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Original Research Article

A case-control study to find out the prevalence of metabolic syndrome in patients with psoriasis as compared to age and sex matched controls

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ABSTRACT

Background: Psoriasis is an immune mediated chronic inflammatory dermatosis and it is associated with high risk of cardiovascular events. Aim of the study was to estimate the prevalence of metabolic syndrome and its association with disease severity in patients with psoriasis.
Methods: This was a case control study which included 150 cases of chronic plaque psoriasis and 150 healthy controls. All subjects underwent detailed history and clinical examination including measurement of blood pressure and waist circumference and psoriasis area and severity index (PASI) score. Fasting blood sugar, triglyceride, cholesterol, and high-density lipoprotein cholesterol levels were tested following overnight fasting. Various parameters of metabolic syndrome were compared in two groups using chi square test and fisher's exact test. Statistical analysis of the data was done using epi-info ^{TM} software.
Results: Prevalence of metabolic syndrome was more common in patients of psoriasis than in control (56.67% vs. 17.33%; p<0.0001). Psoriatic patients had higher prevalence of abdominal obesity (57.33% vs. 27.33%; p=0.0037), elevated blood pressure (32% vs. 12%; p=0.0001), elevated fasting blood sugar level (62% vs. 22%; p<0.0001), hypertriglyceridemia (44.66% vs. 32%; p=0.0326), low level of HDL cholesterol (64% vs. 21.33%; p<0.0001 and alcohol abuse (22.22% vs. 14.66%; p=0.0154).
Conclusions: The findings in our study demonstrated a robust association between psoriasis and metabolic syndrome and its components, irrespective of psoriasis severity.

Keywords: Case-control study, Psoriasis, Metabolic syndrome

INTRODUCTION

Psoriasis is a chronic, inflammatory, hyperproliferative skin disorder with a worldwide prevalence of 2-3%.[1] Psoriasis patients are predisposed to various co-morbidities such as metabolic syndrome, diabetes mellitus, hypertension, obesity and cardiovascular disorders.[2] These co-morbidities have a significant impact on quality of life of patients with psoriasis.[3] Other environmental factors predisposing psoriasis are drugs, infections, alcohol abuse, smoking, physical trauma, stress and sun exposure.

Hypertension is associated in psoriatic patients due to increased level of angiotensin converting enzyme, renin and endothelial-1.[4] Obesity has strongest association in childhood psoriasis and is reported about twice as frequently among psoriasis patients than in general population.[5]

The metabolic syndrome also known as syndrome X, is a combination of abdominal obesity, elevated blood pressure, elevated fasting blood sugar, high levels of serum triglycerides and low levels of HDL cholesterol.[6] Association of metabolic syndrome and its various components with psoriasis have been consistently reported in various earlier studies all over the world. We undertook this study to estimate the prevalence of metabolic syndrome in this western Maharashtra region and its association with other risk factors and also to compare disease severity with metabolic syndrome.

Aim and objective

Aim and objectives of the study were to study and compare prevalence of metabolic syndrome in chronic plaque psoriasis patients with age and sex matched controls, to study the risk factors related to metabolic syndrome in patients with psoriasis and to study association between psoriasis disease severity and metabolic syndrome.

METHODS

This case control study was conducted at a tertiary care hospital in Western Maharashtra. During this study, data was collected from 150 cases and 150 controls attending dermatology out-patient department over a period of 12 months from June 2016 to May 2017. An approval from the institutional ethical committee was taken before conducting the study. Written informed consent of the subjects was taken before enrolling them in this study.

Sample size calculated by using formula, n=(Zα+Z1-β)2* (p1q1+p2q2)/d2 where, Zα=1.96, Z1-β=0.84, p1 and p2 are prevalence of the two groups of metabolic syndromes and q1 and q2 is 100-p1 and 100-p2 respectively. To determine sample size for the present study, we assumed an expected level of prevalence of 25% in controls.[7] From the available previous hospital data we calculated minimum sample size to be 150 per group.

Inclusion criteria

Patients having chronic plaque psoriasis and age group between 18 to 70 years and psoriasis for at least 6 months duration were included from the study.

Exclusion criteria

Patients with psoriasis who have received systemic treatment like methotrexate, acitretin, cyclosporine or phototherapy in previous 6 weeks and patients having history of pre-existing hypertension, diabetes mellitus, dyslipidemia before commencing the study were excluded were excluded from the study.

