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Original Research Article

A Study of Metabolic Syndrome in Patients with Psoriasis and Its Association with Disease Severity a Case Control Study

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ABSTRACT

Background: Psoriasis is a chronic inflammatory disease of skin and joints with an association with other diseases such as metabolic syndrome which remains largely undefined in the Indian population.
Objectives: To investigate the prevalence of MetS in patients with psoriasis and among controls and also to determine the relation between disease severity and the presence of MetS.
Methods: We performed a hospital based case control study between January 2014 and May 2015, on a total of 40 patients with psoriasis vulgaris and 80 controls who were matched by age and sex. Relevant history and clinical data were noted and fasting venous blood samples were taken. Metabolic syndrome was diagnosed using the International Diabetes Federation criteria and the severity of psoriasis was evaluated using PASI score.
Results: Metabolic syndrome was significantly more common in psoriatic patients than in controls (57.5% vs 33.8%, P value=0.013). Psoriatic patients had a higher prevalence of central obesity (65% vs 45%, P value= 0.039). There was no difference in elevated fasting blood sugar, hypertension, triglyceridemia and low levels of high density lipoproteinemia among patients with psoriasis and normal controls. We also found no relationship between disease severity of psoriasis and duration of psoriasis disease with metabolic syndrome.
Conclusion: Metabolic syndrome is more prevalent in psoriatic patients with a significantly higher prevalence of central obesity in psoriasis patients. We found no relation between severity of disease and duration of disease with MetS. Hence, we suggest that all psoriasis patients be evaluated for the MetS, irrespective of severity and duration of the disease.

Keywords: Psoriasis vulgaris, Metabolic syndrome, PASI score.

INTRODUCTION

Psoriasis is defined as a chronic inflammatory and proliferative skin condition in which both genetic and environmental factors play a crucial role. The most characteristic lesions consists of red, scaly, sharply demarcated, indurated plaques, present mainly over the scalp and extensor surfaces of upper and lower limb. [1]

There are more than 125 million people, nearly 3% of the world's population, who endure symptoms of psoriasis. [2] In India reported incidence of psoriasis ranges from 0.44% to 2.8% with a higher prevalence in males, with most of the patients presenting in their third or fourth decade of life. [3-6] It is a lifelong disease affecting multiple aspects of one's life and subsequently leading to psychological and physical morbidity to the patient. It is considered as a great economic burden to the patient especially with those having severe disease.[7] Reduced work productivity and high medical expenses are said to contribute to this economic burden. [8]

Traditionally viewed as an inflammatory skin disorder of unknown etiology, the advances made recently in understanding the autoimmune mechanisms in its pathogenesis and presence of other co-morbidities has lead to it being regarded as a systemic disease. [9] The inflammatory basis of metabolic syndrome has stimulated research in its effects on other systemic inflammatory disorders such as psoriasis. [9]

Metabolic syndrome is defined as a constellation of metabolic abnormalities which include abdominal obesity, hypertriglyceridemia, hyperglycemia, low HDL cholesterol and hypertension that lead to an increased risk of cardiovascular disease. [10] The definitions of Metabolic syndrome given by the National Cholesterol Education Program, Adult Treatment Panel III (NCEP, ATP III), [11] and International Diabetes Federation (IDF) [12] are most commonly used.

The past few decades, has shown a steady rise in the prevalence of metabolic syndrome in developed and developing nations in the world including India. Metabolic syndrome in western countries has been identified in one third of their population. [13] A research study carried out in Chennai, India in 2006 has revealed that 18.3% of the population to have metabolic syndrome. [14]

Among all the cutaneous disorders, the strongest association with metabolic syndrome as well as its individual components has been psoriasis. [15] Patients with psoriasis adopting an unhealthy lifestyle of smoking, alcohol consumption and leading a sedentary life will result in increased risk of metabolic syndrome and also act as independent risk factors for cardiovascular disease. [16-18] Psoriasis has been shown to be an independent risk factor for myocardial infarction, and severe psoriasis has been shown to be associated with increased mortality in patients with cardiovascular disease. [19-21]

Thus the high rate of psoriasis and metabolic syndrome worldwide and in India, as well as the significant psychological impact it has on patients lives has lead to many research studies worldwide. However there is a paucity of research studies pertaining to this topic in India. This topic is one of the most intriguing in the study of psoriasis due to the controversial results obtained from different studies. Hence with this in mind, a study of metabolic syndrome in psoriasis and its association with disease severity was conducted.

