Study of Association of Atherosclerotic Risk Factors and Metabolic Syndrome in Patients of Psoriasis at a Tertiary Care Centre in North India: A Case Control Study

Satish Chand Sharma¹, Prafulla Kumar Sharma², RK Dudeja³

Abstract

Objective: To study the association between psoriasis and atherosclerotic risk factors, including metabolic syndrome.

Methods: Fifty patients with psoriasis and 50 controls were included in the study. Atherosclerotic risk factors were evaluated as per National Cholesterol Education Project Adult Treatment Panel III (NCEP-ATPIII). Metabolic syndrome was diagnosed as per South Asian Modified -National Cholesterol Education Programme’s Adult Treatment Panel III (ATP III).

Result: Psoriatic patients had a significantly higher prevalence of hypertriglyceridaemia (≥150 mg/dl) (p=0.013), low HDL (<40mg/dl) (p=0.025), impaired fasting blood glucose (≥100 mg/dl) (p=0.026). Metabolic syndrome was present in significant number of psoriasis patients than in controls [42 (28%) versus 9 (6%)] (P=0.009).

Conclusion: There is a significantly higher prevalence of metabolic syndrome and atherosclerotic risk factors in psoriasis patients as compared to controls.

Introduction

Psoriasis is a chronic immune-mediated inflammatory disorder of skin and joints affecting nearly 1.5-3% of the world’s population.¹ An association between psoriasis and systemic inflammatory diseases such as systemic lupus erythematosus, rheumatoid arthritis and atherosclerosis have been documented.² Th1 cells and inflammatory cytokines such as tumour necrosis factor (TNF) play an important role in the pathogenesis of both psoriasis and atherosclerosis. Patients with psoriasis are found to have increased risk of cardiovascular diseases.³⁶ Few studies have been done in India on the association between psoriasis and metabolic syndrome.⁷⁻⁸ This study was conducted to know the presence of atherosclerotic risk factors and metabolic syndrome using South Asian Modified (SAM)-NCEP ATP III criteria⁹ in North Indian patients of psoriasis.

Material and Methods

After obtaining approval from Institutional Ethics Committee of PGIMER, Dr. Ram Manohar Lohia Hospital, New Delhi, 50 cases of untreated psoriasis aged 18 years or above and 50 age and sex-matched controls having no skin disease on physical examination were also taken up for study. Their height, weight and waist circumference (at level between the inferior margin of ribs and the superior border of the iliac crest) were measured. After 15 minutes of rest, their blood pressure (BP) was taken (in the sitting posture), which was an average of two measurements. Psoriasis Area Severity Index (PASI) and Body Surface Area (BSA) were calculated in each patient. Complete hemogram, fasting blood glucose (FBG), complete lipid profile (total cholesterol,
triglycerides, HDL, LDL and VLDL), kidney function tests, liver function tests and thyroid function tests (free T3, free T4 and TSH) were done in each patient and control. Patients with altered thyroid function test were excluded from the study. Atherosclerotic risk factors evaluated as per National Cholesterol Education Project Adult Treatment Panel III (NCEP-ATPIII) were; 1) cigarette smoking, 2) hypertension (BP ≥140/90 mmHg), 3) low HDL (<40 mg/dl), 4) diabetes mellitus (fasting blood glucose ≥126 mg/dl, or previously diagnosed DM) and 5) family history of premature CAD in first degree relative <55 years of age in male and <65 years of age in female and 6) obesity (BMI ≥30 kg/m²). Metabolic syndrome (MS) defined as per modified South Asian Modified criteria of NCEP-ATPIII namely 1) abdominal obesity (modified Asia Pacific WHO guidelines waist circumference ≥90 cm for males and ≥80 cm for females), 2) blood pressure ≥130/85 mmHg, 3) fasting blood glucose ≥100 mg/dl, 4) hypertriglyceridemia (≥150 mg/dl) and 5) low HDL cholesterol (<40 mg/dl for males and <50 mg/dl for female).

**Results**

The mean age of psoriasis patients was 39.36 ± 13.42 years and the control was 38.5 ± 12.10 years (p=0.73). There were 29 (58%) males and 21 (42%) females in the ratio of 1.38:1. The duration of the disease was <60, 60-120 and >120 months in 26 (52%), 18 (36%) and 6 (12%) patients, respectively.

Plaque type psoriasis was present in 40 (80%), pustular in 5 (10%), erythrodermic in 3 (6%) and guttate in 2 (4%). Arthritis was present in 5 (10%) cases. Scalp and nails were involved in 27 (54%) and 29 (58%) cases, respectively. PASI score in plaque type psoriasis patients ranged from 2.4 to 46.2 with mean (SD) and median of 17.4 (±11.30) and 15.7, respectively. The mean percentage BSA was 20.24 (± 3.25) and ranged from 1 to 99.

