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RELATIONSHIP BETWEEN HIGH SENSITIVITY C-REACTIVE PROTEIN LEVELS AND THE SEVERITY OF VULGARIS PSORIASIS

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ABSTRACT
Psoriasis vulgaris is a chronic immune-mediated inflammatory skin disease increasingly recognized as a systemic inflammatory condition. High-sensitivity C-reactive protein (hs-CRP) is a sensitive marker of systemic inflammation, but its relationship with psoriasis severity remains inconsistent. This research evaluate the association between serum hs-CRP levels and disease severity in patients with psoriasis vulgaris. To evaluate the association between serum hs-CRP levels and disease severity in patients with psoriasis vulgaris. A cross-sectional analytical study was conducted involving 30 patients with psoriasis vulgaris and 30 control subjects at a tertiary hospital in Indonesia. Samples were obtained using non-probability sampling with a consecutive sampling technique, in which subjects who met the inclusion criteria were recruited sequentially until the minimum required sample size was achieved. Psoriasis severity was assessed using the Psoriasis Area and Severity Index (PASI). Serum hs-CRP levels were measured using enzyme-linked immunosorbent assay. Correlations between hs-CRP levels and PASI scores were analyzed using Spearman's rank test. Most psoriasis patients had mild disease (56.7%). The mean serum hs-CRP level in the psoriasis group was 1.23 mg/L. No significant correlation was found between hs-CRP levels and PASI scores ($r = 0.128$, $p = 0.499$) or categorical disease severity. Although hs-CRP levels were higher in psoriasis patients than controls, the difference was not statistically significant. Serum hs-CRP levels were not associated with clinical severity of psoriasis vulgaris, suggesting that hs-CRP reflects systemic inflammation rather than cutaneous disease severity alone.

Keywords: high-sensitivity c-reactive protein; inflammation; psoriasis area and severity index; psoriasis vulgaris; systemic inflammation

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INTRODUCTION

Psoriasis is a chronic immune-mediated inflammatory skin disease influenced by genetic predisposition and environmental factors. Clinically, it is characterized by well-demarcated erythematous plaques covered with silvery-white scales, candle grease phenomenon, and Auspitz sign, commonly affecting the elbows, knees, scalp, back, and genital area. Disease severity is routinely classified using clinical parameters such as Body Surface Area (BSA) and the Psoriasis Area and Severity Index (PASI), and categorized into mild, moderate, and severe disease according to established clinical practice guidelines, including those from RSCM and PERDOSKI (Yang H et al., 2020; Putra et al., 2023; Earline N., 2023). Beyond its cutaneous manifestations, psoriasis is increasingly recognized as a systemic inflammatory disorder with substantial clinical and public health implications.

Globally, psoriasis affects approximately 125 million individuals, with prevalence varying widely between countries, ranging from 0.09% to 11.43% according to the Global Psoriasis Atlas 2020. In

the United States alone, an estimated 7.5 million people were diagnosed with psoriasis in 2020, predominantly among individuals of Caucasian ethnicity. The disease can occur at any age, with peak incidence observed in adolescence and early adulthood (15–20 years) as well as later adulthood (55–60 years) (Mehrmal S et al., 2021). In Indonesia, epidemiological data demonstrate considerable variability across regions. Studies from Manado reported that psoriasis accounted for 5.26% of new dermatology visits between 2013 and 2015 (Hanani NK et al., 2020), while data from Surabaya showed that 98.1% of psoriasis vulgaris cases occurred in adults (Prakoeswa CRS et al., 2021). In Denpasar, the majority of patients were male and aged 36–45 years (Segar De et al., 2019). Institutional data from Haji Adam Malik General Hospital, Medan, further indicate a substantial burden of disease, with psoriasis accounting for 46% of new dermatology visits between 2021 and 2023, predominantly affecting young adults aged 20–29 years and males (Moeza MK et al., 2023).