MATERIALS AND METHODS

This study was a hospital based case control study, which was conducted at the Mahatma Gandhi Medical College and Research Institute Hospital, a rural tertiary care hospital, with an annual volume of above 1,00,000 patients over one and half year period. The Institutional Medical Ethics Committee approved this study. All Outpatients and Inpatients who were >= 18 years of age having clinical features of psoriasis attending the Dermatology department in MGMC &RI were taken as cases and those patients attending master health checkup who were not having clinical features of psoriasis in MGMC&RI were taken as controls from January 2014 to May 2015 were as controls matched by age and sex. Written informed consent was taken from the patients.

Inclusion criteria

- Cases - All clinically diagnosed cases of psoriasis in Department of DVL, MGMC&RI, Puducherry.
- Age > =18 yrs.
- Controls - All patients attending master health check up without clinical features of psoriasis who were matched by age and sex were taken as controls.

Exclusion criteria

- Patients who received any systemic treatment (cyclosporine, acitretin, psoralens and methotrexate) or native medicine for psoriasis for past 6 weeks and topical treatment for past 2 weeks were excluded. [22]

- Pregnant patients, children <18 years and elderlies > 80 years of age were excluded from the study.
- Patients having skin disorders with systemic inflammatory component, e.g.: immunobullous disorder and autoimmune connective disease were excluded from the study.

Number of groups

Two groups

1. **Cases:** Patients having clinical features of psoriasis satisfying the inclusion criteria were taken as cases.
2. **Controls:** Patients without psoriasis attending master health check up matched by age and sex were taken as controls.

Sample size

Patients attending dermatology department both Outpatients and Inpatients satisfying the inclusion criteria were taken from January 2014 to May 2015 (approx 40 cases and 80 controls).

Brief Explanation of the Procedure

The study included all Outpatients and Inpatients with symptoms of psoriasis attending DVL department of Mahatma Gandhi Medical College & Research Institute over a period of one and half years after satisfying the inclusion criteria.

Selected patients had undergone a thorough history taking pertaining to age, sex, symptoms, duration of disease, treatment history, smoking and alcohol history, family history, history of cardiovascular and cerebrovascular diseases. General physical examination was conducted. Waist circumference (cms) measurement was made at the approximate midpoint between the lower margin of the last palpable rib and the top of the iliac crest. [23]

The blood pressure (mm Hg) was recorded in the sitting posture. [24] The Body Mass Index had been determined by weight and height calculations using following equation= weight in kg/square of height in centimeters and was recorded in a proforma. According to Indian guideline BMI from 23-24.9 is overweight, BMI>=25 is moderate obesity and BMI>=30 is severe obesity. [25]

A detailed cutaneous examination was done. The type and distribution of lesions was noted. Body surface area using rule of nine was documented. Severity of psoriasis was assessed according to the PASI (psoriasis area and severity index) score along with co- guide or guide. [26]

Further the patient had been subjected to blood investigations as per International Diabetes Federation criteria & all the study parameters were documented in a standard proforma.

An informed consent was taken from all the patients (cases and controls) in their own native language regarding the nature of the study, risks, discomforts and benefits of the study

Study Parameters

A) Demographic data:

1. Age
2. Sex

B) Physiological parameters:

1. Weight (kg's)
2. Height (m)
3. Body Mass Index (BMI) (kg/m2)
4. Waist circumference (cms)
5. Blood Pressure (mm Hg)

C) Biochemical Parameters:

1. Fasting Blood Sugar (mg/dl):
2. Fasting triglyceride (mg/dl) :
3. Fasting HDL levels (mg/dl):
4. Fasting LDL levels (mg/dl):
5. Fasting Total Cholesterol (mg/dl):

Data collection

All data were entered into a Data Collection Proforma Sheet (Appendix 1) and entered into Excel (MS Excel 2011). Privacy and Confidentiality were maintained. All patient identifiable numbers and information were stripped and replaced by anonymous numbers.

