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## Significance of Serum Uric Acid levels in non-arthritic Psoriasis with special reference to Metabolic Syndrome

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# Significance of Serum Uric Acid levels in non-arthritic Psoriasis with special reference to Metabolic Syndrome

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## Abstract

**Background:** Psoriasis has been considered of late as dermatological disorder with systemic inflammation that could contribute to various systemic events. There are studies that have demonstrated increased Serum uric acid levels in patients with psoriasis and psoriatic arthritis. There have been no studies so far on Uric acid levels in relation to psoriasis and metabolic syndrome (MetS). **Objectives:** The purpose of this study was to investigate the possible presence of hyperuricemia in non-arthritic psoriasis and to analyze serum uric acid levels in psoriasis patients with and without MetS and in controls with and without MetS. Uric acid levels were also correlated with severity and duration of psoriasis. **Materials and Methods:** We performed a case control study on 100 psoriasis patients, 39 with MetS and 61 without MetS and 100 controls, 22 with and 78 without MetS, matched for age and sex. Serum uric acid levels were measured in all groups. **Results:** The overall serum uric acid levels were significantly higher in psoriasis patients when compared to the controls ( $P = 0.001$ ). A significant increase was also observed in psoriasis patients with MetS than those without MetS in the same group ( $P = <0.001$ ). Similar increase was observed between those with MetS in the psoriasis and control groups ( $P = <0.001$ ). **Conclusion:** Serum uric acid should be monitored in patients with psoriasis. However, a prospective study is required in order to determine if the prevention or treatment of hyperuricemia may affect the development of MetS or the course of psoriasis.

**Key words:** Psoriasis, serum uric acid, metabolic syndrome, duration, severity

## Introduction

Psoriasis is a chronic, immune mediated inflammatory skin disease characterized by epidermal hyper proliferation, impaired differentiation of keratinocytes, excessive angiogenesis and immunological dysfunction<sup>1, 2</sup>. The aetiology of psoriasis is complex; autoimmune

dysfunction is believed to play a significant role in its basic pathophysiology. It is designated as a genetic, systemic, inflammatory disorder of skin<sup>3,4</sup>. Although conventionally, psoriasis has been considered a dermatologic disease, modern day medical literature is accumulating to support the statement that psoriasis is actually a multisystem disease. It is

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associated with MetS, which includes obesity, raised triglycerides, low high-density lipoprotein (HDL), insulin resistance, and hypertension<sup>4, 5</sup>. Uric acid is a product of the metabolic breakdown of purine nucleotides. High levels of uric acid are commonly seen in patients with the MetS and its levels are known to increase with the number of components of this condition. Among the components of MetS, elevated triglyceride has the most influence on serum uric acid levels<sup>6, 7</sup>. Numerous mechanisms, both direct and indirect, explain the increased serum uric acid levels with MetS due to which it is considered a strong, independent predictor of incident MetS among men and women<sup>8, 9</sup>.

The association between serum uric acid levels with psoriasis and psoriatic arthritis has been established<sup>10, 11, 12</sup>. Many studies have described the increased levels of uric acid in MetS as a secondary occurrence; however, some studies have reported that an elevated uric acid level predicts the development of MetS per se<sup>13, 14</sup>. Serum uric acid levels are known to increase with the increases in the duration and severity of psoriasis and in psoriatic arthritis. Such elevations positively correlated with Psoriasis Area and Severity index (PASI), extent of skin involvement and Body Mass Index (BMI)<sup>15, 16</sup>.

There are no studies so far examining the relation between uric acid levels, psoriasis, and MetS as per our knowledge. Hence, we investigated the role of uric acid in relation to psoriasis and MetS. In addition, we evaluated the correlation among uric acid levels in various groups of psoriasis patients divided based on severity and duration.

## Materials and methods

The study was conducted in the Department of dermatology, Yenepoya Medical College hospital, Yenepoya University, Deralakatte, Mangalore, Karnataka, India after obtaining ethical clearance from the University Ethics Committee.

**Sampling:** It was a hospital based case-control study. Hundred psoriasis patients above the age of eighteen years and hundred participants without psoriasis (control) attending the department of dermatology, Yenepoya Medical College Hospital, Deralakatte; Mangalore, India were studied.

Patients with acute febrile illness, active systemic diseases/events such as arthritis, renal disease, hepatic disease, malignancies, pregnancy etc., and individuals with prior history of taking medications for diabetes mellitus or dyslipidemia were excluded from the study.

**Clinical Assessment:** Patients and controls willing to participate in the study were included after taking an informed consent. Detailed history was taken. Clinical examination including general, systemic, and dermatological examination was carried out. A detailed history taking included duration of the disease, severity, joint pain, smoking, alcohol consumption, diet, presence of other systemic illness, past intake of systemic agents for psoriasis and concomitant intake of medicines for other illnesses.

