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Original Research

Prevalence of metabolic syndrome and insulin resistance in chronic plaque psoriasis- Cross sectional study

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Abstract:

Aim: To estimate the frequency of metabolic syndrome and insulin resistance in patients of chronic plaque psoriasis and to evaluate their association with psoriasis severity.

Materials and Method: 110 patients aged 18–70 years with chronic plaque psoriasis were included in the study. Patients were subjected to blood testing for serum lipid profile, fasting blood glucose and fasting insulin level. Metabolic syndrome was diagnosed according to the NCEP ATP III criteria. Psoriasis severity was classified as mild or moderate to severe according to Psoriasis Area Severity Index (PASI) and body surface area (BSA). When PASI was ≥10 and BSA was >10, psoriasis was designated as moderate to severe.

Results: The prevalence of metabolic syndrome was 42.7% and prevalence of insulin resistance was 43.6%. Mean values for all variables anthropometric measurements, age and Extent of disease were higher in patients with metabolic syndrome as compared to those without metabolic syndrome and this difference was statistically significant. 28.2% of participants had increased Total cholesterol level, 21.8% of participants had increased LDL levels, 47.3% of participants had increased VLDL levels, 48.2% of participants had increased triglycerides level and 30% had reduced HDL levels. The mean triglyceride level was raised in participants (177.6 + 102.2) and mean HDL levels were within normal limits (47.3 + 13).

Conclusion: Chronic plaque psoriasis should not be regarded merely as a cutaneous disorder but as a systemic inflammatory condition with significant metabolic implications. Early identification and management of metabolic syndrome and insulin resistance in psoriatic patients can aid in reducing long-term cardiovascular morbidity and improving overall patient outcomes.

Keywords: metabolic syndrome, insulin resistance, chronic plaque psoriasis

Introduction

Psoriasis represents a chronic, immune-mediated systemic inflammatory disorder primarily affecting skin, with global prevalence of 2–4% and is associated with substantial morbidity through recurrent flares and psychosocial distress. It is mainly characterised by elevated levels of pro-inflammatory cytokines such as TNF-α and IL-6[1]. The presence of these cytokines reflects the association of psoriasis with other diseases that can dominate common comorbidities like psoriatic arthritis and anxiety /depression disorder. Recently studies have reflected that Psoriasis and metabolic syndrome share a reciprocal, mechanistically linked pathophysiology roots in chronic low-grade inflammation and immune-metabolic dysregulation comorbidities. TNF-α and IL-6 are pro-inflammatory cytokines, present in chronic inflammation that are implicated in atherogenesis and peripheral insulin resistance that further leads in development of hypertension and type II Diabetes Mellitus (DM). [2, 3]

Furthermore, an increased mortality from CVD (cardio-vascular disease) in patients with severe psoriasis has been recorded, and it can also confer an independent risk of myocardial infarction specifically in young patients. Major factors that may contribute

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to this unfavourable CVD risk profile includes physical inactivity, psychological stress, smoking, hyper homocysteinaemia, and obesity, that have reflected a higher prevalence among patients with psoriasis. Further research has reflected that various traditional systemic therapies implemented for psoriasis have also worsen CVD risk factors such as hypertension, hyperlipidaemia, and hyper-homocysteinemia .[4–6]

Metabolic syndrome is a collection of risk factors such as central obesity, glucose intolerance, hypertension, and antherogenic dyslipidaemia, and is a strong predictor of CVD, diabetes and stroke. A study reflected that men having metabolic syndrome with psoriasis are almost three times more likely to die of coronary artery disease after adjustment for conventional cardio-vascular risk factors.[7, 8]

Aim

To estimate the frequency of metabolic syndrome and insulin resistance in patients of chronic plaque psoriasis and to evaluate their association with psoriasis severity.

Material and methods

Study design: Cross-sectional study

Sample population: Patients with chronic plaque psoriasis reporting in department of dermatology, SGRD, Sri Amritsar.

Study period: 18 months

Sampling technique: purposive sampling.

Sample Size: 110 patients with chronic plaque psoriasis were included in the study.

Inclusion Criteria: Patients aged 18–70 years with clinically diagnosed chronic plaque psoriasis who were willing to participate and provide informed consent.