Statistical methods

All data were entered into a data collection proforma sheet and entered into Excel (MS Excel). Statistical analysis was carried out using SPSS version 19.0 (IBM SPSS, US) software. Pearson's Chi square

test was the statistical method which was used in the study to find the prevalence of metabolic syndrome among psoriasis patients and to assess any relation between severity of disease and metabolic syndrome.

RESULTS

This study was conducted in Mahatma Gandhi Medical College and Research Institute, a tertiary care hospital over a period of one and a half years from January 2014 to May 2015.

Table 1: Gender Distribution among cases and controls

		Cases		Controls	
		Count	Column N %	Count	Column N %
Gender	Male	24	60.0%	48	60.0%
	Female	16	40.0%	32	40.0%
	Total	40	100.0%	80	100.0%

This table shows out of the 40 cases 24 were male and 16 female and among the controls 48 were male and 32 female.

Table 2: Prevalence of Metabolic syndrome among gender of cases

		Cases			
		Male		Female	
		Count	Column N %	Count	Column N %
Metabolic syndrome	Present	10	41.7%	13	81.2%
	Absent	14	58.3%	3	18.8%
	Total	24	100.0%	16	100.0%

Pearson chi square test- 6.155, df-1, P value - 0.013

Table 3: Prevalence of Metabolic syndrome among gender of controls

		Controls			
		Male		Female	
		Count	Column N %	Count	Column N %
Metabolic syndrome	Present	8	16.7%	19	59.4%
	Absent	40	83.3%	13	40.6%
	Total	48	100.0%	32	100.0%

Pearson chi square- 15.663, df-1, P value- 0.0001

This shows a significant presence of metabolic syndrome in female patients 59% vs 16.7% of male patients.

This figure shows distribution of metabolic syndrome among the different age groups with maximum number of cases with metabolic syndrome fall between 60-66 years of age and for controls they fall between 53 and 66 years of age.

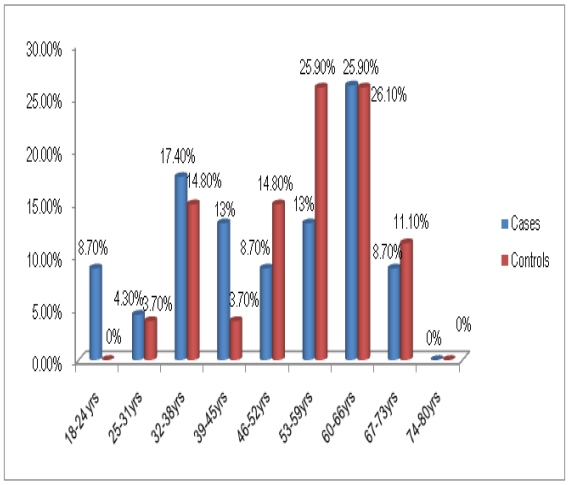

Figure 1: Prevalence of metabolic syndrome among different age groups of cases and controls.

Table 4: Prevalence of metabolic syndrome among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
Metabolic syndrome	Present	23	57.5%	27	33.8%
	Absent	17	42.5%	53	66.2%
	Total	40	100.0%	80	100.0%

Pearson chi-square- 6.189, df - 1, P value- 0.013

This table shows 23(57.5%) out of 40 cases had metabolic syndrome versus 27(33.8%) out of 80 controls, with a significant P value of 0.013.

Table 5: Central obesity among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
Central obesity	Present	26	65.0%	36	45.0%
	Absent	14	35.0%	44	55.0%
	Total	40	100.0%	80	100.0%

Pearson chi-square- 4.271, df-1, P value- 0.039

This table and figure shows 26 (65%) of 40 cases vs 36 (45%) of 80 controls had central obesity with a significant P value of 0.039.