Duration and severity of psoriasis were recorded. The severity of psoriasis was clinically assessed by PASI score<sup>13</sup>. Patients were divided into two groups as PASI  $\leq 12$  (mild to moderate) and PASI  $>12$  (severe) based on the severity<sup>17</sup>. Based on the duration of the disease, patients were divided into two groups as  $\leq 2$  years and  $> 2$  years. Height, weight, waist circumference, and blood pressure were measured as a part of clinical examination. The waist circumference was measured by placing the measuring tape closely around the abdomen at the level of the iliac crest.

**Blood sampling:** All patients and controls underwent the following biochemical tests after overnight fasting.

**Assay:** Serum fasting glucose levels was measured by the hexokinase method, and lipid profile which included total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL), triglyceride levels and uric acid was measured by enzymatic methods Vitros 5.1(J&J) analyzer.

MetS was diagnosed using the South Asian Modified-National Cholesterol Education Program Adult Treatment Panel III (SAM-NCEP ATP III) criteria<sup>17, 18</sup>. As per the criteria, the patient was diagnosed as having MetS if three or more of the following were present. They are abdominal obesity (definition of abdominal obesity was modified using Asia Pacific

WHO guidelines as waist circumference  $\geq 90$  cm for males and  $\geq 80$  cm for females), blood pressure  $\geq 130/85$  mmHg, fasting blood glucose  $\geq 100$  mg/dl, hypertriglyceridemia  $\geq 150$  mg/dl, or low HDL cholesterol ( $\leq 40$  mg/dl for males and  $\leq 50$  mg/dl for females).

**Statistical Analysis:** SPSS (Statistical Package for Social Studies), South Asia Pvt. Ltd. version 17.0 was used to carry out the analysis. The continuous variables were expressed as mean and standard deviation (SD). Student's unpaired *t*-test was used for the comparison of groups. ANOVA was used for comparison between multiple groups. Post hoc test was carried out to check multiple comparisons. P value of less than 0.05 was considered significant.

## Results

The study included one hundred patients and one hundred controls. These groups were matched for age and gender. Thirty-seven patients had short duration of the disease, i.e., less than two years; sixty-three patients had the disease for more than two years. Patients had mild to severe psoriasis with PASI score ranging from 0.9 to 70.8. Forty-four (44%) patients had mild to moderate psoriasis (PASI  $\leq 12$ ) and Fifty-six (56%) had severe psoriasis (PASI  $> 12$ ).

Psoriasis patients were divided into two groups based on the presence of MetS as per SAM NCEP ATP III criteria. Out of 100 psoriasis patients, 39 had MetS. Similarly, the control group was also divided into two groups based on the presence of MetS. Out of the hundred controls, 22 subjects had MetS.

The values of the serum uric acid levels for the control and psoriasis patient groups were found as presented in **Table 1**. Serum uric acid levels were found to be significantly higher in psoriasis group than in control group ( $p=0.001$ ).

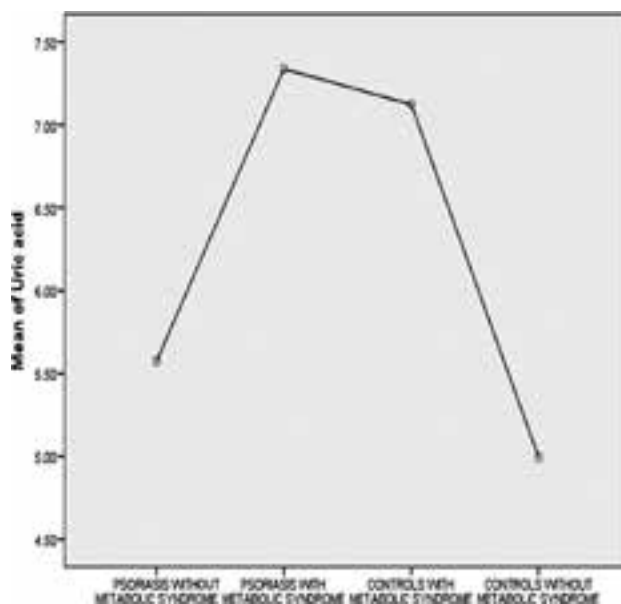
**Table 1:** Comparison of uric acid values between controls and psoriasis patients' groups

Uric acid (mg/dl)	Mean $\pm$ SD	CI*	p value
Cases	6.26 $\pm$ 1.9	5.88-6.63	0.001
Controls	5.48 $\pm$ 1.25	5.23-5.74	

\*Confidence interval

Serum uric acid levels were compared among the four groups i.e., psoriasis with MetS, psoriasis without MetS, controls with MetS and controls without MetS groups as presented in **Table 2**.

