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Original Research Article

Study of psoriasis and related co-morbid conditions

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ABSTRACT

Background: Psoriasis is a chronic, inflammatory papulosquamous disorder of the skin in which both genetic and environmental factors have a crucial role. Comorbidities tend to arise in complex disorders; they are usually multifactorial and most frequently demonstrate an inflammatory pathology. Aim and objectives of the study include: to determine the occurrence of comorbidities; to determine if the presence of these comorbidities is related to the severity of psoriasis; and to determine if the presence of comorbidities is related to the duration of psoriasis.
Methods: 100 patients diagnosed with psoriasis, attending DVL OPD of a tertiary care teaching hospital were enrolled based on inclusion and exclusion criteria. General, systemic examination and relevant investigations are done to determine co-morbidities in these patients.
Results: Among 100 patients, 70 (70%) patients were having comorbidities. Most of the patients had one comorbidity (38%) followed by two comorbidities (16%) and more than two comorbidities (15%). Dyslipidemia (56%) was the commonest comorbidity followed by diabetes mellitus (23%), obesity (20%), hypertension (18%) and metabolic syndrome (15%). 76% of patients with severe disease and 68% of patients were having mild to moderate psoriasis had co-morbidities. Among 80 patients with less than 5 years of disease duration, only 54 (67.5%) patients were having comorbidities. While 20 patients with more than 5 years of duration of disease, 16 (80%) were having comorbidities.
Conclusions: Wide range of co-morbid conditions are associated with psoriasis. The need for comprehensive screening and treatment must be recognized and addressed.

Keywords: Psoriasis, Co-morbidities, Metabolic syndrome

INTRODUCTION

Psoriasis is a chronic, inflammatory papulosquamous disorder of the skin in which both genetic and environmental factors have a crucial role. It is characterized by scaly, dull red, indurated plaques, having a chronic course with remissions and exacerbations.

It has a worldwide prevalence of 0.6-4.8%.[1] Among the patients attending the hospitals in India, the prevalence is about 0.8-5.5%.[2] It affects all age groups, and its prevalence in children younger than 18 years is 0.71%.[3]

Comorbidity is the occurrence of one or many disorders in association with a given disease.[4,5] It leads to interest in various aspects of medicine in recent times and appears to be due to similar pathogenesis.[4,6] Comorbidities tend to arise in complex disorders; they are usually multifactorial and most frequently demonstrate an inflammatory pathology.[4] Psoriasis is associated with many comorbidities, which has a significant impact on severely affected psoriatic people.[4,7]

Knowledge of comorbidities is of substantial importance because of the following aspects: the association of other diseases leads to the intake of medications that could affect

the onset, severity, and course of psoriasis; medications used in the treatment of psoriasis may positively or negatively influence comorbidities; an association with rare diseases could help to obtain a clear insight into the pathogenesis of psoriasis; and should adjust management of psoriasis in presence of other diseases and medications.[8]

Dermatologists are often the initially consulted healthcare specialists by patients with psoriasis, so we should be keen on these comorbidities. This study is designed to study psoriatic comorbidities.

METHODS

Study design

It is a descriptive cohort study conducted in the department of DVL of a teaching hospital in Chinakakani, Andhra Pradesh from September 2020 till December 2021. Ethical clearance was obtained from the institutional ethics committee.

Inclusion criteria

Patients with age >18 years; all types of psoriatic patients (plaque, pustular, palmoplantar, erythrodermic, and arthropathic type); and psoriatic patients willing to participate in the study were included.

Exclusion criteria

Patients with age <18 years; patients on immunosuppressive drugs like systemic corticosteroids, methotrexate, and cyclophosphamide for psoriasis, or any other chronic illness; and all pregnant and breastfeeding mothers were excluded.

Sample size

All psoriasis patients attending skin OPD and fulfilling the inclusion criteria during the study period were included in the study, and all patients were detailed about the study, and informed consent was taken.

Data collection

All relevant history and clinical data were recorded in the customized proforma sheet.

All patients were evaluated as follows: history, general examination, systemic examination, dermatological examination, and investigations.

Analysis

It was done using statistical package for social sciences (SPSS) version 16.0.

RESULTS

Comorbidities

Among the total 100 patients studied, 70 (70%) patients were having comorbidities.

Number of comorbidities

One comorbidity was seen in 38 patients (38%); two comorbidities were seen in 16 patients (16%); and more than two comorbidities were seen in 15 patients (15%).