Exclusion Criteria: Patients with diagnosed diabetes mellitus receiving treatment, pregnant or lactating women and patients receiving oral retinoids or statins.

Data Collection: Basic demographic, anthropometric measurements and clinical details were collected from all the patients. After basic data collection, all patients were subjected to blood testing for serum lipid profile, fasting blood glucose and fasting insulin level. Metabolic syndrome was diagnosed according to the NCEP ATP III criteria. Participants fulfilling ≥3 of the following 5 criteria were classified as having metabolic syndrome:

1. Waist circumference >102 cm (men) or >88 cm (women)
2. Triglycerides ≥150 mg/dL
3. HDL cholesterol <40 mg/dL (men) or <50 mg/dL (women)
4. Blood pressure ≥130/85 mmHg
5. Fasting plasma glucose ≥100 mg/dL

Insulin resistance was assessed using the Homeostatic Model Assessment for Insulin Resistance (HOMA-IR). Participants with HOMA-IR ≥2 were considered insulin resistant.

HOMA-IR = [Fasting Insulin (μU/mL) × Fasting Plasma Glucose (mg/dL)] / 405.

Psoriasis severity was classified as mild or moderate to severe according to Psoriasis Area Severity Index (PASI) and body surface area (BSA). When PASI was ≥10 and BSA was >10, psoriasis was designated as moderate to severe.

In this scoring system, four anatomical regions, including the head (h), upper limb (u), trunk (t) and lower limbs (l), are evaluated separately based on three parameters: erythema (E), induration (I) and scaling (D). Each of these parameters is graded on a severity scale from 0–4 where 0 stands for none; 1 is mild; 2 is moderate; 3 is severe; and 4 is considered very severe. The percentage of area involvement of the involved sites is assessed as follows: 1is less than 10% involvement; 2 is 10–29%; 3 is 30–49%; 4 is 50–69%; 5 is 70–89%; and 6 is more than 90%. The severity scores of three parameters are multiplied by corresponding area scores and weighted values assigned to each of four body parts. These values are then added to obtain the PASI score. The final formula for PASI score is: PASI = 0.1 (Eh + Ih + Dh) Ah + 0.2 (Eu + Iu + Du) Au + 0.3 (Et + It + Dt) At + 0.4 (El + Il + Dl) Al. The maximum PASI score is 72. Institutional Ethics Committee approval was taken. Informed consent was taken from all participants.

Data Analysis: All data was collected and entered in MS excel sheet. The quantitative variables were expressed as Mean ± SD while qualitative variables were expressed as frequencies and percentages. Independent sample t test was used to compare quantitative variables. Chi square test was used to

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analyse associations between qualitative variables. A p value <0.05 was considered statistically significant.

Observations and Results

A total of 110 patients clinically diagnosed with chronic plaque psoriasis, reporting to OPD of department of dermatology of a tertiary care institute meeting the inclusion criteria were included in the study using purposive sampling. The study group consisted of 75.5% (83) males and 24.5% (27) females those were distributed in different age groups. Most number of patients (23.6%) were in age group 18-27 years, followed by 38-47 years (22.7%). 75.5% of patients were male. The most common occupation in the study group was farming (23.6%). The mean weight and height of study participants was 74.6 ± 14.4 kg and 1.68 ± 0.9 m. The mean BMI of patients was 26.4± 4.1 kg/m^2. The mean waist circumference was 93.47± 11.7. (Table 1).

Table 1: Demographic and Anthropometric distribution of study participants

Demographic variable	Frequency (%)
Age group	
18-27	**26 (23.6)**
28-37	**20 (18.2)**
38-47	**25 (22.7)**
48-57	**24 (21.8)**
>57	**15 (13.6)**
Gender	
Male	83 (75.5)
Female	27 (24.5)
Occupation	
Businessman	25 (22.7)
Farmer	26 (23.6)
Housewife	18 (16.4)
Labourer	6 (5.5)
Serviceman	22 (20)
Student	13 (11.8)
Anthropometric measurements	
Weight (kg)	74.6 ± 14.4
Height ((ft.)	5.51 ± 0.31
BMI (kg/m2)	26.4 ± 4.1
Waist circumference(inch)	36.8 ± 4.6

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The prevalence of metabolic syndrome was 42.7% (47 out of 110 patients) and prevalence of insulin resistance was 43.6% (48 out of 110 participants). (Table 2).