Detailed history and complete clinical examination were done for all participants in the study. PASI score was calculated for all the patients. Parameters of metabolic syndrome were assessed and compared between cases and age and sex matched controls. We took fasting venous blood samples at the enrolment visit. Subjects had fasted overnight for at least 8 hours prior to sample collection. Fasting blood sugar level was measured using glucose oxidation method. Serum triglycerides and serum cholesterol were measured with the enzymatic procedures. The abdominal circumference was measured using flexible tape positioned at the level between iliac crest and lower costal border. The blood pressure was measured in supine position from the right arm of subjects at time of enrolment visit. According to the revised NCEP ATP III criteria, participants with 3 or more of the following criteria were defined as having the metabolic syndrome: Abdominal obesity (waist circumference, >102 cm in men and >88 cm in women), hypertriglyceridemia (triglycerides, ≥150 mg/dl), low levels of high-density lipoprotein cholesterol (<40 mg/dl in men and <50 mg/dl in women), high blood pressure (≥130/85 mm Hg) and high fasting blood sugar levels (≥100 mg/dl)

Statistical analysis of the data was done using Epi info ™ software. Categorical variables were compared between cases and controls using chi-square test and fisher's exact test. P<0.05 was considered statistically significant.

RESULTS

The observation of our study comprising of 150 cases of psoriasis and 150 age and sex matched controls were as follows.

Majority of psoriatic patients belonged to age group 41-50 years; 37 patients (24.67%), followed by age group of 21-30 years; 35 patients (23.33%) and 31-40 years is 33 patients (22%) (Table 1). Among 150 cases, 87 were males (58%) and 63 were females (42%). The ratio of male: female was 1.38:1.

Table 1: Age distribution of patients with psoriasis.

Age group (years)	Patients with psoriasis (N)	Percentage (%)
<20	6	4
21-30	35	23.33
31-40	33	22
41-50	37	24.67
51-60	27	18
61-70	12	8
Total	150	100

Among the 150 psoriasis patients, metabolic syndrome was associated with 85 patients. Prevalence of metabolic syndrome in cases was 56.67% whereas only 26 controls (17.33%) had metabolic syndrome, p<0.0001 which was statistically significant. Out of these 85 cases having metabolic syndrome, 77 cases had PASI score ≤10 (mild to moderate). Whereas 8 cases had PASI score>10

(severe). Fischer exact test showed p=0.3508 which was statistically not significant (Table 2).

Table 2: Association between PASI score and metabolic syndrome.

Variables	PASI score≤10 (Mild-moderate)	PASI score>10 (Severe)	Total
Metabolic syndrome present	77	8	85
Metabolic syndrome absent	62	3	65
Total	139	11	150

(Fisher exact test: p=0.3508)

In our study, the abdominal circumference was higher among cases (57.33%) relative to controls (27.33%) with OR of 2.0056 (p=0.0037). We also observed a higher prevalence of high fasting blood sugar level among the psoriasis group (62%) as compared to controls (22%) with OR of 5.7847 (p<0.0001). High level of triglycerides was more prevalent among cases (44.66%) compared to controls (32%) with OR of 1.7154 (p=0.0326). In addition to that, the psoriasis group had higher prevalence of high blood pressure (32%) compared to controls (12%) with OR=3.451 (p=0.0001). Low level of HDL cholesterol was more common among psoriasis group (64%) compared to controls (21.33%) with OR of 6.5556 (p<0.0001) (Table 3).

Furthermore, alcohol abuse was more common among cases (22.22%) compared to controls (14.66%) with OR 2.1157 (p=0.0154). Whereas, the prevalence of smoking in cases was 18.66% and controls was 12.66% with OR of 1.5824 (p=0.2038), which was statistically insignificant (Table 4).

Table 3: Comparison of various parameters of metabolic syndrome in case and control group.

Parameters	Cases, (n=150)		Controls, (n=150)		Odd's ratio	P value
	Present	Absent	Present	Absent		
Abdominal circumference abnormal (>102 cm in men and >88 cm in women)	84	114	41	109	2.0056	0.0037
High fasting blood sugar levels level (≥100 mg/dl)	93	57	33	117	5.7847	<0.0001
High blood pressure (≥130/85 mmHg)	48	102	18	132	3.451	0.0001
Serum hypertriglyceridemia (triglycerides ≥150 mg/dl)	67	83	48	102	1.7154	0.0326
Low levels of high-density lipoprotein cholesterol (<40 mg/dl in men and <50 mg/dl)	96	54	32	118	6.5556	<0.0001
Metabolic syndrome (3 or more parameters out of 5)	85	65	26	124	6.2367	<0.0001

Table 4: Comparison of risk factors for psoriasis in case and control group.