Table 6: Prevalence of raised fasting blood sugar among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
FBS	Present	23	57.5%	51%	63.8%
	Absent	17	42.5%	29	36.2%
	Total	40	100.0%	80	100.0%

Pearson chi-square-0.441, df-1, P value- 0.507

This table and figure shows 23 (57.5%) out of 40 cases vs 51 (63.8%) out of 80 controls had raised FBS, with a non significant P value of 0.507.

Table 7: Presence of Hypertension among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
BP	Present	11	27.5%	28	35%
	Absent	29	72.5%	52	65%
	Total	40	100.0%	80	100.0%

Pearson chi square-0.680, df-1, P value- 0.408.

This table shows 27.5% of cases had hypertension versus 35% of controls with a non significant P value of 0.408

Table 8: Prevalence of TG among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
TG	Present	19	47.5%	24	30.0%
	Absent	21	52.5%	56	70.0%
	Total	40	100.0%	80	100.0%

Pearson chi square: 3.522, df-1, P value- 0.059.

This table and figure shows 47.5% cases having hypertriglyceridemia versus 30% of controls with a statistically non significant P value of 0.059.

Table 9: Prevalence of low HDL among cases and controls

		Group			
		Cases		Controls	
		Count	Column N %	Count	Column N %
HDL	Present	22	55.0%	49	61.2%
	Absent	18	45.0%	31	38.8%
	Total	40	100.0%	80	100.0%

Pearson chi square: 0.431, df-1, P value: 0.511

This table and figure shows low HDL present among 55% (22) of cases versus 61.2% (49) controls with a non significant P value of 0.511.

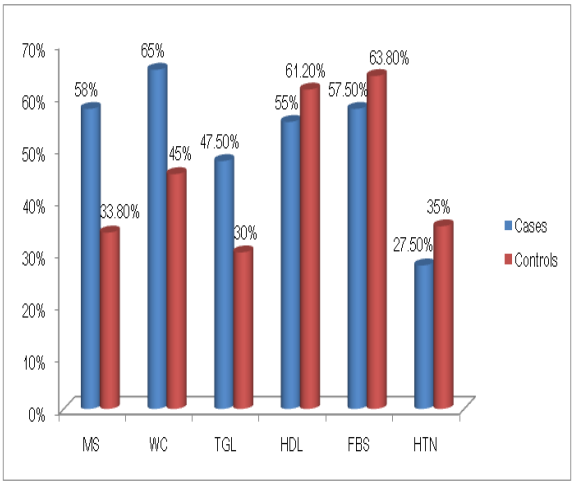

Figure 2: Distribution of MetS and its components among cases and controls (x axis- MS-metabolic syndrome, WC-waist circumference, HDL- high density lipoprotein TGL triglyceride ma, HTN- hypertension, FBS-Fasting blood sugar. Y axis- percentage

This figure shows the presence of metabolic syndrome in 58%of cases versus 33.8% of controls with prevalence of central obesity (waist circumference) higher in cases 65%vs 45% in controls and raised TG levels among cases 47.5% versus 30% among controls, low HDL levels, FBS and HTN were 55%, 57.5% and 27.5% among cases versus 61.2%, 63.8% and 35% among control.

Table 10: Relation of duration of psoriasis with metabolic syndrome

		Duration					
		Less than 1 year		1-5 years		> 5 years	
		Count	Column N %	Count	Column N %	Count	Column N %
Metabolic syndrome	Present	5	62.5%	11	57.9%	7	53.8%
	Absent	3	37.5%	8	42.1%	6	46.2%
	Total	8	100.0%	19	100.0%	13	100.0%

Pearson chi square -0.154, df-2, P value - 0.926

This table and figure shows that there is no significant relation between duration of psoriasis and presence of metabolic syndrome.

Table 114: Number of cases and controls who are smokers

		Cases		Controls	
		Count	Column N %	Count	Column N %
Smoking	Present	10	25.0%	8	10.0%
	Absent	30	75.0%	72	90.0%
	Total	40	100.0%	80	100.0%

Pearson chi square-4.706, df-1, P value-0.030

There are a higher percentage of smokers among cases 25% vs controls 10% with a significant P value of 0.030.

