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Prevalence of raised mean platelet volume in patients of chronic plaque psoriasis

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ABSTRACT

BACKGROUND & OBJECTIVE: Psoriasis is a systemic, chronic autoimmune inflammatory disorder. MPV is a useful metric for assessing platelet aggregation and activity. To determine the mean platelet volume (MPV) in patients of chronic plaque psoriasis.

METHODOLOGY: This cross-sectional study was conducted in the Dermatology Department at Allied II Hospital, Faisalabad Medical University, Faisalabad. A total of 175 patients aged 18 to 50 years with clinically confirmed persistent plaque psoriasis were included in the study. Patients with comorbidities that impacted platelet function were excluded from the study.

RESULTS: Among 175 patients, 58 (33.1%) had raised MPV. Mean MPV was 8.61 ± 0.69 fL. The majority had severe psoriasis (60.6%) and were overweight (62.3% with BMI >25). No statistically significant association was found between MPV status and age (p=0.254), gender (p=0.359), BMI (p=0.709), disease duration (p=0.758), or PASI-based disease severity (p=0.801).

CONCLUSION: A substantial proportion (33.1%) of patients with chronic plaque psoriasis had elevated MPV, with a mean value of 8.61 ± 0.69 fL, indicating increased platelet activation. However, no significant association was observed between MPV and disease severity or other clinical variables. MPV may reflect systemic inflammation, but it is not reliably related to psoriasis severity.

KEYWORDS: Chronic Plaque Psoriasis, Mean Platelet Volume, PASI Score, Platelet Activation, Inflammation, Cardiovascular Risk.

INTRODUCTION

Psoriasis is a systemic, chronic autoimmune inflammatory disorder, affecting about 2–3% of people [1]. Its worldwide prevalence is reported to be as high as 11.4% in adults and 1.4% in children [2]. It may occur at any age and tends to involve the skin and joints, severely impacting quality of life. Further, it is associated with diseases including diabetes, cardiovascular disease, and metabolic syndrome [3]. Typically seen on extensor surfaces such as the scalp, knees, and elbows, characteristic lesions are red, raised plaques with silvery scales [4].

Although the exact cause and pathophysiology of psoriasis are still unknown, immunological dysregulation and inflammation are recognized to be important factors. According to recent research, platelets actively regulate immune and inflammatory pathways in addition to their established roles in coagulation and tissue healing [5]. When activated, they engage leukocytes and cause the release of a variety of growth factors, chemokines, and cytokines. Such platelet-mediated immune activation may result in the characteristic leukocyte infiltration seen in psoriatic skin [6].

MPV is a useful metric for assessing platelet aggregation and activity. MPV represents platelet size and function and is calculated by automated hematology analyzers during a complete blood count test. Larger platelets, which have higher MPV values, possess denser granules and demonstrate increased activity. Therefore, elevated MPV is regarded as a marker of enhanced platelet activation and is also associated with disease severity and cardiovascular risk. An MPV value of 8.63 ± 0.67 fL has been noted in individuals with psoriasis [7].

One of the key markers of platelet activation is mean platelet volume (MPV), a readily available parameter in routine

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blood tests. Higher MPV values indicate larger, more reactive platelets with increased prothrombotic potential. Studies have shown elevated MPV levels in patients with psoriasis, suggesting a link between platelet activation and disease severity. However, findings on the association between MPV and psoriasis are inconsistent, and no local data are available for the Pakistani population.

Not all studies agree on the association between MPV and psoriasis severity. A systematic review and meta-analysis found that although MPV and platelet count were higher in patients with psoriasis, the correlation with PASI scores was inconsistent [2].

Despite evidence of platelet involvement in psoriasis, routine screening for platelet activation markers such as MPV is not currently recommended. Further, most of the published studies are from Western populations with limited data from South Asia, specifically Pakistan. This study intends to fill these gaps by assessing the levels of MPV and the incidence of elevated MPV in Pakistani patients with chronic plaque psoriasis. If a substantial link is found, MPV screening might be incorporated into standard psoriasis care to identify people at increased risk for cardiovascular problems.

METHODOLOGY

This cross-sectional study was carried out in the Dermatology Department at Allied II Hospital, Faisalabad Medical University, Faisalabad. Ethical committee approval was obtained (approval number 48.ERC/FMU/2023-24-544), and the study commenced following the approval of its description. The study period extended from 19th May 2025 to August 2025.

Patients aged 18 to 50, of both genders, with a confirmed diagnosis of chronic plaque psoriasis were included. Psoriasis was defined as a persistent inflammatory skin condition, typically affecting extensor surfaces such as the elbows, knees, scalp, and trunk. It presents as inflamed, crimson plaques covered with silvery scales. Disease severity was assessed using the Psoriasis Area Severity Index (PASI), which ranges from 0 to 72; scores of 0–5 was considered mild, 6–10 moderate, and above 10 severe. Using the WHO sample size calculator, the estimated sample size was 175 patients, based on a 95% confidence level, an absolute precision of 0.1, and an expected population mean MPV of 8.63 ± 0.67 femtolitres.

