Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol. 14, Issue 32s (2025)
https://www.jneonatalsurg.com

OPEN ACCESS

Estimation of serum uric acid level in association with pattern and severity of psoriatic arthritis

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Cite this paper as: Sakar Jamal Ismael, Raouf Rahim Mirza, Ronak Saeed Ahmed, (2025) Estimation of serum uric acid level in association with pattern and severity of psoriatic arthritis *Journal of Neonatal Surgery*, 14 (32s), 6850-6855.

ABSTRACT

Background: Psoriatic arthritis (PsA), a chronic inflammatory disorder, is increasingly associated with hyperuricemia. This study aimed to estimate serum uric acid (SUA) levels in PsA patients compared to healthy controls and evaluate their association with disease activity and subtypes.

Methods: A case-control study was employed, recruiting 40 PsA patients meeting Classification Criteria for Psoriatic Arthritis (CASPAR) criteria and 40 age- and gender-matched clinically healthy controls. Disease activity was assessed via the Disease Activity Index for Psoriatic Arthritis (DAPSA), and fasting SUA levels were measured enzymatically

Results: The SUA levels did not show a statistically significant difference across the clinical patterns of PsA. The most common clinical pattern of PsA observed was Polyarthritis Rheumatoid like, found in 14 (35.0%) patients. The relationship between uric acid levels and the severity of arthritis was also examined. Among 3 (7.5%) patients in remission, the mean ± SD of uric acid was 4.60 ± 0.000, with a 95% CI of (4.60 - 4.60). For 29 (72.5%) patients with low disease activity, the mean ± SD was 4.81 ± 1.139, with a 95% CI of (4.3688 - 5.2353). In 8 (20%) patients with moderate disease activity, the mean ± SD of uric acid was 7.83 ± 1.84, with a 95% CI of (6.2951 - 9.3674). Therefore, the severity of the disease significantly affected SUA levels ($P < 0.001$).

Conclusions: Research findings demonstrated that levels of SUA failed to show any connection to PsA clinical patterns. Higher disease activity of PsA led to increased SUA levels among PsA patients. Patients who were in remission stages demonstrated the lowest concentration of serum uric acid level, yet patients marked by moderate disease activity levels showed the highest serum uric acid levels..

Keywords: *PsA disease Activity, Hyperuricemia, Inflammation, Uric Acid*

1. INTRODUCTION

PsA is an inflammatory musculoskeletal disease associated with cutaneous psoriasis. It affects men and women almost equally between the ages of 40 and 50 years (1). Approximately 20_30% of patients with psoriasis develop psoriatic arthritis (PsA). Hyperuricemia, defined as high serum uric acid (SUA) levels, has emerged as a comorbidity in PsA patients (2). Recent evidence supports that hyperuricemia is implicated in the pathogenesis and progression of PsA, questioning its role as an epiphenomenon, and rather suggesting that it assumes active part in inflammation and severity of disease. Nevertheless, the precise association between SUA levels, clinical manifestations, and disease activity in PsA is not well understood (2,3)., Hyperuricemia is being increasingly recognized as a comorbidity associated with PsA, raising awareness of its role in diagnosis and possible therapy (4). Tripolino et al. (2021), describes how increased cellular turnover, metabolic disorders, and inflammatory pathways may lead to the elevation in SUA. Hence, hyperuricemia may enhance inflammatory cascades by inducing immune responses, which could aggravate the symptoms of PsA (2).

However, there are important limitations and contradictions in the recent literature. To illustrate, although several studies have reported SUA levels to be significantly associated with disease severity (4,5), others have not shown any associations indicating that further studies are warranted (6). Previous studies suggest that therapies aimed at lowering uric acid, when used in combination with anti-rheumatic drugs, may offer a promising treatment option for individuals with psoriatic arthritis (PsA) (7). These treatments not only reduce serum uric acid (SUA) levels but also provide systemic anti-inflammatory effects and localized symptom relief. PsA diagnoses were confirmed by a rheumatologist using the Classification Criteria for Psoriatic Arthritis (CASPAR), which are widely applied in both clinical practice and research. The CASPAR criteria require evidence of inflammatory articular disease (affecting joints, spine, or entheses), along with a total of at least three points from specific clinical and laboratory features. CASPAR Criteria (Total score must be ≥3):

The CASPAR criteria are:

1. Evidence of psoriasis (current, past, family): two points if current history of psoriasis, one-point others.
2. Psoriatic nail dystrophy: one point
3. Negative rheumatoid factor: one point.
4. Dactylitis (current, past history): one point.
5. Radiographic evidence of juxtaarticular new bone formation: one point.