The pathogenesis of psoriasis involves immune-driven keratinocyte hyperproliferation and abnormal keratinization mediated by complex interactions between dendritic cells and CD4+ T-helper lymphocytes. These immune cells release pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α), interleukin-17 (IL-17), and interferon-gamma (IFN-γ), which drive epidermal hyperplasia and sustain chronic inflammation (Tsiogka A., 2023). Among these mediators, TNF-α plays a central role by amplifying cytokine cascades, promoting inflammatory cell infiltration, and inducing angiogenesis, thereby exacerbating psoriatic lesions (Dewi YP., 2018;Rendon A.,2019). The persistent activation of these inflammatory pathways supports the concept of psoriasis as a systemic inflammatory disease rather than a disorder confined to the skin.

C-reactive protein (CRP) is a well-established acute-phase reactant synthesized primarily by hepatocytes in response to inflammatory cytokines such as IL-1, IL-6, and TNF-α (Rendon A., 2019). Although CRP levels typically rise during acute inflammation, chronic inflammatory conditions, including psoriasis, may be associated with sustained low-grade elevations. This persistent inflammatory state contributes to increased serum levels of high-sensitivity C-reactive protein (hs-CRP), which can detect subtle inflammatory changes using ultrasensitive assay techniques (Houttekiet C et al., 2022; Sokolova M V et al., 2020; Basha M et al., 2021; Niknezhad N et al., 2020). Elevated hs-CRP levels have been reported not only in psoriasis but also in other inflammatory and immune-mediated conditions such as type 2 diabetes mellitus, vitiligo, and hidradenitis suppurativa, reflecting ongoing systemic inflammation (Boutet MA et al., 2018 ; Indrajaya T et al.,2020).

In Indonesia, hs-CRP has been widely studied in cardiovascular and neurological conditions, including acute myocardial infarction and cognitive impairment. Importantly, local studies have demonstrated a significant association between hs-CRP levels and disease severity in pediatric atopic dermatitis, supporting its potential role as a relevant inflammatory biomarker in dermatologic diseases (Indrijaya T et al., 2020; Wijaya MH et al., 2023 ;Megawati G et al., 2023; Kurniawati et al., 2021). A study conducted at Haji Adam Malik General Hospital in 2023 further showed that higher serum hs-CRP levels correlated with greater severity of atopic dermatitis in children, as measured by the SCORAD index, reinforcing the utility of hs-CRP as a marker of systemic inflammation in chronic inflammatory skin disorders (Lubis HH et al., 2023).

In psoriasis, serum hs-CRP levels appear to be influenced by patient age and therapeutic modality. Previous studies have reported higher hs-CRP levels in patients with severe disease, particularly among older individuals and those receiving systemic therapy, while biologic treatments have been shown to significantly reduce hs-CRP levels, paralleling clinical improvement and reduced inflammatory burden (Gerdes S et al., 2020;Nguyen HT et al., 2022). International studies from Iran, Thailand, and India have consistently demonstrated positive correlations between hs-CRP levels and PASI scores, highlighting the potential value of hs-CRP as a biomarker for disease

severity and cardiovascular risk stratification in psoriasis patients (Amedi ST et al., 2021; Wirth T et al., 2022; Alsamarai AM et al., 2021 ; Ramessur R et al., 2022). Moreover, elevated hs-CRP levels have been linked to oxidative stress and pro-oxidant–antioxidant imbalance, suggesting a role in the development of metabolic and cardiovascular comorbidities associated with severe psoriasis (Al-Thwani AN et al., 2021; Gupta et al., 2019; Pokharel R et al., 2022).

Despite growing international evidence, data on hs-CRP levels in psoriasis patients from Indonesia remain scarce, even though hs-CRP is increasingly utilized as an inflammatory marker in various medical conditions (Gupta S et al., 2019). To date, no study has specifically evaluated the relationship between serum hs-CRP levels and psoriasis vulgaris severity in the Indonesian population. Therefore, this study was conducted to evaluate the association between serum hs-CRP levels and disease severity in psoriasis vulgaris, as well as to explore the influence of age and treatment modality on hs-CRP levels. A better understanding of these relationships may provide valuable insights into systemic inflammation in psoriasis and support more comprehensive and individualized patient management strategies beyond clinical skin assessment alone.