Eligible patients were selected through a non-probability consecutive sampling method. Individuals with comorbidities (including rheumatoid arthritis, chronic renal disease, diabetes mellitus, chronic liver disease, autoimmune disorders, obesity, or cardiovascular diseases) that might affect platelet indices were excluded. The study also excluded patients using medications known to impact platelet function, such as aspirin, acetylsalicylic acid, or heparin.

After confirming inclusion criteria, obtaining ethical approval, and securing informed consent, participants completed a standardized questionnaire recording demographic details, BMI, disease duration, and PASI score. Venous blood samples were collected and analyzed in the hospital's pathology laboratory. MPV was measured by an automated haematology analyzer (Sysmex XE 2000, Germany), with results reported by a qualified pathologist.

Data analysis was performed using SPSS version 27. For quantitative variables such as age, BMI, duration of illness, PASI score, and MPV, means and standard deviations were calculated. Qualitative variables, including gender and psoriasis severity category, were described using frequencies and percentages. To control for potential effect modifiers such as age, gender, BMI, disease duration, and severity, stratification was carried out. Following stratification, independent-samples t-tests and ANOVA were used to assess statistical significance, with p-values < 0.05 considered significant.

RESULTS

The study comprised a total of 175 patients. The mean participant age was 33.95 ± 10.01 years; 43.4% were aged 31–40 years, and 29.7% were aged 21–30 years. Of 175 patients, 53.7% were female and 46.3% male. Mean BMI was 27.05 ± 5.33 kg/m²; 62.3% were overweight or obese, and 37.7% had a normal BMI. Mean PASI score was 13.59 ± 8.37; by PASI, 60.6% had severe disease, 20.0% moderate, and 19.4% mild psoriasis. Mean MPV was 8.61 ± 0.69 FL; 33.1% had elevated MPV (>8.9 FL), and 66.9% had normal MPV (≤8.9 FL). Mean duration of illness was 2.17 ± 0.935 months (Table-I & Table-II).

Males had a mean MPV of 8.54 ± 0.69 FL, whereas females had a slightly higher mean of 8.67 ± 0.70 FL; however, this difference was not statistically significant ($p = 0.231$), suggesting that gender may not have a substantial impact on MPV levels in this research cohort. Turning to age, individuals aged <20 years had an MPV of 8.73±0.67 FL; those aged 21–30 years had 8.746±0.70 FL; those aged 31–40 years had 8.67±0.68 FL; and those aged 41–50 years had an MPV of 8.50±0.65 FL. Again, the difference was modest and not statistically significant ($p = 0.732$), indicating no clear association between age group and MPV in this sample.

Regarding illness duration, participants with 1-3 months had an average MPV of 8.60 ± 0.70 FL, whereas those with a duration of >3 months had a lower mean MPV of 8.65 ± 0.62 FL, with no statistically significant difference ($p = 0.758$). Focusing on BMI, participants with a BMI between 18 and 25 had a mean MPV of 8.64 ± 0.68 FL, compared to 8.59 ± 0.70 FL for those with a BMI more than 25. The difference was not statistically significant ($p = 0.655$), indicating that BMI does not significantly affect MPV levels in this group. Lastly, patients with mild illness had a mean MPV of 8.66 ± 0.79 FL, whereas those with severe disease had an average of 8.61 ± 0.66 FL. This difference was also not statistically significant ($p = 0.801$), indicating that MPV may not vary substantially with illness severity in this cohort. (Table III)

Table-I: Frequency Distribution of Demographic and Clinical Variables.

Variable	Groups	n(%)
Age	≤20 Years	8(4.6)
	21-30 Years	52(29.7)
	31-40 Years	76(43.4)
	41-50 Years	39(22.3)
Gender	Male	81 (46.3)
	Female	94 (53.7)
BMI	18–25	66(37.7)
	>25	109 (62.3)
Disease Severity	Mild	34(19.4)
	Moderate	35(20.0)
	Severe	106 (60.6)
MPV Status	Raised(>8.9fL)	58(33.1)
	Normal (≤8.9 fL)	117 (66.9)

Table-II: Mean and Standard Deviation of Quantitative Variables.

Variable	Mean ± SD
Age	33.95 ± 10.01
Duration of Disease (months)	2.17 ± 0.935
BMI	27.05 ± 5.33
PASI Score	13.59 ± 8.37
MPV	8.61 ± 0.69

Table-III: Mean MPV according to various effect modifiers.