Table 12: Number of cases and controls with alcohol consumption

		Cases		Controls	
		Count	Column N %	Count	Column N %
Alcohol	Present	12	30.0%	17	21.2%
	Absent	28	70.0%	63	78.8%
	Total	40	100.0%	80	100.0%

Pearson chi square-1.114, df-1, P value- 0.291

This table shows among the cases 30% consumed alcohol versus 21.2% among controls.

Table13: Correlation of PASI among cases having metabolic syndrome and those not having metabolic syndrome

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
Metabolic syndrome	Present	10	50.0%	3	60.0%	10	66.7%
	Absent	10	50.0%	2	40.0%	5	33.3%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi square- 0.989, df-2, P value- 0.610

This table shows there is no significance between mild, moderate and severe psoriasis and presence of metabolic syndrome.

This table shows no significance of presence of central obesity with mild, moderate or severe disease of psoriasis.

Table 14: Relation between Central obesity and PASI

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
Central obesity	Present	12	60.0%	3	60.0%	11	73.3%
	Absent	8	40.0%	2	40.0%	4	26.7%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi-square-0.733, df-2, P value-0.693

Table 15: Relation between TG and PASI

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
TG	Present	8	40.0%	3	60.0%	8	53.3%
	Absent	12	60.0%	2	40.0%	7	46.7%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi-square- 0.969, df-2, P value- 0.616

This table shows that among cases that had TG 53% had mild disease, 60% had moderate disease and 40% had severe disease versus those cases who did not have raised triglyceridemia had 36.7% of mild disease, 40% of moderate disease and 60% of severe disease.

This table shows no significant relation between raised blood sugar and PASI score 66.7% of mild disease, 20% of moderate disease and 60% of severe disease had raised blood sugar versus 33% of mild disease, 80% of moderate disease and 40% of severe disease had normal fasting blood sugar levels.

Table 16: Relation between raised fasting blood sugar and PASI

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
Fasting Blood sugar	Present	12	60.0%	1	20.0%	10	66.7%
	Absent	8	40.0%	4	80.0%	5	33.3%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi-square- 3.444, df-2, P value- 0.179

Table 17: Relation between HDL and PASI

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
HDL	Present	9	45.0%	2	40.0%	11	73.7%
	Absent	11	55.0%	3	60.0%	4	26.7%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi-square-3.300, df-2, P value- 0.192

This table shows 73%of mild psoriasis, 40% of moderate psoriasis and 45% of severe psoriasis had low HDL levels versus 26.7%, 60% and 55% of mild, moderate and severe disease of psoriasis had normal HDL levels with no significant correlation between HDL and severity of psoriasis.

Table18: Relation between BP and PASI

		PASI					
		>12		8-12		<8	
		Count	Column N %	Count	Column N %	Count	Column N %
BP	Present	4	20.0%	2	40.0%	5	33.3%
	Absent	16	80.0%	3	60.0%	10	66.7%
	Total	20	100.0%	5	100.0%	15	100.0%

Pearson chi square- 1.212, df- 2, P value- 0.545

This table shows 33.3%, 40% and 20% of mild, moderate and severe disease had hypertension versus 66.7%, 60% and 80% of mild, moderate and severe psoriasis disease had absence of hypertension showing no significant association between hypertension and severity of disease.