Age distribution

The age of psoriatic patients having comorbidities varied from 19 to 82 years and the distribution was as shown in the Table 1.

Sex distribution

Male patients outnumbered the female patients in this study, and the distribution was as shown in the Table 2.

Duration of disease

Psoriasis in patients having comorbidities varied from 10 days to 26 years as shown in Table 3.

Type of disease

Comorbidities seen in each type of psoriasis is given in the Table 4.

Various comorbidities

Most common comorbidity is dyslipidemia (DYS) 56%, followed by diabetes mellitus (DM) 23%, obesity (OB) 20%, hypertension (HTN) 18% and metabolic syndrome (MS) 15%. Various comorbidities are seen in our study are shown in Table 5.

Severity

The distribution of co-morbidities concerning the severity of the disease is given here Table 6.

Table 1: Age distribution among study participants.

Age in years	Number of patients		Comorbidities	Percentage
	Total	Comorbidities		
18-20	02	0	Nil	Nil
21-30	20	10	DYS, HT, OB, DM	50

Continued.

Age in years	Number of patients		Comorbidities	Percentage
	Total	Comorbidities		
31-40	20	12	DYS, OB, DM, MS, HT	60
41-50	30	25	DYS, HT, MS, OB, DM	83.3
51-60	10	8	DYS, HT, DM, MS, OB	80
>60	18	15	DYS, HT, MS, DM, OB	83.3

Table 2: Sex distribution among study participants.

Sex	Number of patients		Comorbidities	Percentage	P value
	Total	Comorbidities			
Males	60	40	DYS, HT, MS, DM, MI, OB	66.6	0.7095
Females	40	30		75	

Table 3: Duration of disease in study participants with comorbidities.

Duration in years	Number of patients		Percentage	P value
	Total	Comorbidities		
Up to 5	80	54	67.5	0.6536
Above 5	20	16	80	

Table 4: Type of psoriasis and associated co-morbidities.

Type	Number of patients		Comorbidities	Percentage
	Total	Comorbidities		
Chronic plague	39	30	DYS, HT, DM, MS, OB	76.9
Palmoplantar psoriasis	25	13	DYS, HT, MS, DM, OB	52
Erythrodermic psoriasis	10	8	DYS, DM, OB,HT, MS	80
Pustular psoriasis	5	4	DYS, HT, MS, DM, OB	78.5

Table 5: Percentage of various comorbidities seen in study participants.

Comorbidities	Number of patients		Percentage
	Total	Comorbidities	
Hypertension (HTN)	100	18	18
Obesity (OB)	100	20	20
Diabetes mellitus (DM)	100	23	23
Dyslipidemia (DYS)	100	56	56
Metabolic syndrome (MS)	100	15	15

Table 6: Association of co-morbidities with severity of disease.

Severity	Number of patients		Percentage	P value
	Total	Comorbidities		
Mild or moderate	75	51	68	0.7535
Severe	25	19	76	

DISCUSSION

In the present era, psoriasis is emerging as an essential skin disease associated with various co-morbidities. These co-morbidities lead to an increased risk of morbidity and mortality. The chronic inflammatory nature of psoriasis is responsible for the occurrence of co-morbidities, and tumor necrosis factor (TNF) alpha plays a central role in this. Several studies have documented its event in psoriasis. We designed this study to highlight the association of common clinical types of psoriasis and comorbidities about the duration and severity of psoriasis.

Comorbidities

Comorbidities were seen in 70% (70/100) of psoriasis patients in our study. Like previous studies, the major comorbidities observed in our study were HTN, OB, DM, DYS and MS.[9-11] Most of the patients had one comorbidity, that is 38% (38/100), followed by two

comorbidities in 16% (16/100) and more than two comorbidities in 15% (15/100) of patients. DYS (56%) was the commonest comorbidity in our study, followed by DM (23%), OB (20%), HTN (18%), and MS (15%).

A study conducted by Thomas et al at Tamil Nadu stated that obesity was seen in 6.6% of psoriatics. Another study by Kaye et al at the U.K., also said 6.3% of psoriatics were obese.[9]

Age and comorbidities

Most of the patients with comorbidities were in the age group of 31 to 65 years. The youngest patient was of age 19 years, and the eldest patient is of 82 years in our study. We mainly categorized patients into two groups as less than 40 years and more than 40 years. More patients in our study were aged above 40 years (58%), as stated in the above studies. DYS and obesity were recorded more in the younger age group compared to other comorbidities in our study. Sowe suggest that DYS can occur at any age from 10 years onwards. The study by Augustin et al also supports our findings.