Serum uric acid levels were found to be significantly higher in psoriasis patients with MetS when compared with those patients without MetS ( $P < 0.001$ ), and when compared with controls with MetS ( $P = 0.001$ ). In both groups without MetS, uric acid levels were higher in psoriasis group and were statistically significant. Values were highest in psoriasis patients with MetS and lowest in controls without MetS as shown in **Figure 1**.



**Figure 1:** Mean uric acid values in all groups

## Serum uric acid levels and duration, and severity of psoriasis

The values of the serum uric acid levels as compared between the mild to moderate and severe psoriasis patient groups are presented in **Table 3**. The mean uric acid level was higher in the severe group but not statistically significant. The values of the serum uric acid levels as compared between the patients having short duration of the disease, i.e., less than 2 years and patients' having the disease for more than 2 years are presented in **Table 4**. Serum uric acid levels were found to be significantly higher in psoriasis patients having long duration of the disease ( $> 2$  years).

**Table 2:** Comparison of uric acid values among the groups

Group 1 variables	Uric acid(mg/dl) Mean ± SD	Group 2 Variables	Uric acid(mg/dl) Mean ± SD	CI*	p value
Psoriasis with MetS**	7.33±2.35	Psoriasis without MetS	5.57±1.11	5.28-5.85	< 0.001
		Controls with MetS	7.12±0.89	6.72-7.52	< 0.001
		Controls without MetS	4.99±0.87	4.79-5.20	< 0.001
Psoriasis without MetS	5.57±1.11	Controls with MetS	7.12±0.89	6.72-7.52	< 0.001
		Controls without MetS	4.99±0.87	4.79-5.20	< 0.001
Controls with MetS	7.12±0.89	Controls without MetS	4.99±0.87	4.79-5.20	< 0.001

**Group 1:** variables compared with group 2 variables\*Confidence interval, \*\*Metabolic syndrome

**Table 3:** Comparison of uric acid values between mild to moderate psoriasis and severe psoriasis groups

Uric acid(mg/dl)	Mean ± SD	CI**	p value
PASI* ≤ 12 (Mild to moderate)	6.14±2.04	5.52-6.71	0.612
PASI* >12 (Severe)	6.34±1.81	5.86-6.82	

\*Psoriasis Area Severity Index, \*\*Confidence interval

**Table 4:** Comparison of Uric acid values between psoriasis patients having short duration (<2 years) and long duration (> 2 years) of the disease

Uric acid(mg/dl)	Mean ± SD	CI*	p value
Duration of the disease(<2years)	5.72±1.24	5.30-6.15	0.035
Duration of the disease(>2years) (Severe)	6.56±2.14	6.025-7.09	

\*Confidence interval

## Discussion

Similar to earlier studies, which have demonstrated higher Uric acid levels in psoriasis patients, we found significantly higher serum uric acid levels in psoriasis patients when compared to controls<sup>10, 11</sup>. However, a few other studies have demonstrated conflicting results<sup>14</sup>. Hyperuricemia in psoriasis could be a result of accelerated epidermal turnover. The psoriasis patients show marked improvements when treated for their hyperuricemia<sup>19</sup>.

Hyperuricemia is a common finding among patients with the MetS and is considered a predictor of MetS development. Its presence could be an indication to screen for and aggressively treat any accompanying hypertension, dyslipidaemia or diabetes mellitus<sup>1, 20, 21</sup>.

In our study, Serum uric acid levels were highest in psoriasis patients with MetS and lowest in controls without MetS suggesting that uric acid could contribute to the MetS in psoriasis patients. However, Serum uric acid levels were significantly higher in psoriasis patients with MetS when compared to controls with MetS, thus suggesting a role in psoriasis irrespective of the presence of MetS.

The studies have also demonstrated that an elevated serum uric acid is positively correlated with PASI<sup>14</sup>. Serum uric acid levels exacerbate with the increases in severity and duration of psoriasis<sup>15</sup>. In our study, we found no correlation between serum uric acid levels and severity of psoriasis. Serum uric acid levels were found to be significantly higher in patients having long duration of the disease (>2 years). Serum uric acid levels are higher in psoriasis patients irrespective of the severity of the disease. However, Serum uric acid levels may exacerbate by increasing the duration of the disease.

## Conclusion

Our findings suggest that Serum uric acid should be monitored in patients with psoriasis. However, further studies are required to determine if the prevention or treatment of hyperuricemia may affect the course of psoriasis and the development of MetS.

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