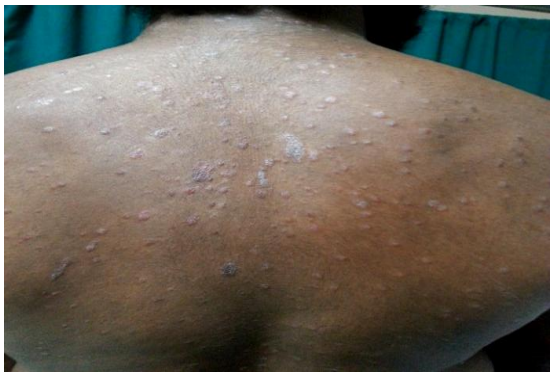

Figure III- Koebner phenomenon present over back of psoriasis patient

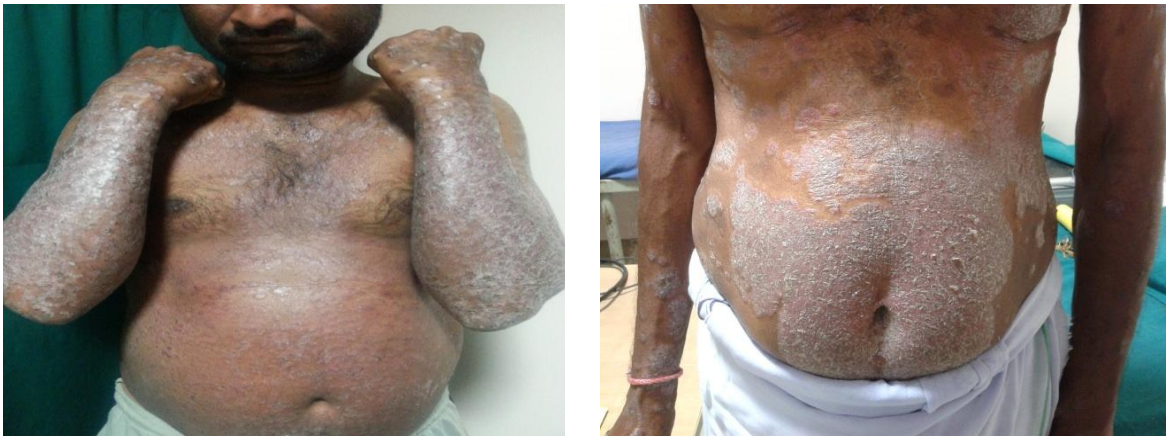

Figure IV- Chronic plaque type Psoriasis

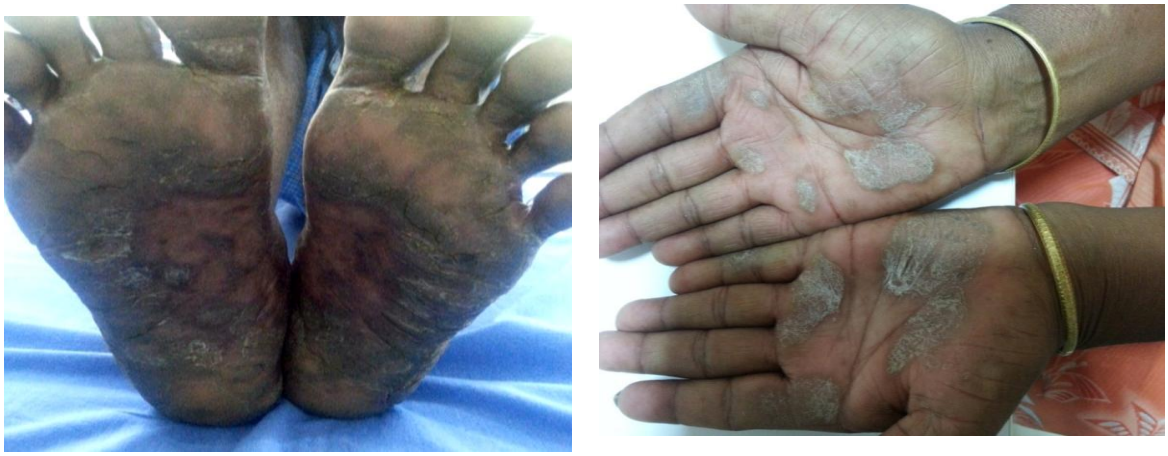

Figure V- Palmoplantar psoriasis

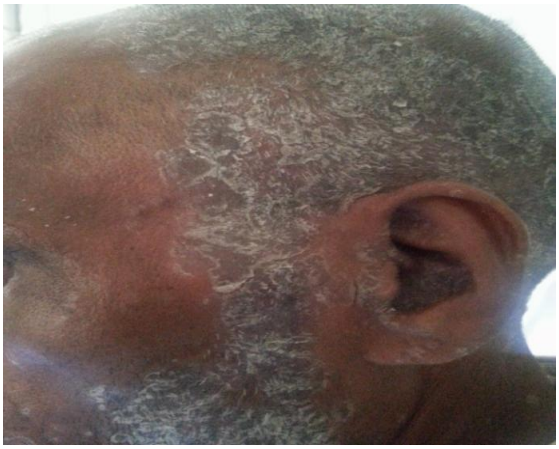

Figure VI - Scalp psoriasis

DISCUSSION

Metabolic syndrome was originally described as a cluster of four conditions glucose intolerance, dyslipidemia, hypertension and central obesity that increased the risk of developing cardiovascular disease. Many studies linking psoriasis and individual components of metabolic syndrome have been studied since the 1950s. In this study we try to find the prevalence of metabolic syndrome among psoriasis patients and also to find if the severity of the psoriasis disease has any relation to the presence of metabolic syndrome.

Age

Out of the forty patients of psoriasis who were enrolled in the study, patients between 60 and 66 years of age had the highest prevalence of metabolic syndrome (26.7%) followed by patients in the age group 32-38 years of age (17.4%), 39-45 (13%) and 53-59 (13%) years of age and the lowest among 25-31 years of age. The control group showed highest prevalence of metabolic syndrome among age groups 60 - 66 (25.9%) and 53-59 years of age (25.9%) and the lowest among 18-24 years of age. These findings were similar to a study by Zindanci et al in which he found a higher prevalence of metabolic syndrome in psoriasis patients between 40 and 59 years of age. [27] Similarly in a study by Kim et al patients older than 53 years of age were found to have higher prevalence of MetS. [28]

Gender

In our study there were 24 males and 16 female psoriasis patients and among controls there were 48 males and 32 female individuals without psoriasis. Our study found a significantly higher prevalence of Met S in female gender compared to males among both psoriasis cases (81% vs 41.7%) and controls (59% vs 16.7%). Other studies showing similar results of higher prevalence of MetS in female gender were Zindanci et al [27] (P<0.05%) and Mebazaa et al [29] which found increased prevalence among female psoriasis patients (47.4%) versus controls (30.1%). Studies by Nisa and Qazi [30] and Kim et al [28] found no difference among gender in prevalence of MetS.