Twenty nine patients (58%) and 26 (52%) controls were vegetarian (P=0.524). Smoking, history of alcohol intake and family history of premature CAD in first degree relative was present in 11 (22%), 22 (44%) and 6 (12%) psoriasis patients and 5 (10%), 24 (48%) and 4 (8%) controls with P values 0.143, 0.686 and 0.505, respectively. Mean waist circumference in psoriasis patients and controls was 86.3 (±9.11) cm and 83.33 (±5.33) cm, respectively (p=0.04). Waist circumference of ≥90 cm in males and ≥80 cm in females was present in 26 (52%) psoriatic patients and 19 (38%) controls (P=0.229). Mean BMI was 24.4 (±3.18) and 22.99 (±2.16) in psoriasis patients and control respectively (P=0.01). BMI ≥30 kg/m² was detected in 2 (4%) psoriasis patients and none in control (p>0.05). Blood pressure of ≥130/85 mmHg was seen in 14 (28%) and 7 (14%) psoriasis patients and controls respectively (P=0.109). BP ≥140/90 mmHg was present in 11 (22%) psoriatics and 5 (10%) controls respectively (P=0.102). The blood biochemistry in psoriatics and controls is shown in Table 1. Seven (14%) psoriasis patient and 5 (10%) controls had raised HbA1c (>6) (p>0.05). Four (8%) of these psoriasis patients and 5 (10%) of these controls had some abnormalities in lipid profile along with raised HbA1c. The mean HbA1c of these patients and the controls was 7.2±0.75 and 6.54±0.70 (P=0.15), respectively (P=0.15). The average values of FBG, total cholesterol, VLDL, LDL, HDL cholesterol and TG were significantly more in psoriasis patients than in controls (Table 2).

The various atherosclerotic risk factors present in patients of psoriasis were low HDL cholesterol (<40 mg/dl) in 37 (74%), obesity (BMI ≥30 kg/m²) in 2 (4%), diabetes mellitus (fasting blood glucose ≥126 mg/dl) in 6 (12%), hypertension (≥140/90 mmHg) in 11 (22%), cigarette smoking in 11 (22%) and family history of premature CADs in 6 (12%). The comparative figures for control group were 29 (58%), 0 (0%), 1 (2%), 5 (10%), 5 (10%) and 4 (8%), respectively.

### Table 1: Physical and biochemical profile

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Cases (%)</th>
<th>Controls (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP (≥130/85)</td>
<td>14 (28)</td>
<td>7 (14)</td>
<td>0.109</td>
</tr>
<tr>
<td>BP ≥140/90 or on treatment</td>
<td>11 (22)</td>
<td>5 (10)</td>
<td>0.102</td>
</tr>
<tr>
<td>BMI &gt;30 kg/m²</td>
<td>2 (4)</td>
<td>0 (0)</td>
<td>-</td>
</tr>
<tr>
<td>WC ≥90 cm in men and ≥80 cm in women</td>
<td>26 (52)</td>
<td>19 (38)</td>
<td>0.229</td>
</tr>
<tr>
<td>FBG ≥100 mg/dl</td>
<td>19 (38)</td>
<td>9 (18)</td>
<td>0.026</td>
</tr>
<tr>
<td>FBG ≥126 mg/dl</td>
<td>6 (12)</td>
<td>1 (2)</td>
<td>0.027</td>
</tr>
<tr>
<td>Hba1c (&gt;6)</td>
<td>7 (14)</td>
<td>5 (10)</td>
<td>&gt;0.05</td>
</tr>
<tr>
<td>TC ≥200 mg/dl</td>
<td>9 (18)</td>
<td>2 (4)</td>
<td>0.025</td>
</tr>
<tr>
<td>LDL ≥130 mg/dl</td>
<td>9 (18)</td>
<td>4 (8)</td>
<td>0.137</td>
</tr>
<tr>
<td>HDL ≤40 mg/dl</td>
<td>35 (70)</td>
<td>29 (58)</td>
<td>0.108</td>
</tr>
<tr>
<td>VLDL ≤40 mg/dl in men and &lt;50 in women</td>
<td>37 (74)</td>
<td>29 (58)</td>
<td>0.108</td>
</tr>
<tr>
<td>TG ≥150 mg/dl</td>
<td>19 (38)</td>
<td>8 (16)</td>
<td>0.013</td>
</tr>
<tr>
<td>Metabolic syndr.</td>
<td>21 (42)</td>
<td>9 (18)</td>
<td>0.009</td>
</tr>
</tbody>
</table>