Risk factors	Cases, (n=150)		Controls, (n=150)		Odd's ratio	P value
	Present	Absent	Present	Absent		
Alcohol abuse	40	110	22	128	2.1157	0.0154
Smoking	28	122	19	131	1.5824	0.2038

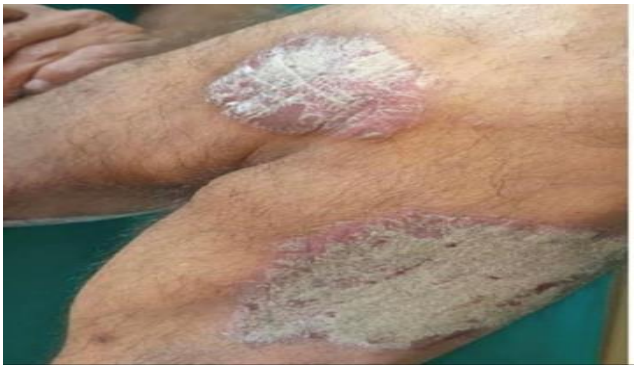

Figure 1: 52-year-old male presented with 2, well-defined, erythematous, plaques with micaceous scales present over left lower limb.

DISCUSSION

The underlying mechanism which links psoriasis and metabolic syndrome may include overlapping inflammatory pathways and genetic predisposition. Chronic Th-1 and Th-17-mediated inflammation with dysregulation of tumor necrosis factor-alpha and interleukin 6, not only promotes epidermal hyperplasia in psoriasis, but may antagonize insulin signaling too, alter adipokine expression, and mediate insulin resistance and obesity. Contrariwise, hyperinsulinemia in metabolic syndrome may promote psoriasis susceptibility or severity by promoting chronic inflammation and angiogenesis.[8]

During this study, 24.67% of patients belonged to age bracket of 41-50 years. The male to female ratio in our study revealed a rather higher incidence in men (58%) than in women (42%) at ratio 1.38:1. A slight male preponderance in our study was similar to studies which were conducted by Madanagobalane et al.[9] Lowest number of patients were in age group below 20 years but this may be due to our inclusion criteria of patients above 18 years only.

PASI score ranged from 1 to 22.2. The mean PASI score was 4.69. Earlier studies like Lakshmi et al found the mean PASI 13.93. The mean PASI score was low in our study as compared to study done by Laxmi et al.[10] This may be due to a greater number of patients who had high PASI score were already on systemic treatment which were excluded from our study.

In the present study, we have found significantly higher prevalence of metabolic syndrome in cases compared with controls (56.67% vs. 17.33%, p<0.0001) that's in accordance with various studies conducted in diverse geographic locations by Madangobalane et al observed (44% vs. 30%, p<0.025), Gisondi et al observed (30.1% vs. 20.6%, p=0.005).[9,11]

Analyzing the individual components of metabolic syndrome, in our study, increased waist circumference ≥102 cm in men and ≥88 cm in women, as a criterion of metabolic syndrome was fulfilled by more individuals within the case group (57.33%) than controls (27.33%) (OR=2.0056; p<0.0001), which was statistically significant (Table 3). Most of the international studies indicate that obesity is more common among psoriasis patients than controls. In a study done by Herron et al they observed significant association between obesity and metabolic syndrome which was similar to our study. (34% vs. 18%, p=0.001).[12] Also statistically significant correlation between obesity and psoriasis was observed by Cohen et al (29.4% vs. 23.5%, p=0.012).[13] Some of them even show that abdominal obesity as the commonest component of metabolic syndrome in psoriasis patients.[14] Most of the Indian studies except one from Delhi conducted by Gopal et al didn't observed a significant independent association between obesity and psoriasis.[15] But in our study, there was significant association between abdominal obesity and psoriasis.