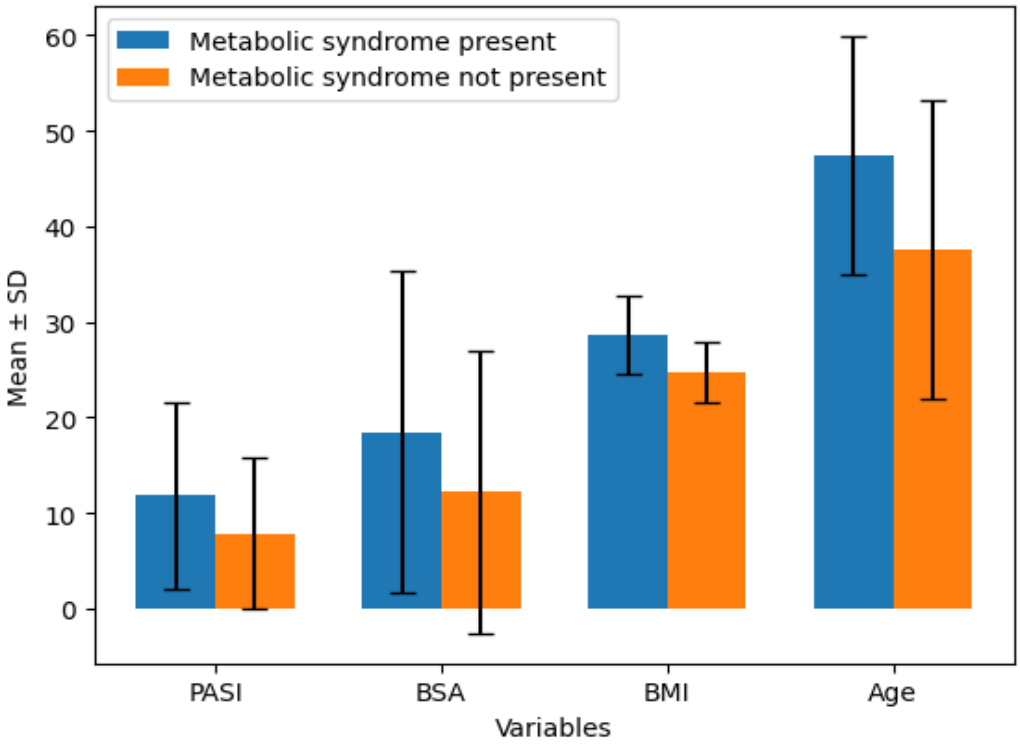
Table 2: Prevalence of Metabolic syndrome and Insulin resistance among studied participants.

Variable	Frequency (%)
Metabolic syndrome	47 (42.7)
Insulin resistance	48 (43.6)

On comparison of anthropometric measurements, age and Extent of disease among patients with metabolic syndrome and without metabolic syndrome, it was observed that mean values for all variables were higher in patients with metabolic syndrome as compared to those without metabolic syndrome and this difference was statistically significant (p-value < 0.05). (Table 3).

Table 3: Association of Anthropometric measures, Extent of disease and Age with metabolic syndrome.

Variable	Metabolic syndrome present	Metabolic syndrome Not present	p-value
PASI	11.84 ± 9.78	7.86 ± 7.9	0.016*
BSA	18.45 ± 16.8	12.2 ± 14.8	0.006*
BMI	28.6 ± 4.1	24.7 ± 3.2	<0.001*
Age	47.4 ± 12.5	37.6 ± 15.6	0.001*



Graph 1: Pictorial representation of anthropometric measures (BMI), Extent of disease (BSA, PASI) and Age with metabolic syndrome.