Three or more points have 99% specificity and 92% sensitivity for diagnosis of PsA. (8).

Nevertheless, inconsistencies persist regarding the precise mechanisms underlying this association, as well as the broader clinical implications of modulating uric acid metabolism in PsA management. These uncertainties highlight the necessity for more comprehensive investigations to clarify the role of hyperuricemia in PsA and its relationship with disease activity and clinical outcomes.

The main purpose of this study is estimating SUA levels in PsA patients and their comparison with healthy controls. The research aims to establish a relationship between SUA levels and the clinical manifestations of different types and Disease Activity Index for Psoriatic Arthritis (DAPSA) scorings of PsA severity.

2. METHODS

Study Design and Setting

A case-control study compares the association between SUA level with the patterns and severity of PsA. This study was conducted at the Rheumatology and Rehabilitation Center of Sulaymaniyah in a 6-month period from August 2024 to January 2025.

Sampling method and sample size

Total of 80 participants in two groups (40 patients with PsA and 40 healthy controls) were obtained through non-random convenient sampling from an outpatient rheumatology facility including patients diagnosed by consultant rheumatologist with PsA as well as matched healthy controls from the clinically healthy control. A rheumatologist verified PsA diagnoses through the Classification Criteria for Psoriatic Arthritis (CASPAR criteria) which includes inflammatory articular disease combined with psoriasis history, specific clinical and radiographic characteristics.

Inclusion criteria include the patients whose diagnosed as Psoriatic arthritis by Rheumatologist based on CASPAR criteria, with different types of Psoriatic arthritis (Symmetric psoriatic arthritis, asymmetric psoriatic arthritis, distal interphalangeal predominant, spondylitis, arthritis mutilans). Age more than 16 years old.Both male and females. Exclusion criteria for both groups include: Age less than 16 years old.Patients with renal failure.known history of any medical diseases like Malignancy,diabetic mellitus ,hypertension, tuberculosis, and gout. Patients currently on treatments that influence serum uric acid (Asprin, Diuretics, anti-tubercular drugs, chemotherapy, immune suppressant drugs).

Data Collection

Data were collected through structured clinical assessments. For PsA patients, disease activity was evaluated using the DAPSA score, which incorporates tender and swollen joint counts, patient-reported pain, and C-reactive protein levels. SUA levels were measured via venous blood samples after an overnight fasting, using a standardized enzymatic assay (Uricase Method). Demographic data, medical history, and medication use were recorded via interviews and medical records. Controls underwent identical SUA testing and baseline health assessments to ensure comparability.

Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the Rheumatology and Rehabilitation Center, Sulaimani, in compliance with the Declaration of Helsinki. Written informed consent was obtained from all participants, and confidentiality was maintained through anonymized data handling.

Data Analysis

The IBM SPSS Statistics version 22.0 performed all analyses to show participant characteristics using descriptive statistics while using inferential tests to compare SUA measurements between PsA patients and healthy controls. The analysis employed independent t-tests to compare SUA means while Pearson's correlation conveyed associations between SUA and

DAPSA and one-way ANOVA measured SUA variances between distinct PsA clinical patterns. The study evaluated statistical significance at $p \leq 0.05$ while indicating highly significant findings at $p < 0.001$.