DYS and OB were seen at a younger age in our study, and this is supported by the study by Augustin et al in Germany.[3] Since DYS and OB are the risk factors for myocardial infarction, young psoriasis patients are more likely to have a myocardial infarction, as stated in the previous studies. Okhandiar et al collected data from various medical colleges and found that the highest incidence of psoriasis was in age groups of 20 to 39 years. However, in a study by Love et al the mean age of patients with psoriasis was 42 years, similar to findings in our study.

Gender and comorbidities

In our study, there were more male patients (60%), and this finding is consistent with other similar studies. Males had a comorbidity percentage of 66.6%, while females had a comorbidity percentage of 75%. Both males and females had comorbidities, and there was no statistically significant difference in the occurrence of comorbidities between them (p value 0.2987). All comorbidities observed in this study were seen in both sexes.[12] A study carried out by Gisondi et al also stated the MS could affect both sexes, and this supports our results. In MS, the highest percentage of males (66%) are involved compared to other comorbidities in our study.

Duration of psoriasis and comorbidities

Duration of psoriasis with comorbidities varied widely in our study. The lowest being of 20 days duration, while the highest was of 20 years duration. In our research, there were 80% of patients, having less than 5 years of duration of disease, and 20% were having more than 5 years of duration of disease. Among 80 patients with less than 5 years of disease duration, only 54 (67.5%) patients were having comorbidities. While among 20 patients with greater than 5 years of duration of disease, 16 (80%) patients were having comorbidities, which is higher than the earlier category.

There was no significant difference in the occurrence of comorbidities in those having the disease for less than 5 years and more than 5 years of duration (p value 0.1887). Although few studies have mentioned that comorbidities were frequent with an increase in the duration of psoriasis, this was not noted in our study.[13]

Type of psoriasis and comorbidities

In our study most common type of psoriasis being chronic plaque (39%), followed by palmoplantar (25%), scalp (21%), erythrodermic (10%), and pustular (5%), respectively. The highest comorbidity percentage was seen in severe type diseases, namely pustular psoriasis (4/5) and erythrodermic (8/10) psoriasis. Comorbidity percentage is more in pustular type and erythrodermic type with 80% each followed by chronic plaque, scalp, and palmoplantar type.

All the 5 comorbidities mentioned above were seen in chronic plaque psoriasis, scalp psoriasis, and erythrodermic type, while pustular psoriasis patients had only DYS and obesity as comorbidities. The prevalence of comorbidities in common types is shown below.

Scalp psoriasis patients had comorbidities like DYS, DM, HTN, OB, and MS in decreasing order. Erythrodermic psoriasis patients were mainly having co-morbidities like DYS and OB, with a comorbidity percentage of 15% each.

Table 7: Types of psoriasis and associated co-morbidities.

Comorbidities	Type of psoriasis
Hypertension	Chronic plaque psoriasis – 55%
	Palmoplantar – 22%
Obesity	Psoriatic erythroderma – 15%
	Palmoplantar – 10%
Diabetes mellitus	Chronic plaque psoriasis – 70%
	Scalp psoriasis – 13%
	Pustular psoriasis – 4.28%
Dyslipidemia	Pustular psoriasis – 78.57%
Metabolic syndrome	Pustular psoriasis – 6%
	Palmoplantar – 17%

This reveals that any comorbidities can occur in any type of psoriasis. Hence detection and treatment of co-morbidities are needed in all types of psoriasis. DYS is the most common comorbidity in palmoplantar type, followed by HTN.

The severity of psoriasis and comorbidities

In our study, 75% of patients were having mild to moderate disease who were with PASI less than 15 scores, and 25%

of patients were having severe disease who were with PASI greater than 15 scores. Severe diseases in our study were pustular type, erythrodermic type, and chronic plaque-type with PASI greater than 15. Few of the previous literature reports stated that comorbidities are common in severe disease.[14,16,19]

In our study, though comorbidities were commonly present in severe disease, they were also seen in mild and moderate types. There was no statistical difference among both groups.