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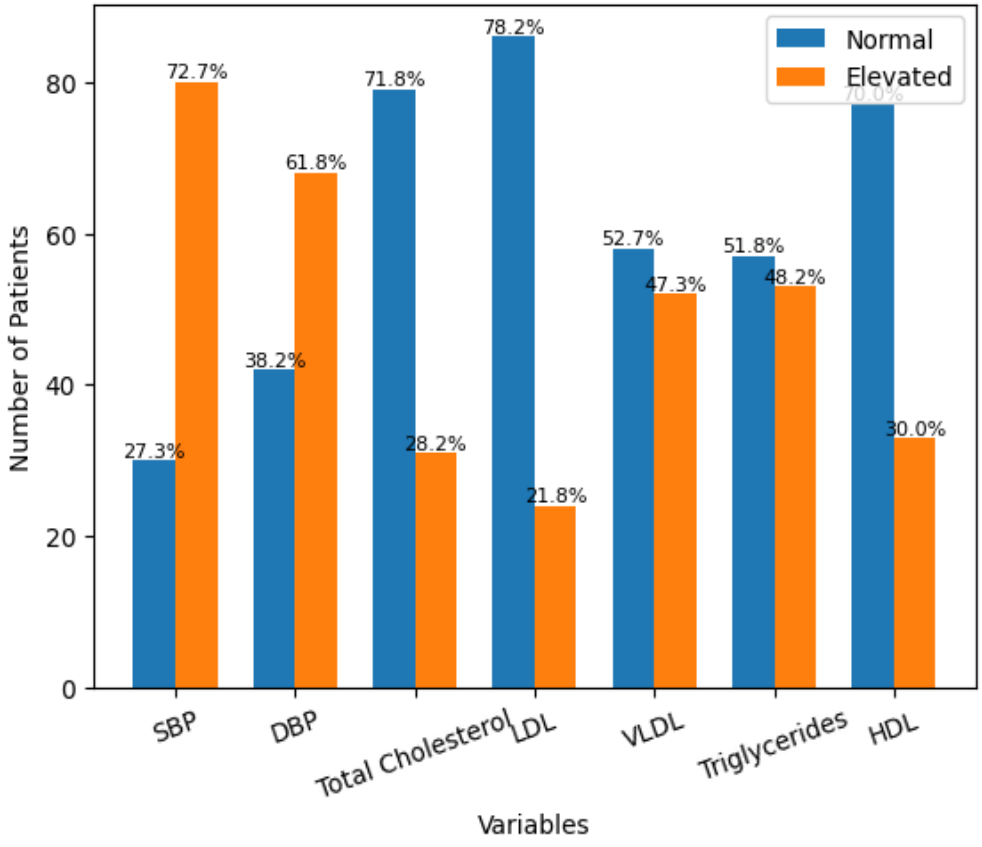
To understand the effect of psoriasis on hypertension among studied participants, blood pressure was monitored. It was observed that, systolic blood pressure (SBP) was elevated (>120 mm Hg) in 72.7% of participants and diastolic blood pressure (DBP) was elevated (>80 mmHg) in 61.8% of participants. Further, it was observed that 28.2% of participants had increased Total cholesterol level, 21.8% of participants had increased LDL levels, 47.3% of participants had increased VLDL levels, 48.2% of participants had increased triglycerides level and 30% had reduced HDL levels. The mean triglyceride level was raised in participants (177.6 ± 102.2) and mean HDL levels were within normal limits (47.3 ± 13). (Table 4).

Table 4: Distribution of blood pressure and lipid profile among participants.

VARIABLE	Normal	Elevated
SBP	30 (27.3)	80 (72.7)
DBP	42 (38.2)	68 (61.8)
Total Cholesterol	79 (71.8)	31 (28.2)
LDL	86 ((78.2))	24 (21.8)
VLDL	58 (52.7)	52 (47.3)
Triglycerides	57 (51.8)	53 (48.2)
HDL	77 (70)	33 (30)



Graph 2: Pictorial representation of of blood pressure and lipid profile among participants.

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Discussion

In the present study most participants were in age group 18-27 years, with mean age of 41.7 years. The study conducted by **Kim CR et al** [9], **Nisa N et al** [8], **Praveen Kumar U et al** [10] and **Love T et al** [11], also reported similar mean age of study participants i.e., 42.33 years, 37.34 years, 42.07 years and 41.7 years respectively. These similar findings indicate that psoriasis is commonly present in the middle age group. Regarding gender distribution, male preponderance was observed in the present study (75.5%), with Male: Female ratio of 3:1. **Mustata M et al**[12] and **Nisa N et al**[8]reported similar findings, where also male participants were in higher number i.e., 62% and male: female ratio of 2.48:1 respectively. This depicts the epidemiologically higher prevalence of psoriasis among male population.

