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IP Indian Journal of Clinical and Experimental Dermatology

Journal homepage: www.ijced.org/

Original Research Article

A study of the association of psoriasis with metabolic syndrome from a tertiary care centre in Kerala, South India

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ARTICLE INFO

Article history:
Received 19-11-2020
Accepted 14-12-2020
Available online 22-02-2021

Keywords:
Crosssectional study
Metabolic syndrome
Psoriasis vulgaris

ABSTRACT

Context: Epidemiological data demonstrate that psoriasis patients suffer from a spectrum of co-morbidities such as cardiovascular disorders and metabolic syndrome (MS).
Aims: To compare the prevalence of metabolic syndrome and its individual components in psoriatic patients to that of the control population. Also to compare the descriptive characteristics of psoriasis in patients with and without the metabolic syndrome.
Settings and Design: Cross-sectional study.
Methods and Material: 51 patients with a clinical diagnosis of chronic plaque psoriasis were taken for the study. Metabolic syndrome was identified with the National Cholesterol Education Program's Adult Treatment Panel III guidelines.
Statistical analysis used: Statistical Package for the Social Sciences {SPSS} version 13 software, Chi square test and Student's t test were used where appropriate.
Results: MS was found in 21(41.2%) of the psoriatic patients compared to only 16 (31.4%) of non-psoriatic controls in our study. Psoriatic patients with MS had a higher mean age and later age of onset of psoriasis. There was no positive correlation of severity or duration of the disease with MS in this study, but psoriatic arthritis was found to be more in patients having metabolic syndrome. Also psoriatic patients with MS had a statistically significant higher BMI than psoriatics who had no MS.
Conclusions: MS was found to be more in psoriatic patients, even though it was not statistically significant. Psoriatic patients with MS had a higher mean age, later age of onset, higher BMI and higher prevalence of psoriatic arthritis than those without MS.

1. Introduction

Psoriasis is a common, chronic, inflammatory and proliferative condition of the skin, in which both genetic and environmental influences have a critical role. Recently psoriasis has been increasingly associated with metabolic disorders including obesity, dyslipidemia and diabetes. [1,2]

The Metabolic syndrome (MS) consists of a constellation of metabolic abnormalities that confer an increased risk of coronary artery disease (CAD) and diabetes mellitus. Metabolic syndrome can be diagnosed according to the National Cholesterol Education Program (NCEP): Adult treatment Panel III (ATPIII) guidelines. [3]

The present study aims at finding the prevalence of metabolic syndrome and its individual components in psoriatic patients to that of age and sex matched control populations.

2. Materials and Methods

This is a hospital-based, comparative cross sectional study done in patients attending the Dermatology OPD over a 6 month continuous fixed period. All patients with age of

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https://doi.org/10.18231/j.ijced.2021.004

18yrs and above and with a clinical diagnosis of chronic plaque psoriasis lasting atleast six months were taken for the study. Patients who had taken specific systemic treatment for psoriasis in the last one month prior to enrolment in study were excluded. Age (± 2yrs) and sex matched non psoriatic patients who were apparently healthy and had attended the outpatient department for common diseases being treated in our daily practice like various forms of eczema, infections, pigmentary disorders, urticaria etc and who were not on any other specific systemic treatment were taken as control.

Data was collected from both the enrolled cases and control population in a pretested structured questionnaire and the data was analyzed using appropriate statistical software. All relevant examinations and investigation were done. Severity of psoriasis was assessed according to the Psoriasis Area Severity Index (PASI) score.

Metabolic syndrome was identified in the presence of 3 or more criteria of the National Cholesterol Education Program's Adult Treatment Panel III guidelines(NCEP-ATPIII 2001[#]) Table 1 . Central obesity was determined with the ethnic specific values for waist circumference set by International diabetes federation criteria.

Analysis was carried out using the Statistical Package for the Social Sciences {SPSS} version 13 software. Standard descriptive statistics such as mean, standard deviation, and prevalence proportion were computed. Chi square test and Student's t test were used where appropriate. The study was approved by the institutional ethical and research committee.