Elevated blood pressure, systolic ≥130 mm of Hg and/or diastolic ≥85 mm of Hg as a criterion of metabolic syndrome was found higher in cases (32%) than controls (12%) (OR=3.451; p<0.0001), which was statistically significant (Table 3). This is similar with a study conducted in India by Khunger et al Where systolic and diastolic blood pressures were found to be significantly higher in psoriasis patients compared to controls.[16]

Elevated fasting blood sugar level ≥100 mg/dl as a criterion of metabolic syndrome was found in 62% cases and 22% of controls (OR=5.7847; p<0.0001), which was statistically significant (Table 3). A possible explanation for the association between psoriasis and diabetes is that the presence of chronic inflammation that happens because of persistent secretion of TNF alpha and other proinflammatory cytokines such as IL-1, IL-6, which precipitates both psoriasis and diabetes. Chronic systemic inflammation induces endothelial dysfunction, altered glucose metabolism, and insulin resistance that play a major role in the development of diabetes.[17] In a study done by Nisa et al they showed statistically significant correlation between fasting blood sugar levels and patients with psoriasis. (18% vs 5.33%, OR=3.90, p=0.0006).[17]

In our study, 44.66% of cases fulfilled elevated triglycerides ≥150 mg/dl as a criterion of metabolic syndrome, compared to 32% of controls (OR=1.7154; p=0.023), which was statistically significant. As a criterion of metabolic syndrome, reduced HDL levels (HDL <40 mg/dl in males and <50 mg/dl in females) was fulfilled by 64% of cases and 21.33% of controls, a statistically significant difference (OR=6.5556; p<0.0001) (Table 3). The correlation between dyslipidemia and psoriasis is variable in numerous studies. In a study done at Jammu and Kashmir by Nisa et al.[17] They found statistically significant correlation between serum cholesterol and psoriasis but they didn't observe any significant independent association between HDL cholesterol and psoriasis. It's been proposed that lipoprotein which is genetically determined molecule whose levels are reported to be elevated in patients with psoriasis could also be an element contributing to an increased cardiovascular risk in patients with psoriasis.[18]

The percentage of alcohol consumption was (22.22%) in cases as compared to controls (14.66%) in our study and it was statistically significant (OR=2.1157; p=0.0154) (Table 3). The relationship between alcohol and psoriasis is a less studied arena. Alcohol use is a very important risk factor, particularly in male psoriasis patients. Alcohol use is reported to trigger psoriasis through a rise in trauma or infection. Effect of ethanol on lymphocyte transformation suggests that alcohol may also affect immune mechanisms.[19,20]

In our study, patients with psoriasis were more likely to indulge in smoking than patients without psoriasis. (18.66% vs. 12.66%, p=0.2038 with OR=1.5824). But these findings were not statistically significant. On the other hand, a study done by Nisa et al in Jammu and Kashmir showed correlation between psoriasis and smoking which was statistically significant (42% vs. 10%; p=0.0001 with OR=6.5172).[17]

In our study, patients with psoriasis were more likely to have metabolic syndrome than patients without psoriasis (56.7% vs 17.33%; p≤0.0001). These findings were similar to a study done in South Africa. In their study, they found significant association between metabolic syndrome and psoriasis. (52.4% vs. 33.7%; p=0.007) [21]

Similarly, a study done by Salunke et al observed metabolic syndrome occurring commonly among Indian patients with psoriasis as compared to controls. (38.9 % vs. 31%; p=0.007).[22] Another study done by Guiet et al in Chinese population had similar findings. They observed higher prevalence of metabolic syndrome among patients with psoriasis as compared to controls. (14.3% vs. 10%; p=0.001 with OR of 1.5).[23]

Our study showed positive association of psoriasis with hypertriglyceridemia, abdominal obesity, reduced HDL cholesterol, increased fasting blood sugar, increased blood pressure and alcohol abuse. Amongst all, increased fasting blood sugar and reduced HDL cholesterol were most common associations.

Limitation

In our study the directionality of the association between psoriasis and metabolic syndrome could not be determined. Hence, association alone was documented, causality could not be assessed. There could be chance for selection bias because controls which we enrolled in our study were hospital-based controls. So, in order to avoid this selection bias controls should be selected from general population.

CONCLUSION

Metabolic syndrome was associated with psoriasis irrespective severity of disease. Our findings suggest that psoriasis is associated with numerous diseases such as diabetes, hypertension, and metabolic syndrome. Therefore, patients with psoriasis should be screened thoroughly for metabolic syndrome and should be effectively treated at earliest for the same, to reduce risk of cardiovascular events.