### Table 2: Mean biochemical values in psoriasis patients and controls

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Mean ± SD (mg/dl)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>FBG</td>
<td>102 ± 37.26</td>
<td>88.7 ± 20.50</td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>176.3 ± 31.96</td>
<td>163.82 ± 22.07</td>
</tr>
<tr>
<td>VLDL</td>
<td>30.6 ± 14.80</td>
<td>24.96 ± 9.56</td>
</tr>
<tr>
<td>LDL</td>
<td>108.34 ± 25.41</td>
<td>97.18 ± 18.90</td>
</tr>
<tr>
<td>HDL</td>
<td>37.36 ± 8.41</td>
<td>41.2 ± 7.61</td>
</tr>
<tr>
<td>TG</td>
<td>157.36 ± 72.25</td>
<td>125.04 ± 42.17</td>
</tr>
</tbody>
</table>

Data was compared between cases and controls using unpaired t-test and chi-square test. Unpaired t-test was applied for comparison of waist circumference, body mass index, fasting blood glucose and lipid profile parameters. Chi-square test was used for comparison of qualitative data. P value of less than 0.05 was taken as significant.
least one atherosclerotic risk factor was present in 45 (90%) psoriasis patients and in 32 (64%) of controls. MS was present in 21 (42%) psoriatics [15 (71.9%) plaque type and six (28.1%) other type] and nine (18%) controls (p=0.009), the FBG was ≥100 mg/dl in 19 (38%) cases and nine (18%) control (p=0.026). MS was found in one (33.3%) out of three erythrodermic patients, four (80%) out of five pustular psoriasis patients and one (50%) out of two guttate psoriasis patients.

Mean PASI was 18.52±10.56 in psoriatics with MS and 16.23±10.33 in psoriatics those without MS (p>0.05). Mean BSA was 22.09 (±23.56) in psoriatics with MS and 19.03 (±10.3) in psoriatics without MS (p=0.05).

**Discussion**

The cardiovascular diseases in psoriasis have been reported in a number of studies. Several reports indicate the association between psoriasis and metabolic syndrome. Herron et al and our study found increased presence of atherosclerotic risk factors, namely smoking, alcohol, family history of premature CAD, obesity, hypertension, diabetes, low HDL in psoriatics than in controls.

The mean waist circumference of psoriasis patients was significantly higher than controls in our study as was in the studies by Gisondi et al and Bardazzi et al. Whereas in the study by Gisondi et al, the difference in the mean BMI in psoriatics patients and controls was insignificant, our study (p=0.01) and study by Herron et al reflected a higher BMI in psoriatics than in controls.

Though statistically insignificant (p=0.102), hypertension was found to be more frequent in psoriasis subjects in our study as had been reported by earlier workers. Further Inerot et al could not find increase in frequency of hypertension in psoriatic patients sampled from general population.

The mean fasting blood glucose (>100 mg/dl) was much higher in psoriasis patient 102.44 (±36.93 mg/dl) than in controls 88.7 (±20.50 mg/dl) (p=0.02), indicative of some insulin resistance. However, raised FBG (≥126 mg/dl) in 6 (12%) Psoriatics 1 (2%) and control (p=0.027) was indicative of presence of diabetes mellitus, as had been reported in earlier studies.

Psoriasis has been reported to be associated with atherogenic dyslipidaemia, an increased blood levels of total cholesterol, triglycerides, LDL, VLDL and lipoprotein A, and low HDL and apolipoprotein B. On comparison of lipid profiles in our patients and controls, the various components of lipids were significantly higher in psoriasis group as compared to control (p<0.05), though within normal range except in case of low (p=0.01) HDL and raised (p=0.007) triglycerides. Dyslipidaemia is a feature in patients with thyroid hormone insufficiency and so those with thyroid hormone insufficiency were excluded from our study but none of previous studies had remarked about this.

Metabolic syndrome in psoriasis patients was significantly higher than in controls (p=0.009) and is similar to cross-sectional study by Gisondi et al. Furthermore, Sommer et al also found higher prevalence of metabolic syndrome among hospitalized psoriatic patients as compared to hospitalized melanoma patients using WHO definition of metabolic syndrome.

Though, mean BSA and PASI was higher in psoriatics with MS than without MS in our study, it was not statistically significant (p>0.05). In a Korean study MS has been found to be more prevalent in patients who had moderate and severe disease while other studies have shown that MS can be present irrespective of the extent of involvement.

In conclusion, our study found that psoriasis patients have significant dyslipidaemia, particularly low HDL and raised triglycerides. They also tend to have a higher BMI as compared to controls. Diabetes mellitus was found to be associated in psoriatic patients. Psoriasis appears to be an important risk factor for development of atherosclerosis and metabolic syndrome. Thus these patients should be kept under regular observation for timely diagnosis and prompt intervention if needed.

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**References**