The mean BMI of study participants was 26.4 $\pm$ 4.1 kg/m^2. **Bilir Y et al** [13] and **Zindanci I et al**[1]reported the similar finding of mean BMI 27.83 ± 7.08 and 28.73 $\pm$ 6.1kg/m^2. As BMI and waist circumference are established indicators of overweight and central adiposity, their elevated mean values in the present study underscore the importance of considering anthropometric parameters while interpreting the clinical findings and outcomes of the study.

The prevalence of metabolic syndrome in our study was 42.7%, whereas the prevalence of Insulin resistance was 43%. The findings were comparable to study conducted by **Bilir Y et al** [13] and **Mebazza et al**[14], **Madangobalane et al**[15]**,** and **Karoli et al**[16] where prevalence of metabolic syndrome was reported as 43.75% ,40.9%, 44%, and 40% respectively. This highlights the significant metabolic burden associated with chronic plaque psoriasis. Psoriasis is increasingly recognised as a systemic inflammatory disorder in which pro-inflammatory cytokines such as TNF-α, IL-6, and IL-17 contribute to insulin resistance, endothelial dysfunction, and dyslipidaemia. These shared inflammatory pathways may explain the frequent coexistence of psoriasis with metabolic syndrome and other cardiometabolic comorbidities. Furthermore, the significantly higher PASI and BSA scores observed among patients with metabolic syndrome suggest that greater disease severity may be associated with increased metabolic dysregulation. Similar observations have been reported by Bilir et al. ,Levakov et al., and Madanagobalane et al., who demonstrated a positive association between psoriasis severity, metabolic syndrome, and insulin resistance. Early identification of metabolic syndrome and insulin resistance in patients with psoriasis may facilitate timely lifestyle modification and therapeutic interventions, thereby reducing the long-term risk of type 2 diabetes mellitus and cardiovascular disease. [2,3,4,12,13,15]

Further, it was observed that in 72.7% of participants SBP was elevated (>120 mm Hg) and DBP was elevated (>80 mmHg) in 61.8% of participants. The mean SBP levels were 127.1 $\pm$ 10.3 and mean DBP levels were 83.5 $\pm$ 6.3 mm of Hg. The findings were comparable to other studies conducted by **Bilir Y et al** [13] and **Agarwal K et al** [17], where similar distribution of mean SBP and DBP levels were reported. It was observed that 28.2% of participants had elevated Total cholesterol level, 21.8% of participants had elevated LDL levels, 47.3% of participants had elevated VLDL levels, 48.2% of participants had elevated triglycerides level and 30% had decreased HDL levels. The mean triglyceride level was raised in participants (177.6 $\pm$ 102.2) and mean HDL levels were within normal limits (47.3 $\pm$ 13). The findings were similar to study conducted by **Mustata M et al [12] and Bilir Y et al** [13], where mean triglyceride levels were elevated above the normal range indicating the role of underlying adiposity in development of metabolic syndrome. The high frequency of hypertension, hypertriglyceridemia, and other lipid abnormalities observed in the present study further highlights the increased cardiovascular risk among patients with psoriasis. Chronic systemic inflammation promotes vascular dysfunction and atherogenesis through cytokine-mediated pathways, thereby linking psoriasis with cardiometabolic disease. These findings emphasise the importance of routine cardiovascular and metabolic screening in patients with chronic plaque psoriasis. [2,4,12,17]

Conclusion

In conclusion, chronic plaque psoriasis should not be regarded merely as a cutaneous disorder but as a systemic inflammatory condition with significant metabolic implications. Early identification and management of metabolic syndrome and insulin resistance in psoriatic patients can aid in reducing

long-term cardiovascular morbidity and improving overall patient outcomes. These findings support the need for a multidisciplinary approach and routine metabolic screening as an integral part of psoriasis management.

Limitations

The present study adopted the cross-sectional study design including the psoriasis patients only, which could not ascertain the causal association between the psoriasis and metabolic syndrome, which could have been better assessed in case-control and cohort study designs. Secondly the participants in our study were included from tertiary healthcare facility, which may not be representative of the general population. The relatively small sample size limits generalisability and statistical power. The absence of healthy control group limited direct comparison of the prevalence of metabolic syndrome and insulin resistance with general population.

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Conflict of Interest: None

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