3. Results

The study population included 51 psoriatic cases and an equal number of non-psoriatic controls attending the department of Dermatology OPD.

The average duration of psoriasis was 7.05 years. 49% of psoriatic patients had onset of psoriasis before 40 years and 51% had onset of the disease after 40 years of age. Mean age of onset among males was 44.59 ± 15.92 years and about 38 ± 11.47 years among females. Average PASI score was around 9.37 ± 7.85 ranging from 1.8 to 44.1 with a median of 8 (95%CI, 5.7-8.8) in this study. Psoriatic joint involvement was seen in 9.8% of the cases.

36% of the total population enrolled in this study were found to have the metabolic syndrome. MS was found in 21(41.2%) of the psoriatic patients compared to only 16 (31.4%) of non-psoriatic controls, but this difference was not statistically significant. The prevalence of MS in the different age groups in cases and controls are charted in Figure 1.

Table 2 shows the comparison of descriptive characteristics in both the cases and the controls. History of alcohol consumption was seen to be equally divided in the cases and controls. Comparison of data of descriptive features of psoriatic patients with and without MS shown in Table 3.

Family history of psoriasis was seen in 5 (9.8%) cases compared to no evidence of family history in the control population. Family history of diabetes mellitus was seen in 31.4% of the psoriatic cases and this was statistically significant (OD-4.909, p= 0.004, 95%CI, 1.657-14.545). Family history of parameters of psoriatic cases with and without the MS compared in Figure 3.

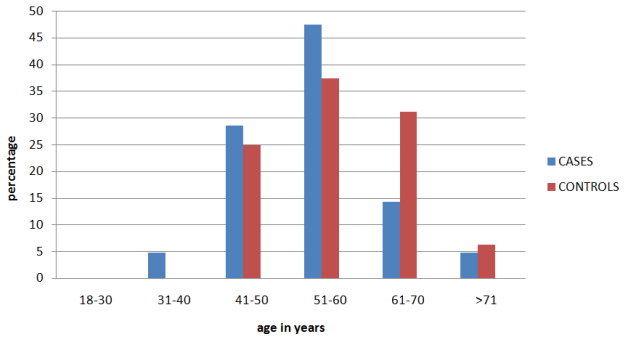

Fig. 1: Prevalence of Metabolic Syndrome in different age groups

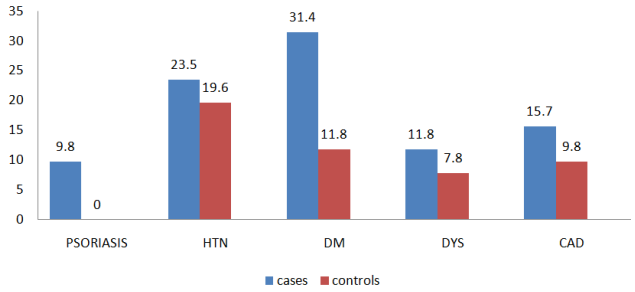

Fig. 2: Comparison of family history of parameters in cases and controls

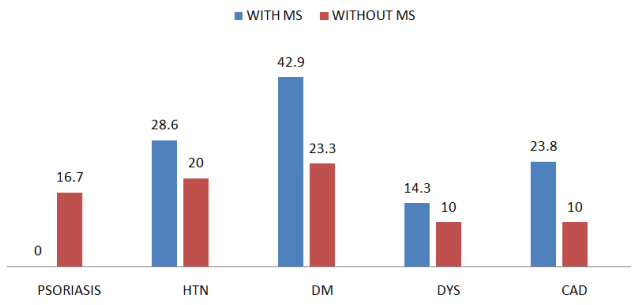

Fig. 3: Comparison of family history of psoriasis, HTN, DM, dyslipidemia (DYS) and CAD in cases with and without MS

Table 1: Adult Treatment Panel III guidelines[#].