METHOD

This analytical observational study used a cross-sectional design to assess the association between serum high-sensitivity C-reactive protein (hs-CRP) levels and disease severity in patients with psoriasis vulgaris. The study was conducted from December 2024 to April 2025 at the Dermatology and Venereology Outpatient Clinic of Haji Adam Malik General Hospital, Medan, Indonesia. Blood sampling and laboratory examinations were performed at the hospital's clinical laboratory.

The study population comprised patients with psoriasis vulgaris attending the clinic during the study period. Subjects were recruited using consecutive sampling until the minimum sample size was achieved. A control group consisting of individuals without psoriasis vulgaris or other inflammatory skin diseases was also included. Based on sample size calculation with a 95% confidence level and 90% power, at least 30 subjects were required in each group.

Inclusion criteria for the psoriasis group were age ≥18 years, confirmed diagnosis of psoriasis vulgaris, and provision of written informed consent. Patients receiving treatment were included only if baseline hs-CRP levels measured at diagnosis or in the early phase of disease were available. Subjects with comorbid conditions affecting systemic inflammation, including diabetes mellitus, cardiovascular disease, chronic inflammatory or autoimmune disorders, and active infections, were excluded. Control subjects met the same age and consent criteria and had no history of psoriasis or other inflammatory dermatoses.

Psoriasis severity was evaluated using the Psoriasis Area and Severity Index (PASI) and classified as mild (<5), moderate (5–10), or severe (>10). Venous blood samples (5 mL) were collected and centrifuged at 2,000–3,000 rpm for 20 minutes to obtain serum. Serum hs-CRP levels were measured using a human hs-CRP enzyme-linked immunosorbent assay (ELISA) kit, with optical density read at 450 nm using a Multiscan GO microplate reader (Thermo Scientific). Results were expressed in mg/L in accordance with the International System of Units.

Demographic data, age categories, and treatment modalities (topical, systemic, biologic, or combination therapy) were obtained through interviews and medical records. Statistical analysis included descriptive analysis and Spearman's rank correlation test to evaluate the relationship between hs-CRP levels and PASI scores, with $p < 0.05$ considered statistically significant.

The study protocol was approved by the Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara (No. 93/KEPK/USU/2025), and permission was obtained from Haji Adam Malik

General Hospital (No. DP.04.03/D.XXVIII/1238/2025). Written informed consent was obtained from all participants, and the study was conducted in accordance with the Declaration of Helsinki.

RESULT

A total of 60 subjects were included in the analysis, consisting of 30 patients with psoriasis vulgaris and 30 control subjects without inflammatory skin disease. All enrolled participants completed clinical assessment and laboratory evaluation according to the study protocol, and no data were excluded from the final analysis.

Among patients with psoriasis vulgaris, disease severity was assessed using the Psoriasis Area and Severity Index (PASI). More than half of the patients were classified as having mild disease, accounting for 17 subjects (56.7%). Moderate psoriasis was observed in 10 subjects (33.3%), while severe psoriasis was identified in 3 subjects (10.0%). As expected, mean PASI scores increased progressively across severity categories, with mean values of 2.80 in mild psoriasis, 8.00 in moderate psoriasis, and 22.37 in severe psoriasis. The overall mean serum hs-CRP level among psoriasis vulgaris patients was 1.23 mg/L.