3. RESULTS

Five clinical subtypes of Psoriatic Arthritis (PsA) were identified among the studied population:
Polyarthritis (Rheumatoid-like pattern) was the most frequent subtype, observed in 14 patients (35.0%). These patients had a mean serum uric acid (SUA) level of 5.240 ± 1.524 mg/dL, with a 95% confidence interval (CI) of 4.36 to 6.12. Asymmetric Oligoarticular pattern was present in 9 patients (22.5%), with a mean SUA level of 5.022 ± 2.045 mg/dL and a 95% CI of 3.46 to 6.59. Axial involvement was also found in 9 patients (22.5%), and their mean SUA level was 4.989 ± 1.469 mg/dL, with a 95% CI of 3.86 to 6.12. Predominant distal interphalangeal (DIP) joint involvement with nail changes was observed in 6 patients (15.0%), with a mean SUA level of 4.58 ± 1.58 mg/dL and a 95% CI of 2.92 to 6.24. Predominant Asymmetric Oligoarticular disease was the least common subtype, found in 2 patients (5.0%). These patients had a consistent SUA level of 4.60 ± 0.000 mg/dL, with a 95% CI of 4.60 to 4.60. There was no statistically significant difference in SUA levels among the different clinical patterns of PsA (P = 0.93) (Table 1).

Table 1. Serum uric acid levels in clinical patterns of psoriatic arthritis

Pattern of Psoriatic Arthritis (CASPAR Criteria)	**SUA Levels (mg/dL)**				**P-value**
	N (%)	Mean ± SD	CI 95%	Min- Max	
Asymmetric oligoarticular disease (DIP and PIP, MCP and MTP joints of hands and feet, dactylites, knees, hips and ankles)	9 (22.5%)	5.022 ± 2.045	3.46 - 6.59	3.10 - 9.90	0.93
Predominant DIP involvement Nail changes.	6 (15.0%)	4.58 ± 1.58	2.92 - 6.24	3.60 - 7.70	
Polyarthritis Rheumatoid like (fusion type: MCP, PIP and wrists).	14 (35.0%)	5.240 ± 1.524	4.36 - 6.12	3.73 - 8.70	
Axial involvement (sacroiliac, vertebral).	9 (22.5%)	4.989 ± 1.469	3.86 - 6.12	3.50 - 6.70	
Asymmetric oligoarticular disease and Predominant (DIP involvement Nail changes).	2 (5.0%)	4.60 ± 0.000	4.60 - 4.60	4.60 - 4.60	
Total	40 (100.0%)	5.004 ± 1.57	4.51 - 5.51	3.10 - 9.90	

The relationship between uric acid levels and the pattern of PsA is depicted in Figure 1. SUA levels did not show a significant difference among the clinical patterns of PsA. The most prevalent clinical pattern was Polyarthritis Rheumatoid, observed in 14 (35.0%) patients, followed by the patterns of Asymmetric Oligoarticular, Axial Involvement, Predominant DIP Involvement Nail Changes, and Asymmetric Oligoarticular Disease and Predominant, seen in 9 (22.5%), 9 (22.5%), 6 (15.0%), and 2 (5.0%) patients, respectively.
The relationship between SUA levels and disease activity, assessed by the Disease Activity index for Psoriatic Arthritis (DAPSA), was also examined: In the remission group (3 patients, 7.5%), the mean SUA level was 4.60 ± 0.000 mg/dL, with a 95% CI of 4.60 to 4.60. Among patients with low disease activity (29 patients, 72.5%), the mean SUA level was 4.81 ± 1.139 mg/dL, with a 95% CI of 4.3688 to 5.2353. In the group with moderate disease activity (8 patients, 20.0%), the mean SUA level was markedly higher at 7.83 ± 1.84 mg/dL, with a 95% CI of 6.2951 to 9.3674. Unlike the distribution across clinical subtypes, SUA levels were found to be significantly associated with disease activity, with higher levels observed in patients with more active disease (P < 0.001) (Table 2).
The relationship between uric acid levels and the severity of PsA is illustrated in Figure 2. The mean uric acid levels for Remission, Low Disease Activity, and Moderate Disease Activity demonstrated statistically significant differences (P < 0.001), with an increase in uric acid levels corresponding to greater disease severity.