1.	Central obesity: Waist circumference >90 cms in males[4] > 80 cms in females[4]
2.	Hypertension: Blood pressure ≥ 130 mm systolic or ≥85 mm diastolic or specific medications
3.	Fasting plasma glucose ≥ 100 mg/dl[5]or specific medication or previously diagnosed Type 2 DM
4.	Hypertriglyceridemia: Triglyceride (TG) ≥ 150 mg/dl or specific medications
5.	Low HDL cholesterol: <40mg/dl (males) <50 mg/dl (females) or specific medications

[#]National Cholesterol Education Program's Adult treatment panel III
[4]cut off values according to ethnic specific values for waist circumference according to International diabetes federation criteria

Table 2: Descriptive characteristics of cases and controls

Characteristics	Cases (n=51)	Controls (n=51)	P Value
Male/Female Ratio	39/12	39/12	1
Age in Years (Mean ± SD)	50.25 ± 14.49	50.25 ± 14.16	1
Body Mass Index (Mean ± SD)	22.7 ± 3.95	24.11 ± 3.06	0.05
Waist Circumference (>90 M, >80F)	28 (54.9%)	24 (47.06%)	0.4
Hypertension (≥ 130/85 or treatment)	21 (41.2%)	17 (33.3%)	0.4
FBS ≥ 100 mg/dl or treatment	28 (54.9%)	21 (41.2%)	0.2
TG ≥ 150 mg% or treatment	16 (31.4%)	12 (23.5%)	0.4
HDL(<40 in M, <50 in F) or treatment	24 (47.1%)	24 (47.1%)	0.1
Smoking	18 (35.3%)	7(13.7%)	0.003

Table 3: Comparison of the descriptive characteristics of cases with and without MS

Descriptive Psoriatic Characteristic	Cases With MS	Cases Without MS	P Value
Sex- Male/Female	16/5	23/7	1
Age at Enrolment (Yrs)	53.62 ± 9.08	47.95 ±16.83	0.2
Duration of Psoriasis	7.30 ± 8.85	6.88 ± 9.44	0.9
Age of Onset	46.02 ± 12.04	40.95 ± 16.83	0.2
PASI , mean ± SD	9.04 ± 7.20	9.61 ± 8.39	0.8
BSA ≥ 10, n (%)	7 (33.3%)	14 (46.7%)	0.3
PASI ≥ 10, n(%)	5 (23.8%)	13 (43.3%)	0.2
BMI	24.34 ± 4.38	21.55 ± 3.21	0.012
Smoking	38.1%	33.1%	0.7
Alcohol consumption	33.3%	20%	0.3

Table 4: Statistically significant parameters indicating correlation between psoriasis and metabolic syndrome in different studies (NS: not significant)

Serial number	Author & Place	Criteria for MS	MS in psoriaticsVs Control in %	Duration of psoriasis in those with MS	Severity of psoriasis in those with MS	Obesity & Metabolic parameters
1	Nisa & Qasi Jammu & Kashmir	NCEP ATP III	28 Vs 6	Longer	NS	Higher TAG, FBS & BP
2	Kothiwala SK et al New Delhi	NCEP ATP III SAM NCEP	39.3 Vs 17.1 42.1 Vs 21.4	Longer	Severe	Higher central obesity, BP & FBS
3	Aruna C et al. Andhra Pradesh	NCEP ATP III	42 Vs 22	Longer	Severe	Higher TAG, FBS & BP and lower HDL
4	Rupinder Kaur et al Maharashtra	NCEP ATP III	46 Vs 16	NS	NS	Higher TAG
5	Narendra Gangaiah et al Karnataka	NCEP ATP III	38 Vs 22	NS	NS	Higher TAG, FBS & BP
6	Present study, Kerala	NCEP	NS (41.2 Vs 31.4)	NS	NS	NS

Table 5: Reviews and meta-analysis

S. No	Author	Year	Study design	No of studies analysed	Observation
1	April W Armstrong et al	2013	Systematic review & meta-analysis	12 observational studies	Higher prevalence of MS in psoriatics. Severe cases hadgreater odds of metabolic syndrome
2	Jing-Ji Jin & San-Wu Zeng	2016	Meta-analysis	12 case control studies	Higher prevalence of MS and hypertension in psoriatics
3	MJM Rodriguez-Zuniga et al	2017	Systematic review & meta-analysis	14 observational studies	Increased risk of MS in psoriatics
4	Singh S, Young P & Armstrong AW	2017	Meta-analysis	35 observational studies	Higher prevalence of MS in psoriatics
5	Saumya Choudhary et al	2019	Systematic review & meta-analysis	63 observational studies	Increased prevalence of MS in psoriatics