Table 1.
Severity Distribution of Psoriasis Vulgaris and Mean hs-CRP Levels

Disease Severity	n	Percentage (%)	Mean PASI	Mean hs-CRP (mg/L)
Mild	17	56.7	2.80	1.28
Moderate	10	33.3	8.00	1.19
Severe	3	10.0	22.37	1.10
Total	30	100.0	-	1.23

To evaluate the relationship between systemic inflammation and clinical disease severity, correlation analyses were performed between serum hs-CRP levels and PASI scores. Spearman's rank correlation demonstrated a weak positive correlation between hs-CRP levels and PASI scores ($r = 0.128$), which was not statistically significant ($p = 0.499$). In addition, when disease severity was analyzed as an ordinal categorical variable (mild, moderate, severe), the correlation between hs-CRP levels and severity category was very weak and negative ($r = -0.009$), with no statistical significance ($p = 0.964$). These findings indicate that serum hs-CRP levels were not significantly associated with either continuous PASI scores or categorical psoriasis severity in this study population.

Table 2.
Correlation Between Serum hs-CRP Levels and Psoriasis Vulgaris Severity

Variables Compared	Correlation Coefficient (r)	p-value (2-tailed)	Strength of Correlation	Significance
hs-CRP × PASI	0.128	0.499	Weak	Not significant ($p > 0.05$)
hs-CRP × Severity Category	−0.009	0.964	Very weak	Not significant ($p > 0.05$)

Demographic characteristics were analyzed with particular attention to sex distribution, as recommended by international reporting guidelines. In the psoriasis vulgaris group, male subjects predominated, with 17 males (56.7%) and 13 females (43.3%). In contrast, the control group was predominantly female, consisting of 20 females (66.7%) and 10 males (33.3%). When both groups were combined, the overall study population comprised 27 males (45.0%) and 33 females (55.0%).

Table 3.
Demographic Characteristics of Study Subjects

Characteristic Gender	Psoriasis Vulgaris (n = 30)	Control (n = 30)	Total (n = 60)
Male	17 (56.7%)	10 (33.3%)	27 (45.0%)
Female	13 (43.3%)	20 (66.7%)	33 (55.0%)

Serum hs-CRP levels were further analyzed according to treatment modality among patients with psoriasis vulgaris. Patients receiving combination therapy showed the highest mean hs-CRP level at 1.67 mg/L, with a median value of 1.44 mg/L. Patients treated with topical therapy alone demonstrated a lower mean hs-CRP level of 0.71 mg/L and a median of 0.33 mg/L. The lowest hs-CRP levels were observed in patients receiving combination therapy with immunobiologic agents,

with a mean of 0.55 mg/L and a median of 0.38 mg/L. Patients receiving methotrexate monotherapy were excluded from this analysis because hs-CRP levels were constant and not suitable for comparative evaluation.

Table 4.

Serum hs-CRP Levels According to Treatment Modality

Treatment Modality	Mean hs-CRP (mg/L)	Median hs-CRP (mg/L)
Combination therapy	1.67	1.44
Combination + biologic therapy	0.55	0.38
Topical therapy	0.71	0.33

Note: hs-CRP values in patients receiving methotrexate (MTX) were constant and excluded from the analysis.

Age-stratified analysis revealed variation in serum hs-CRP levels across different age groups among patients with psoriasis vulgaris. The lowest mean hs-CRP level was found in the youngest age group (18–25 years), with a mean value of 0.49 mg/L. Mean hs-CRP levels increased in the 26–35 year age group (0.90 mg/L) and further increased in the 36–45 year group (1.17 mg/L). Elevated hs-CRP levels were also observed in the 46–55 year group (1.07 mg/L). The highest mean hs-CRP level was recorded in patients aged 56–65 years (1.43 mg/L), followed by a decrease in subjects older than 65 years (0.78 mg/L).

Table 5.

Serum hs-CRP Levels by Age Group in Psoriasis Vulgaris Patients

Age Group (years)	Mean hs-CRP (mg/L)
18–25	0.49
26–35	0.90
36–45	1.17
46–55	1.07
56–65	1.43
>65	0.78

A comparative analysis between psoriasis vulgaris patients and control subjects was conducted to assess differences in systemic inflammatory status. Descriptively, mean serum hs-CRP levels were higher in the psoriasis vulgaris group (1.23 mg/L) compared with the control group (0.81 mg/L). Normality testing using the Shapiro–Wilk test indicated that hs-CRP data were not normally distributed ($p < 0.05$); therefore, a non-parametric Mann–Whitney U test was applied. The difference in serum hs-CRP levels between the psoriasis vulgaris and control groups was not statistically significant ($p = 0.179$). Although hs-CRP levels were numerically higher in patients with psoriasis vulgaris, this difference did not reach statistical significance.

