriasis vulgaris (48.76%) and scalp psoriasis (30%). In guttate psoriasis, there were no cases of MS. In the study conducted by Das *et al*.,[10] from West Bengal, chronic plaque psoriasis was linked with the maximum occurrence of MS followed by palmoplantar psoriasis. Other studies did not comment on this aspect.

**Table 3: Various factors and their significance in the development of metabolic syndrome in psoriasis**

| Parameter | Psoriatic patients with MS (%) | Psoriatic patients without MS (%) | *P* |
|---|---|---|---|
| Sex | | | |
| Males | 32 (34.04) | 62 (65.96) | 0.000 |
| Females | 71 (62.83) | 42 (37.17) | |
| Cardiovascular involvement | | | |
| Present | 6 (66.67) | 3 (33.33) | 0.300 |
| Absent | 97 (48.99) | 101 (51.01) | |
| History of smoking | | | |
| Present | 5 (26.32) | 14 (73.68) | 0.032 |
| Absent | 98 (52.13) | 90 (47.87) | |
| History of alcohol intake | | | |
| Present | 8 (29.63) | 19 (70.37) | 0.025 |
| Absent | 95 (52.78) | 85 (47.22) | |
| Scalp involvement | | | |
| Present | 41 (41) | 59 (59) | 0.905 |
| Absent | 43 (40.18) | 64 (59.81) | |
| Nail involvement | | | |
| Present | 93 (51.67) | 87 (48.33) | 0.156 |
| Absent | 10 (37.04) | 17 (62.96) | |
| Arthropathy | | | |
| Present | 5 (50) | 5 (50) | 0.987 |
| Absent | 99 (50.25) | 98 (49.75) | |
| Physical activity | | | |
| Present | 65 (47.10) | 73 (52.90) | 0.280 |
| Absent | 38 (55.07) | 31 (44.93) | |
| Family history | | | |
| Present | 9 (47.37) | 10 (52.63) | 0.825 |
| Absent | 94 (50) | 94 (50) | |

MS = Metabolic syndrome

In those patients of psoriasis with accompanying arthritis in our study, no significant association with MS was demonstrated. However, studies by Ali *et al*.[19] and Raychaudhuri *et al*.[20] did demonstrate high percentages of the association of both. Studies conducted by Pehlevan *et al*.[21] and Bostoen *et al*.[22] also demonstrated an association between psoriatic arthropathy and MS, but to a lesser extent.

The association of a family history for the same was not considered significant in our study. This feature however was not analyzed in any of the previous studies.

## Conclusion

Our study reiterates the fact that MS and psoriasis do have a close association. As this was a cross-sectional study, the directionality and association of psoriasis with MS could not be determined. However, immune mediators heralding psoriasis have a close association with dyslipidemia and vice versa. Therefore, either of the two could be responsible for the development of one of the components. With an increased genetic susceptibility of Asian Indians for developing insulin resistance, the occurrence of MS in the Indian population is high. This is further compounded by the introduction of a lifestyle devoid of significant physical activity. Although our study compared many variables with previous studies done in this regard, emphasis was given to preceding studies done in India, owing to the greater susceptibility encountered among Indians, and also to understand which population in India demonstrated a higher prevalence for the same. Clearly, the prevalence was more in the South Indian population when compared

**Table 4: Comparison of few attributes in our study with other similar studies conducted in India**

| Authors | Prevalence of MS (%) | Gender predisposition | Smoking | Alcohol consumption | Physical activity |
|---|---|---|---|---|---|
| Nisa and Qazi[7] | 28 | None | No association | No association | - |
| Khunger *et al*.[8] | 30 | - | No association | No association | - |
| Madanagobalane and Anandan[3] | 44 | - | - | - | - |
| Lakshmi *et al*.[9] | 32.5 | Females | - | - | No association |
| Das *et al*.[10] | 40.4 | Females | - | - | - |
| Ali *et al*.[11] | 37 | - | Significant link (+) | Significant link (+) | - |
| Malhotra *et al*.[12] | 25 | - | Significant link (+) | Significant link (+) | - |
| Our study | 49.8 | Females | Significant link (+) | Significant link (+) | No association |

MS = Metabolic syndrome

to the North, with Chennai highlighting a much higher number of psoriatic patients having MS; hence, whether an environmental factor along with genetics and dietary habits is closely associated with the development of MS in psoriasis needs to be seriously considered. These findings emphasize that all patients with psoriasis should be screened for MS along with education regarding lifestyle modifications while administering systemic therapy for psoriasis to holistically manage these patients. However, to determine the actual mechanics of this association and the effects of systemic therapies in such cases, more studies in this regard need to be undertaken.

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## Conflicts of interest

There are no conflicts of interest.

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