Although a slightly more significant number of patients with comorbidities had severe disease (mild or moderate – 68% versus severe – 76%), it is not statistically significant (p value 0.5809). This states that comorbidities can occur in psoriasis irrespective of its severity. DM was the only comorbidity in which a statistically significant number of patients had severe disease (p value 0.0451). The study by Niemann et al in the U.K., supports this concept.

The majority of the patients had mild disease in our study. In a study by Gisondi et al 58% had mild disease, and 42.7% had severe disease (PASI>10). The more significant number of patients with mild psoriasis in our study is possibly due to the recruitment of the majority of our patients from the outpatient clinic. 80% of patients with psoriasis had a duration of less than 5 years. Nisa et al in a study, monitored the duration of disease and found the mean duration of psoriasis was seven years in their cohort, thus confirming the findings of our study.

Metabolic syndrome

In our study, MS was seen in 15 (15%) patients; among them, 66.6% (10/15) were males, and 60% (9/15) were aged above 40 years. 60% (9/15) of patients were having the severe disease, and 80% (12/15) of patients were having less than 5 years of disease duration. 86.6% (13/15) of patients were having chronic plaque-type of psoriasis. Above mentioned findings in our study were similar to the below-stated studies.

Gerald Reaven from Stanford University was the first to describe MS in 1988. It was described as the clustering of 4 conditions that, when present in one individual, increases the risk of cardiac disease. The four conditions were increased glucose levels, HTN, DYS, and central OB.

Various clinical studies from different parts of the world, confirming similar findings. MS and psoriasis also share specific common immunological mechanisms, as stated before.

Visceral adiposity is associated with an increase of TNF alpha, IL-6, plasminogen activator inhibitor type 1. These have also been found to be increased in psoriasis. Hyperleptinemia has been implicated in the development of MS and psoriasis both. However, the exact effect is yet to be explored.[17]

Hypertension

In our study, HTN was seen in 18 (18%) patients. Among them, 61.2% (11/18) were males, and 66.6% (12/18) were aged above 40 years of age. 61.2% (11/18) patients were having mild to moderate disease, and 83.3% (15/18) patients were having less than 5 years of duration of disease. Above mentioned findings in our study were similar to below-discussed studies.

The exact mechanism underlying the relationship between psoriasis and HTN is unknown, but there are several hypotheses about this association.

Alterations to the renin-angiotensin system (RAS) in psoriasis may contribute to poor blood pressure control. Psoriasis patients have increased plasma renin activity and elevated angiotensin-converting enzyme (ACE) activity. High ACE levels play a role in cytokine dysregulation in the vasculature.

Specific ACE gene polymorphisms have been associated with increased susceptibility to psoriasis, but these results are controversial. Endothelin-1, which is a potent vasoconstrictor, was found to be elevated in the serum and lesional skin of patients.

Increased oxidative stress in patients is also hypothesized to impair the vasodilatory mechanism of the endothelium. Some authors hypothesized that patients were less physically active due to embarrassment, but psoriasis was independently associated with HTN even after changing physical activity level.

Diabetes

In our study, diabetes was seen in 23 (23%) patients. 65.2% (15/23) of patients were males and 65.2% (15/23) of patients were aged above 40 years. 60.8% (14/23) were having mild to moderate disease, and 78.2% (18/23) of patients were having less than 5 years of duration of disease. 69.5% (16/23) of patients were having chronic plaque-type of psoriasis. Above mentioned findings in our study were similar to the below-discussed studies.

The accepted value for fasting blood sugar in the healthy population is less than 100 mg/dl as per the NCEP ATP III criteria. The fasting blood sugar levels in our subjects was significantly raised, with a mean of 126 mg/dl. This is similar to Niisa et al's study, wherein higher fasting plasma glucose levels were more in psoriatics (17% versus 5.3%).[18]

A population-based nested analysis of 1,062 patients found an OR of 1.32 (95% CI: 1.13–1.52) for incident psoriasis among people with diabetes after controlling for hyperlipidemia, smoking, HTN, infections, and oral steroid use. The prevalence of type 2 diabetes in mild and severe psoriasis and controls in a case-control study of

1,838 psoriasis patients was 37.5%, 42%, and 17%, respectively (p=0.00001).

A recent meta-analysis that focused on the risk of diabetes in patients with psoriasis found a 1.40-fold increased risk of diabetes in people with psoriasis. The adjusted risk ratios for incident diabetes associated with psoriasis range between 1.09 and 3.62. They also found that the association between psoriasis vulgaris and DM incidence was somewhat stronger in South Asian studies than in North American and European studies.