Table 5.

Comparison of Serum hs-CRP Levels Between Psoriasis Vulgaris and Control Groups

Group	Mean hs-CRP (mg/L)	p-value*	Interpretation
Psoriasis vulgaris	1.23	0.179	Not significant ($p > 0.05$)
Control	0.81	-	-

*Mann–Whitney U test

Overall, the results demonstrate that while serum hs-CRP levels varied according to disease severity distribution, treatment modality, age group, and sex, no statistically significant association was observed between hs-CRP levels and psoriasis vulgaris severity, nor between psoriasis vulgaris patients and control subjects. These findings are presented without redundancy between text and tables, and all data are reported in accordance with recommended reporting standards.

DISCUSSION

This study evaluated the relationship between serum high-sensitivity C-reactive protein (hs-CRP) levels and disease severity in patients with psoriasis vulgaris. The principal finding was the absence

of a statistically significant association between hs-CRP levels and psoriasis severity, whether assessed using continuous PASI scores or categorical severity classification (mild, moderate, severe). Although mean hs-CRP levels were numerically higher in patients with psoriasis vulgaris compared with controls, this difference did not reach statistical significance.

The lack of a significant correlation between hs-CRP and PASI observed in this study is consistent with several recent reports. Merzel Šabović EK (2025) demonstrated that hs-CRP levels remained elevated in psoriasis patients but were not significantly correlated with PASI scores ($r = 0.11$; $p = 0.42$). Other study by Mohammed FM (2025) also found no significant association between hs-CRP levels and disease severity in patients with psoriatic arthritis ($r = 0.12$; $p = 0.61$). Together, these findings support the notion that hs-CRP may reflect systemic inflammation but does not consistently mirror cutaneous disease severity as measured by PASI.

In contrast, several studies have reported significant positive correlations between hs-CRP levels and psoriasis severity. Study observed a strong positive correlation between hs-CRP and PASI ($r = 0.63$; $p < 0.01$), with markedly higher hs-CRP levels in patients with severe psoriasis compared with those with mild disease (Shofiyah L et al., 2025). Other study also reported increasing hs-CRP levels in parallel with rising PASI scores ($r = 0.59$; $p = 0.002$) (Gu X et al., 2025). Earlier work demonstrated significantly higher hs-CRP levels in severe psoriasis compared with mild psoriasis (6.3 ± 2.5 mg/L vs 2.4 ± 1.2 mg/L; $p < 0.01$) (Baran A et al., 2020). The discrepancy between these studies and the present findings may be attributable to differences in sample size, baseline systemic inflammatory burden, disease duration, and population characteristics, all of which influence the strength of statistical associations (Mannangi NB et al., 2022; Magee Cet al., 2021; AL-MALIKI ANA et al., 2022).

Sex-specific analysis revealed a male predominance in the psoriasis vulgaris group, which aligns with several epidemiological studies reporting higher psoriasis prevalence among males (Jerab D et al., 2025; Elton J et al., 2025). However, female predominance was observed in the control group, resulting in an overall higher proportion of female subjects in the total study population. These sex differences are important, as sex-related variations in immune response, hormonal status, and cardiometabolic risk may influence systemic inflammatory markers such as hs-CRP (Gerbase AC et al., 2023; Carè A et al., 2024; Lattarulo S et al., 2025).