Metabolic Syndrome

In our study metabolic syndrome has a higher prevalence among patients with psoriasis compared to controls. It was observed that 57.5% of patients with psoriasis had metabolic syndrome versus 33.8% among controls with a significant p value-0.013. Similar finding are present among other studies.

Sommer et al [31] showed metabolic syndrome was more prevalent in psoriasis patients. In a study by Love et al, [32] the prevalence of the metabolic syndrome was 40% among psoriasis cases and 23% among controls. In a study by Madanagobalane et al, [22] Met S was significantly more common in psoriatic patients than in controls (44.1% vs. 30%, *P* value - 0.025). Our studies supports the observations of these studies that metabolic syndrome had a higher prevalence among patients with psoriasis.

However in a study by Nath et al [33] in South India found no correlation of psoriasis and metabolic syndrome stating that though a higher prevalence was present among cases it wasn't statistically significant.

Central Obesity

Among the cluster of risk factors for metabolic syndrome in our study we found that central obesity has a significant association to psoriasis (P-0.039). The intra abdominal fat acts as an endocrine organ, by promoting inflammation, affecting glucose metabolism and vascular endothelial biology by secreting adipocytokines. [34,35] Leptin is another hormone secreted by adipocytes that has a role in acute and chronic inflammation. Hyperleptinemia has been observed both in metabolic syndrome and psoriasis. [34,35] However the exact effect in psoriasis is yet to be explored.

The most common feature of the metabolic syndrome among psoriasis patients was abdominal obesity in the study done by Love et al [32] and similar finding was observed in a study by Danielsen et al. [36] This component was more common among psoriatic women in Danielsen et al's study.