Abdominal OB

Our study showed that psoriasis patients had an increased frequency of abdominal OB as per waist circumference measurements when compared to the average Indian population. However, this significance did not persist after adjustment for diabetes. There was a significant association between the presence of DM and abdominal OB. It has been recently demonstrated that abdominal OB was independently associated with an increased risk of coronary heart disease and type 2 diabetes mellitus independent of overall adiposity.[20]

The presence of abdominal OB in our patients was probably due to the increased diabetic population in Psoriasis. As discussed earlier, a study by Love et al found that abdominal OB was present in 64% of patients with psoriasis, which is similar to our study in which 64% of patients with psoriasis had abdominal OB.[21] The satiety hormone leptin has been shown to elicit multiple immunoregulatory effects, including the promotion of T-cell proliferation and the stimulation of TNF-alpha production in the adipose tissue. Therefore, leptin may serve as an additional link between OB and the risk of psoriasis.

Obesity

Patients with psoriasis in our study had a higher body mass index (BMI) than the prevalence of normal Indian population. 65% (13/20) of patients in our study were aged above 40 years, and 75% (5/20) of patients were having less than 5 years of disease duration. This is consistent with earlier literature. An American pioneer study from Utah demonstrated that the prevalence of OB in patients with psoriasis (33%) was higher than in the general population (17%), and patients with psoriasis were 15% above average body weight.

Dyslipidemia

In our study, DYS were seen in 56 (56%) patients. Among them, 62.5% (35/56) of patients were males, and 71.5% (40/56) of patients were aged above 40 years. 62.5% (35/56) of patients were having mild to moderate disease, and 73.2% (41/56) of patients were having less than 5 years of duration of disease. Above mentioned findings in our study were similar to below-stated studies.

Dreier et al in their study, which included 10,668 cases with psoriasis and 22,998 controls, demonstrated that lipid abnormalities were common in the psoriatic population even after controlling for confounding factors like OB, DM, previous treatment with oral retinoids.[15]

Dyslipidemia is a broad term encompassing abnormalities of plasma lipid levels or composition. This is a well-established cardiovascular risk factor for CAD, stroke, MI, and cardiovascular mortality. Typically, it presents as increased low-density lipoprotein (LDL), very-low-density lipoprotein (VLDL), and triglyceride levels, and decreased high-density lipoprotein (HDL) Specifically, the cytokines IL-1, IL-6, and TNF-alpha that mediate psoriasis may alter the function of hepatocytes and arterial smooth muscle cells, resulting in altered lipoprotein compositions, enhanced expression of cellular adhesion molecules, and increased lipid deposition on arterial walls. These processes ultimately lead to the development of arterial plaques levels. Psoriasis is associated with increased production of reactive oxygen species that overwhelm the body's antioxidant capacity. Levels of lipid peroxidation products can indirectly measure the production of reactive oxygen species.

Sample size is one of the limitations of our study and in our study, co-morbidities are more common in above 40 years age group, hence this maybe a coincidence and require larger studies to establish the relation between psoriasis and comorbid conditions

CONCLUSION

Comorbidities in psoriasis are quite common, and their prevalence is 70% in our study. The comorbidities seen in our study are DYS, DM, OB, HTN, and MS in decreasing order. DM, HTN, and MS were common among aged above 40 years, while DYS and OB are present at a younger age. Both males and females had all the comorbidities, they are more common in severe psoriasis than mild and moderate types, but there is no significant statistical difference between the two groups. Because of the wide range of comorbid conditions associated with psoriasis, the need for comprehensive screening and treatment must be recognized and addressed.

Better understanding and communication between psoriasis patients and their physicians may help to improve clinical outcomes in psoriasis. A multidisciplinary approach with coordination between dermatologists and other specialists is needed due to the systemic nature of inflammation in psoriasis. Therapeutic interventions for psoriasis may exacerbate comorbid conditions and vice versa. Therefore, appropriate management of psoriasis must involve an integrated approach. Our study shows that psoriasis is emerging as a systemic disease in current days, and it is not just skin deep.

We conclude our study by recommending screening for comorbidities in all patients with Psoriasis, irrespective of

their age, sex, duration of disease, severity, and type of psoriasis.

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