4. Discussion

51 consecutive chronic plaque psoriatic patients who satisfied the inclusion criteria were included in our study along with an equal number of age and sex matched control population. Males were the predominant sex in our study with a male to female ratio of 3.25:1. The increased prevalence of psoriasis in males as compared to females was in concordance with the findings of other Indian investigators like Mehta[4] and Verma[7]who had reported a male to female ratio of 4:1.

The mean age of psoriatic patients with MS (53.62 $\pm$ 9.08) was higher than those without MS (47.9 $\pm$ 17.06) and this finding was similar to other case control studies.[5,6]

Mean age of onset of psoriasis in the total study population was 43.03 years with females having earlier onset at 38 $\pm$ 11.47 years compared to 44.59 $\pm$ 15.92 years in males. Kaur et al study[7] had also shown that mean age of onset of psoriasis was earlier in females than males (29yr vs 37yrs).

Family history of psoriasis was seen in 9.8% of the cases compared to none in the control population. That genetic factors play a role in aetiology is supported by Sharma et al,[8] Verma et al[9] and Lal S[10] who showed a familial occurrence of 7- 36%. Mean age of onset of psoriasis in those with family history was at around 37.4 years compared to later onset at 43.65 years in those with no family history. Kaur et al[10] study also showed earlier onset at 23yrs in patients with family history compared to 28yrs in others. The mean values in our study were probably higher because we included a minimum age of 18 years in our inclusion criteria.

Smoking habits were recorded higher in the cases than controls with 18 (35.3%) of the psoriatic males being current smokers compared to only 7(13.7%) in the control population and this was statistically significant with a p value of 0.01. This was similar to the study conducted by Gisondi et al[5] (36.2% Vs 21.0%, p value- 0.0001).

Psoriatic cases with MS had a higher prevalence of smoking (38.1% Vs 33.3%) and alcohol consumption (33.3% Vs 20%) compared to those without MS. According to ATP III, cigarette smoking is considered to be a major risk factor for developing the MS and our study also showed that 44% of smokers had MS compared to only 33.76% of non smokers who presented with MS.

A study by Sudhakar P et al[11] showed 29.7% prevalence of MS in population above 20 years. In our combined study population the total prevalence of MS was around 36%.MS was seen in 41.2% of the psoriatic patients and in only 31.4% of the control population,but this difference was not statistically significant. In a similar case control study by Gisondi et al[5]MS was seen more in the cases than controls (30.1% vs 20.6%, OD -1.65,p=0.005). Another study by Nisa et al[6] in Srinagar also showed increased prevalence of MS in the cases (28% vs 6%, OD-6.09, p<0.05).Studies by Kothiwala SK et al[14] (39.3% Vs 17.1%), Aruna C et al[12] (42% Vs 22%), Rupinder Kaur et al[13] (46% Vs 16%) and Narendra Gangaiah[14] et al (38% Vs 22%) showed statistically significant increase in metabolic syndrome in psoriatic patients. Findings of the above studies are summarized in table 4. But a study by Sristi Lakshmi et al[15] could not find a statistically significant increase in MS in psoriatic patients from South India.

It was noted that the largest group with the MS was in the age group 51-60 years and MS was higher in the cases than the controls from the 4^{th} to the 6^{th} decade. Gisondi et al[5] documented a higher prevalence of MS in psoriatic patients than controls after the age of 40 years. Majority of the cases with MS had age of onset of psoriasis after 40 years of age (71% Vs 29%) suggesting that increasing age may favour metabolic risk factors which may precipitate psoriasis or vice versa.

Raised values of waist circumference as a measure of central obesity, though not statistically significant (p-0.4) was found higher in the psoriatic cases which was a finding similar study by Nisa et al.[6] Statistically significant higher values for waist circumference were found in cases in the

study by Gisondi et al[5] and Kothiwala SK et al.[11] The mean BMI at 24.1 was higher in the control population compared to the psoriatic cases with mean BMI of 22.7. This was in contrast to earlier studies by Gisondi et al[5] and Nisa et al[6] who showed that mean BMI was significantly higher in patients with psoriasis.