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REFERENCES

1. Azfar RS, Gelfand JM. Psoriasis and metabolic disease: epidemiology and pathophysiology. Curr Opin Rheumatol. 2008;20(4):416-22.
2. Menter A, Griffiths C, Tebbey P, Horn E, Sterry W, on behalf of the International Psoriasis Council. 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 Acad Dermatol Venereol. 2010;24:1371-7.
3. Greb JE, Goldminz AM, Elder JT. Psoriasis. Nat Rev Dis Primers. 2016;2:16082.
4. Das UN. Is angiotensin-II an endogenous pro-inflammatory molecule? Med Sci Monit. 2005;11:155-62.
5. Sommer DM, Jenisch S, Suchan M, Christophers E, Weichenthal M. Increased prevalence of the metabolic syndrome in patients with moderate to severe psoriasis. Arch Dermatol Res. 2006;298:321-8.
6. Takahashi H, Iizuka H. Psoriasis and metabolic syndrome. J Dermatol. 2012;39(3):212-8.
7. Sawant A, Mankeshwar R, Shah S, Raghavan R, Dhongde G, Raje H. Prevalence of metabolic syndrome in urban India. Cholesterol. 2011;2011:920983.
8. Davidovici BB, Sattar N, Prinz JC, Puig L, Emery P, Barker JN et al. Psoriasis and systemic inflammatory diseases: potential mechanistic links between skin disease and co-morbid conditions. J Invest Dermatol. 2010;130:1785-96.
9. Madanagobalane S, Anandan 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.
10. Lakshmi S, Nath AK, Udayashankar C. Metabolic syndrome in patients with psoriasis: A comparative study. Indian Dermatol Online J. 2014;5:132-37.
11. Gisondi P, Tessari G, Conti A. Prevalence of metabolic syndrome in patients with psoriasis: A hospital-based case-control study. Br J Dermatol. 2007;157:68-73.
12. Prevalence of metabolic syndrome in patients with psoriasis: a hospital-based case-control study. Br J Dermatol. 2007;157:68-73.
13. Cohen AD, Drieher J, Shapiro Y, Vidavsky L, Vardy DA, Davidovici B et al. Psoriasis and diabetes: A population based cross sectional study. J Eur Acad Dermatol Venerol. 2008;22:585-9.
14. Love TJ, Qureshi AA, Karlson EW, Gelfand JM, Choi HK. Prevalence of the metabolic syndrome in psoriasis: results from the National Health and Nutrition Examination Survey, 2003-2006. Arch Dermatol. 2011;147:419-24.
15. Gopal MG, Talwar A, Sharath Kumar BC, Ramesh M, Nandini AS. A clinical and epidemiological study of psoriasis and its association with various biochemical parameters in newly diagnosed cases. J Clin Diagn Res. 2013;7:2901-03.
16. Khunger N, Gupta D, Ramesh V. Is psoriasis a new cutaneous marker for metabolic syndrome? A study in Indian patients. Indian J Dermatol. 2013;58(4):313-4.
17. Nisa N, Qazi MA. Prevalence of metabolic syndrome in patients with psoriasis. Indian J Dermatol Venereol Leprol. 2010;76(6):662-5.
18. Misra A, Khurana L. The metabolic syndrome in South Asians: epidemiology, determinants, and prevention. Metab Syndr Relat Disord. 2009;7(6):497-514.
19. Shapiro J, Cohen AD, Weitzman D, Tal R, David M. Psoriasis and cardiovascular risk factors: Acase-

control study on inpatients comparing psoriasis to dermatitis. J Am Acad Dermatol. 2012;66:252-8.
20. Pietrzak A, Kadzielewski J, Janowski K, Rolinski J, Krasowska D, Chodorowska G et al. Lipoprotein in patients with psoriasis: Associations with lipid profiles and disease severity. Int J Dermatol. 2009;48:379-87.
21. Goolam Mahyoodeen N, Crowther NJ, Snyman T, Pillay L, Tikly M. High burden of the metabolic syndrome and its component disorders in South Africans with psoriasis. Int J Dermatol. 2019;58 (5):557-62.
22. Salunke AS, Nagargoje MV, Belgaumkar VA, Tolat SN, Chavan RB Association of metabolic syndrome in chronic plaque psoriasis patients and their correlation with disease severity, duration and age: a case control study from Western Maharashtra. J Clin Diagn Res. 2017;11(8):WC06-10.
23. Gui XY, Yu XL, Jin HZ, Zuo YG, Wu C. Prevalence of metabolic syndrome in Chinese psoriasis patients: a hospital-based cross-sectional study. J Diabetes Investig. 2018;9(1):39-43.

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