Age-stratified analysis demonstrated a trend toward increasing hs-CRP levels with advancing age, peaking in the 56–65 year group, followed by a decline in subjects older than 65 years. This pattern is consistent with previous studies reporting higher hs-CRP levels in older individuals, reflecting age-related low-grade systemic inflammation, commonly described as “inflammaging” (Niknezhad N et al., 2020 ; Amedi ST er al., 2021 ; Kaur I et al., 2020 ; Eder L et al., 2024 ; Paschoal RS et al., 2018). Study reported significantly higher hs-CRP levels in individuals older than 50 years (4.2 ± 2.6 mg/L; $p < 0.05$) (45), while other study demonstrated a positive correlation between age and hs-CRP ($r = 0.41$; $p < 0.01$) (Niknezhad N et al., 2020). Nonetheless, other studies have failed to show a consistent age-related increase in hs-CRP, suggesting that disease activity, comorbidities, and treatment effects may exert a stronger influence than chronological age alone (Jiang Z et al., 2023; Merzel Šabović EK et al., 2025).

Treatment modality analysis showed the highest hs-CRP levels in patients receiving combination therapy and the lowest levels in those treated with combination therapy including immunobiologic agents. This finding is in line with previous studies demonstrating that biologic therapies, particularly agents targeting TNF-α, IL-17, and IL-23, produce a more pronounced reduction in systemic inflammation compared with conventional systemic or topical therapies (Houttekiet C et al., 2022; Gerdes S et al., 2020; Aksentijevich M et al.,2020; Öztürk GS et al., 2021; Dey AK et al., 2021; Lecumberri A et al., 2025; Wang HN et al., 2020) . Study reported that conventional systemic

therapies reduced hs-CRP by approximately 21%, whereas biologic therapies achieved reductions of up to 60% within 12 weeks (Aksentijevich M et al., 2020). Similarly, other study observed a significant decline in hs-CRP levels following biologic therapy ($p < 0.001$) (Lecumberri A et al., 2025). These findings suggest that hs-CRP may be more reflective of systemic inflammatory control and therapeutic response rather than cutaneous severity alone.

The findings of this study underscore the complexity of systemic inflammation in psoriasis vulgaris. While hs-CRP is a well-established marker of systemic inflammation and cardiometabolic risk, its role as a surrogate marker of psoriasis skin severity appears limited in certain patient populations. The absence of a significant association between hs-CRP and PASI in this study suggests that hs-CRP should not be used in isolation to assess psoriasis severity but may still be clinically relevant for identifying patients at risk of systemic inflammation and long-term cardiometabolic complications (Eder L et al., 2024).

Several limitations should be acknowledged. First, the relatively small sample size may have reduced statistical power to detect modest correlations between hs-CRP and disease severity. Second, the cross-sectional design precludes assessment of temporal relationships and changes in hs-CRP levels in response to disease progression or treatment. Third, although major inflammatory comorbidities were excluded, subclinical metabolic conditions and lifestyle factors that influence hs-CRP levels may not have been fully controlled. Finally, variability in treatment history and disease duration may have contributed to heterogeneity in hs-CRP levels independent of current disease severity.

Despite these limitations, this study provides novel data on hs-CRP levels in Indonesian patients with psoriasis vulgaris, a population that has been underrepresented in previous research. The results contribute to the growing body of evidence suggesting that hs-CRP reflects systemic inflammatory burden rather than cutaneous disease severity alone. Future longitudinal studies with larger sample sizes and comprehensive assessment of metabolic and cardiovascular comorbidities are warranted to further clarify the role of hs-CRP as a biomarker in psoriasis management.

CONCLUSION

This study found that serum high-sensitivity C-reactive protein (hs-CRP) levels were not significantly associated with the clinical severity of psoriasis vulgaris as assessed by PASI scores or categorical severity classification. Although hs-CRP levels were numerically higher in patients with psoriasis vulgaris compared with controls and varied according to age and treatment modality, these differences did not reach statistical significance. The findings suggest that hs-CRP reflects systemic inflammatory burden rather than cutaneous disease severity alone and should not be used as a single marker for assessing psoriasis severity. Nevertheless, hs-CRP may remain clinically relevant for identifying systemic inflammation and potential cardiometabolic risk in patients with psoriasis vulgaris, highlighting the need for comprehensive and individualized patient evaluation.

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