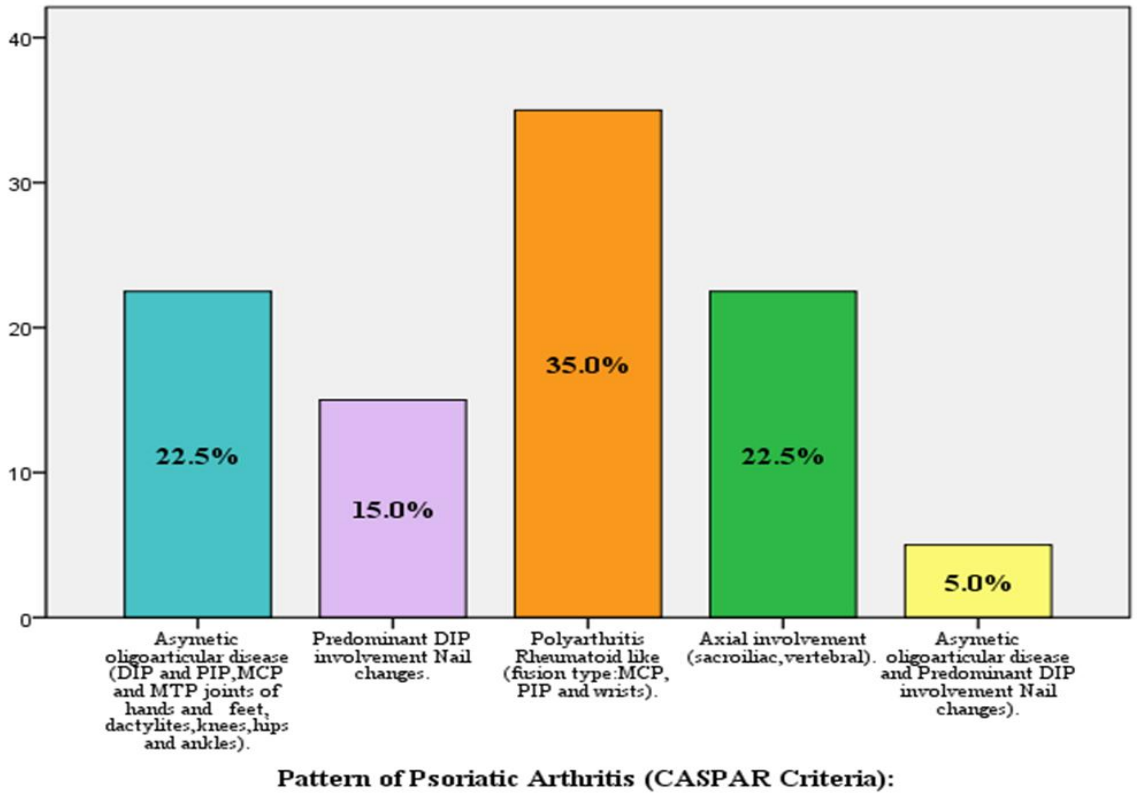

Figure 1. Serum uric acid levels based on Severity of Pattern of Psoriatic Arthritis (CASPAR Criteria).

Table 2: Association Between SUA Levels and Disease Activity (DAPSA Score)

Remission (≤ 4)	3 (7.5%)	4.17 ± 0.321	3.3681 - 4.9652	3.80 - 4.40
Low Disease Activity (> 4–≤ 14)	29 (72.5%)	4.81 ± 1.139	4.3688 - 5.2353	3.40 - 7.70
Moderate Disease Activity (> 14–≤ 28)	8 (20%)	7.83 ± 1.84	6.2951 - 9.3674	4.70 - 10.30
Total	40 (100.0%)	5.36 ± 1.77	4.7938 - 5.9267	3.40 - 10.30