Variable	Groups	n	MPV (fL) Mean±SD	P-value*
Gender	Male	81	8.54±0.69	0.231*
	Female	94	8.67±0.70	
Age Group	<20	8	8.73±0.67	0.378*
	21–30	52	8.746±0.70	
	31–40	76	8.67±0.68	
	41–50	39	8.50±0.65	
Duration of Disease	1–3 months	157	8.60±0.70	0.758*
	>3 months	18	8.65±0.62	
BMI	18–25	66	8.64±0.68	0.655*
	>25	109	8.59±0.70	
Disease Severity	Mild	34	8.66±0.79	0.801**
	Moderate	35	8.55±0.70	
	Severe	106	8.61±0.66	

*Independent t test **ANOVA Test

DISCUSSION

Patients with mild illness had a mean MPV of 8.66 ± 0.79 fL, whereas those with severe disease had an average of 8.61 ± 0.66 fL. This difference was also not statistically significant (p = 0.540), indicating that MPV may not vary substantially with illness severity in this sample. The current study aimed to determine the prevalence of elevated mean MPV in individuals with chronic plaque psoriasis in a Pakistani community. Our results showed that 33.1% of patients had elevated MPV values (>8.9 fL), indicating that a significant proportion of patients with psoriasis exhibit enhanced platelet activation. This discovery confirms the opinion of Gasparyan et al., who emphasized platelets' dual function in thrombosis and inflammation, as well as their participation in immunological modulation [8].

Our study found a mean MPV of 8.61 ± 0.69 fL, which is similar to the 8.63 ± 0.67 fL reported in a local study by Aman et al., who also studied MPV in patients with psoriasis from Pakistan[7]. Despite the prevalence of moderate-to-severe psoriasis in the study (PASI >5 in 80.6% of cases), there was no statistically significant relationship between increased MPV and disease severity (p = 0.579). This is in line with the findings of Liu et al., whose comprehensive review and meta-analysis revealed that although MPV is higher in patients with psoriasis than in controls, its association with PASI scores remained weak and inconsistent [2].

However, different outcomes have also been documented. Kılıç et al. found markedly elevated MPV levels in individuals with psoriasis vulgaris and psoriatic arthritis, with a modest yet statistically significant positive association between MPV and PASI scores [9]. Similarly, Li et al., in their PRISMA-compliant meta-analysis, found significantly higher MPV in patients with psoriasis and suggested its use as an additional measure of systemic inflammation [10].

Mean illness duration was 2.17 ± 0.935 months, which may explain the variance in findings. Khatun et al. similarly found higher MPV in psoriasis; however, their subjects had a longer illness duration, which might have allowed systemic inflammatory markers to appear more prominent [11]. Özlü et al. suggest that variations in laboratory equipment and thresholds for defining "raised MPV" may contribute to inter-study discrepancies [12].

Additionally, we found no statistically significant correlations between MPV and clinical or demographic traits, including age, gender, BMI, or length of illness. These results are consistent with those of Sener et al., who found no conclusive link between MPV and factors such as BMI, gender, or CRP in patients with psoriasis [13]. In particular, this lack of relationship may have been due to our strict exclusion of individuals with concomitant conditions,, including diabetes mellitus and cardiovascular disease, which may have reduced confounding.

Further supporting the potential clinical significance of MPV, Conic et al. demonstrated that MPV and red blood cell distribution width could distinguish different cardiovascular endotypes in patients with psoriasis and psoriatic arthritis. This highlights MPV's possible role as a biomarker of cardiovascular risk beyond its relevance to skin disease activity [14]. In a similar vein, Safina Nageen et al. suggested that greater MPV in psoriatic individuals may indicate increased thrombotic risk and a higher inflammatory load [15].

By showing that activated platelets interact with leukocytes and the endothelium to enhance immune responses, Jiang et al. provide a more mechanistic understanding. This interaction leads to systemic issues, including cardiovascular disease, as well as skin irritation [16]. Even in the lack of a significant association with PASI scores, these pathophysiological findings support the idea that MPV may be a useful indicator of systemic inflammatory state.

This study provides useful information from a Pakistani psoriasis cohort, particularly given the paucity of local research on MPV in this population. Our results are strengthened by the use of a validated severity assessment (PASI) and the meticulous exclusion of potential confounders, such as long-term comorbid illnesses. Nevertheless, causal interpretation is intrinsically limited by the cross-sectional design. Additionally, the lack of a control group and the participants' relatively brief illness duration may have obscured potential correlations that would be more apparent in comparative research or with longer disease progression.

CONCLUSION

The present study demonstrates that a considerable proportion (33.1%) of patients with chronic plaque psoriasis had elevated mean platelet volume (MPV >8.9 fL), with an overall mean MPV of 8.61 ± 0.69 fL. This suggests that these patients may have a systemic inflammatory load and increased platelet activation. However, raised MPV did not show a statistically significant correlation with illness severity, age, gender, BMI, or duration. These results imply that while MPV could be a sign of systemic inflammation, it might not accurately represent the severity of psoriasis. Further longitudinal studies with larger cohorts will clarify the clinical relevance of MPV in psoriasis management.

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Pakeeza Amna: Substantial contributions to the conception or design of the work

Muhammad Shahid: The acquisition and analysis of data for the work.

Amara Safdar: Interpretation of data for the work.

M.Hassan Shahid: Drafting the work and reviewing it critically for important intellectual content.