Other components of metabolic syndrome

In this study there was no statistical significance of triglyceridemia (P value-0.059), Low HDL cholesterol levels (P value- 0.511), raised fasting blood sugar (P value-0.507) and hypertension (P value-0.408) among psoriasis patients with metabolic syndrome versus controls. This could be due to an increased risk of metabolic syndrome among the general population among South Asian population compared to Caucasians according to Misra and Khuranna. [37] Thus leading to an increased prevalence of the components of MetS among the control group while negating the difference of their prevalence among cases.

Some studies have shown significant raised lipid levels among psoriasis patients versus control such as Dreiher et al (P<0.001). [38] Another study by Cohen et al showed significant association of dyslipidemia among psoriasis patients with a P value <0.015. [39] A study by Nisa N and Qazi [30] showed statistical significant association between raised blood glucose, hypertension and raised triglyceride levels among those who had psoriasis.

Duration of Psoriasis disease and Metabolic syndrome

In this study there was no significance between duration of psoriasis and metabolic syndrome. The presence of MetS in patients who had psoriasis for less than one year, one to five years and more than five years were 62.5%, 57.9% and 53.8% respectively (P value- 0.926).This finding is similar with study done by Madanagobalane et al. [22] Another Indian study by Nisa et al [30] showed a positive association between longer duration of disease and metabolic syndrome. Similarly Mallbris et al [21] showed increased total cholesterol and HDL in patients with new onset psoriasis than controls thus proving presence of lipid abnormalities even in patients with short duration of disease.

PASI and Metabolic Syndrome

In our study we infer from the results that there exists no significant relation with the severity of the disease psoriasis and the presence of metabolic syndrome. Our findings were similar to a study done by Gisondi et al (2007) [40] who found no correlation between severity of psoriasis and prevalence of metabolic syndrome. Madanagobalane et al [22] also found no correlation between the severity of psoriasis and MetS.

However in a study in Korea there was a significant prevalence of MetS in patients who had more severe disease. [28] Also a study by Sommer et al found an increased presence of metabolic syndrome with psoriasis patients having mild and severe form of the disease. [31]

Our study did not find any positive correlation among the individual components of metabolic syndrome and disease severity. Studies by Nisa et al [30] and by Gisondi et al [40] have shown a positive correlation between individual components like triglyceridemia and higher PASI score. While other studies mentioned above have shown Met S is present irrespective of the severity of the disease.

[22,40] This acts as an indicator for doing screening tests for metabolic syndrome irrespective if they have mild, moderate or severe form of the disease.

CONCLUSION

Based on the results and methodology applied we have concluded that:

- The prevalence of metabolic syndrome among psoriasis patients was 57.5% which was significantly higher compared to controls.
- The maximum number of patients among psoriasis who had metabolic syndrome was within 60 and 66 years of age.
- There was a female preponderance for the presence of metabolic syndrome among both psoriasis and control group.
- Smoking was found to be higher in patients with psoriasis compared with controls.
- Central obesity was the common factor of metabolic syndrome (65%) which was significantly higher among the psoriasis cases.
- There was no relation between the duration and severity of psoriasis disease and the presence of metabolic syndrome.

This study has noted that there is a clear association of metabolic syndrome among psoriasis patients compared to controls irrespective of disease severity. Thus it is important to screen for metabolic syndrome in patients with psoriasis irrespective of duration or severity of psoriasis.

The elderly individuals and female patients were found to have a higher prevalence in psoriasis patients; hence they must be monitored for metabolic syndrome. This will also help in preventing cardiovascular events as it's a proposed risk factor for it.

The higher prevalence of smoking in psoriasis patients requires these patients to be given appropriate counselling on the course of the illness to the patient and educate the patient about the disease and provide psychiatric counselling and assistance when needed to the patient.

As central obesity was the highest risk factor found among our patients with psoriasis, it can be used as a predictor which must be routinely carried out in psoriasis patients as it is a simple and cost effective investigation which will help the patient in improving their lifestyle if required.

Hence we conclude that psoriasis being one of the most common skin disorders is associated with the presence of metabolic syndrome. This requires all psoriasis patients to be screened for metabolic syndrome regardless of the severity of the disease. This will help in treating the patient as a whole and improving their quality of life and also aid in preventing or controlling comorbidities. Further studies on this subject with a larger sample size are required for more accurate findings.

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