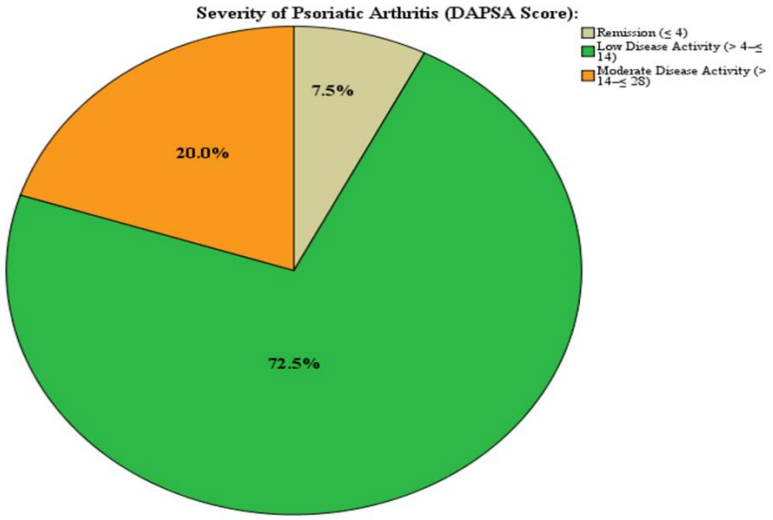

Figure 2. Serum uric acid levels based on Severity of Psoriatic Arthritis (DAPSA Score).

4. DISCUSSION

This study evaluated SUA levels in patients with PsA while assessing their clinical patterns and disease severity together with the association between SUA levels and both features. The study results showed Rheumatoid-like Polyarthritis as the most commonly observed clinical pattern among patients with no significant variations found between their SUA levels according to PsA clinical patterns. The majority of patients were in the Low Disease Activity stage and SUA levels increased as the disease severity became more severe.

Diverse study results have displayed different prevalence rates of clinical patterns in PsA patients (9,10). The analysis of PsA patients in this study showed Rheumatoid-like Polyarthritis to be their primary clinical pattern. The clinical characteristics research of 109 PsA patients conducted by Kim et al. (2022) (11), showed that Asymmetric Oligoarthritis emerged as the prevalent pattern. Studies in Pakistan have identified Asymmetric Oligoarthritis as the most widespread pattern which affected patients during evaluation (12). Different clinical pattern outcomes emerge because each study uses distinct methodologies along with various sample sizes.

The results in current study showed no significant differences in SUA levels across clinical patterns of PsA. The findings of Ambike et al. (2024), which involved 50 PsA patients and 50 controls assessing serum calcium and uric acid levels and their relationship with disease severity, supported this study's results, indicating no differences in uric acid levels across different disease patterns or between patients and healthy individuals (13).

This study demonstrated that SUA levels varied significantly with disease severity(activity), with higher uric acid levels observed in patients with more severe disease. In a case-control study by Yehia et al. (2021), involving 100 chronic psoriasis patients and 100 matched controls, a direct and significant relationship was inconsistence with our study (14). Additionally, the study by HM Ragab et al. aimed to investigate the relationship between SUA levels, endothelial dysfunction, and disease activity in PsA patients. It demonstrated, consistent with the results of the present study, that PsA patients exhibited higher SUA levels compared to the control group and that SUA levels rose in these patients as disease severity increased. (15).

This research demonstrated that psoriatic arthritis patients with more severe disease conditions according to DAPSA index measurement tended to have higher observed uric acid levels. High uric acid levels and their connection to multiple disease vulnerabilities support the need for monitoring hyperuricemia among psoriatic arthritis patients.

5. CONCLUSION

Rheumatoid-like Polyarthritis was identified as the most common PsA pattern, whereas other forms, including Asymmetric Oligoarticular Disease, Axial Involvement, and DIP Involvement, demonstrated diverse distributions, highlighting the varied manifestations of the disease.

The current research results demonstrated SUA measurements did not show any correlation with PsA clinical patterns but disease severity had a substantial effect on uric acid concentrations which were higher among patients experiencing moderate disease activity than those achieving remission statuses. Therefore, determining uric acid levels may be a biomarker for PsA disease activity

Acknowledgments: Our sincere gratitude goes out to everyone who contributed their time, effort, and expertise to make this study a success, especially for my supervisors Assistant Professor Dr.Raouf Rahim Mirza and Senior Specialist Dr.Ronak Saeed Ahmed.

Conflict of interest: All authors assert the absence of any conflict of interest.

Authors' contributions: Each author made an equal contribution to this research work.

Funding: Not applicable

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