In our study we noted that psoriatic patients who presented with the MS had a higher BMI (24.34 $\pm$ 4.38) than psoriatics who had no MS (21.55 $\pm$ 3.21) and this was statistically significant (OD-1.248, p=0.012, 95%CI, 1.036-1.504).Thus we propose that even though psoriatic patients may not be heavier than the control population, increasing BMI puts them at risk of MS.

Hypertension, raised FBS and hypertriglyceridemia were noted to be higher in the psoriatic cases compared to the controls though it was not statistically significant. Similar findings with statistically significant association was noted in the studies from other parts of India like Srinagar[9], Maharashtra[13] and Karnataka.[14]

There was no difference in the prevalence of low values of HDL in both the cases and controls and this was similar to the study conducted by Gisondi.[5] But Ayse S et al[16] and Aruna C et al[12] showed that HDL cholesterol was significantly lower in psoriasis than the controls and suggested it as a risk factor for atherosclerosis.

In contrast to the Gisondi,[5] Nisa,[6] Kothiwala[11] and Aruna C et al[12] studies where statistically significant association between total duration of the psoriasis and MS was observed, we found an almost similar duration of illness in both groups.

PASI scoring as a measure of disease severity as well as mean BSA involvement was found to be lower in our psoriatic patients with MS, compared to those without MS suggesting that risk of MS in psoriatic patients was not related to these parameters. No significant correlation was found between PASI and BSA involvement and the prevalence of MS in Nisa et al[6] study also. But studies by Kothiwala SK et al[11] & Aruna C et al[12] observed statistically significant association between psoriasis severity and presence of MS.

Joint involvement suggestive of psoriatic arthritis was noted in 9.8% of the cases. Psoriatic arthritis was noticed in 14.3% of patients with MS compared to only 6.7% in those without MS thus showing positive correlation between the two. 60% of patients with psoriatic arthritis had MS compared to only 38.29% of psoriatic patients without arthritis. Thus it was noted that presence of psoriatic arthritis could suggest a higher risk for developing MS.

Reviews and meta-analysis[16–20] on the subject have reinforced the positive correlation between psoriasis and metabolic syndrome and findings have been summarized in table 5. It is controversial as to whether psoriasis results from a primary abnormality in epidermal keratinocytes with secondary inflammation (Outside in hypothesis) or from dysregulation of immune system leading to psoriatic phenotype (inside out hypothesis).[21]

This study was a cross sectional study, hence the directionalty of the association between psoriasis and MS could not be assessed. The other limitations of this study were the small sample size, which probably resulted in a few statistically significant correlations in our study. Also all the confounding variables like socioeconomic status were not suitably matched.

5. Conclusions

36% of the total study population had MS, with the higher prevalence in psoriatics than controls (41.2% vs 31.4%). Psoriatic patients with MS had a higher mean age and later age of onset than those without MS suggesting that increasing age is a risk factor for MS. BSA involvement, PASI and average duration of psoriasis did not show any positive correlation with MS in this study. Prevalence of psoriatic arthritis was higher in the cases with MS. Psoriatic patients had lower BMI than controls but it was higher in psoriatics with MS than those without MS. Current smoking habits were higher in the psoriatic cases and in those with MS. Family history of DM, HTN, dyslipidemia and CAD were higher in psoriatic patients than controls and in those with MS compared to those without MS. Dermatologists being the first point of contact with the psoriatic patients can serve an important role in identifying and modifying the underlying metabolic abnormalities.

6. Source of Funding

No financial support was received for the work within this manuscript.

7. Conflict of Interest

The authors declare they have no conflict of interest.

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Cite this article: Mathew C, Sridharan R, Sudhamani B. A study of the association of psoriasis with metabolic syndrome from a tertiary care centre in Kerala, South India. *IP Indian J Clin Exp Dermatol* 2021;7(1):18-23.