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Mean Platelet Volume in Psoriasis: Is it a New Prognostic Indicator?

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Abstract

Background: **Psoriasis is a chronic multifactorial inflammatory autoimmune disease. It has significant impacts on health and quality of life. Platelets play a major role in the pathogenesis of psoriasis, and the activated platelets increase the migration of leukocytes to the skin, increasing the release of inflammatory cytokines. Recent studies showed that MPV (mean platelet volume) could be used as an indicator of platelet function and activation. Previous studies assessed only the value of MPV in psoriatic patients without studying its relationship with different treatment modalities.** ***Aim:*** **To study the changes in MPV in psoriasis patients and its association with disease severity after treatment with NB-UVB.** ***Patents and Methods:*** **25 psoriatic patients were assessed for MPV and psoriasis area and severity index score (PASI) before treatment, during treatment, and after treatment with NBUVB (three times weekly for 3 months).** ***Results:*** **The relation between MPV and PASI was statistically insignificant before and after treatment. The PASI score was significantly decreased after treatment.** ***Conclusion:*** **This study demonstrated an insignificant correlation between MPV levels and PASI score of psoriatic patients before and after NBUVB phototherapy. Further studies on a larger number of patients are needed to assess the relationship between MPV and psoriasis.**

***Keywords*:** Psoriasis, Mean Platelet Volume, NB-UVB

Introduction

Psoriasis is a chronic inflammatory skin disease occurring at all ages, characterized by the activation of T cells with the release of pro-inflammatory cytokines including tumor necrosis factor-alpha (TNFα), interleukin-1, IL-6, IL-17, IL-22, and IL-36[(1)]. Platelets have an important role in immune responses and inflammatory reactions in psoriasis[(2)]. Various proinflammatory mediators are stored in platelets, such as serotonin, adenosine triphosphate, adenosine diphosphate, cytokines, and chemokines[(3)]. MPV is an indicator of platelet function and activation. MPV values could be changed in a variety of disorders like systemic sclerosis, systemic lupus erythematosus, etc.[(3)]. Phototherapy is one of the lines of treatment that has the highest satisfaction rates in psoriasis improvement[(4)] Narrowband Ultra Violet B (Nb-UVB) is cost-effective and can be safely used in children and pregnancy[(5)]. Thus, this study is conducted to study the change in MPV in psoriatic patients before and after treatment with NB-UVB. To our knowledge, previous studies assessed only MPV in psoriatic patients without studying its relationship with any type of treatment modality.

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Patients and Methods

A prospective analytical study was conducted on 25 psoriatic patients recruited from the Dermatology Outpatient Clinics. This study was performed in compliance with the guidelines of the Helsinki Declaration. Approval was taken from the Research Ethics Committee and the Institutional Review Board. Written informed consent was taken from each patient before enrollment in the study. We recruited patients with chronic plaque psoriasis of both genders with ages above 16 years old. We excluded the followings; any patient who had a current or history of malignancy, autoimmune diseases, metabolic syndrome, cardiovascular disease, inflammatory bowel disease, liver diseases, diabetes, hypertension, or any disease that could alter the hematological parameters, pregnant and lactating patients and patients who received any systemic treatment for psoriasis during the last 2 months and topical treatment during the last 1 month. In this study, all patients were subjected to full history taking and general and detailed dermatological examination. The severity of psoriasis was assessed before and after treatment with Nb-UVB by Psoriasis Area and Severity Index (PASI). The PASI included an assessment of four body areas: head and neck (H), upper limbs (UL), trunk (T), and lower limbs (LL). Within each area, the severity of three signs, erythema (E), thickness/induration (I), and desquamation/scaling (D), is each assessed on a five-point scale: 0, none; 1, mild; 2, moderate; 3, severe; 4, very severe. According to the European consensus, interpretation of PASI is mild if PASI score <10, moderate if PASI score: 10-20 and severe if PASI >20[6].

Assessment of MPV

MPV was measured by an autoanalyzer (Sysmex XT-1800 i).

Phototherapy protocol:

Each patient received treatment in the form of Narrowband ultraviolet B (NBUVB) three times per week. The device used was Waldmann UV 100 L ®. The starting dose was 300 mJ/cm2 and the dose increased by 20% each session if the erythema did not last longer than one day. The treatment continued for 3 months.

Patient assessment

Assessment of MPV and PASI score before treatment, every month and after treatment with NB-UVB for 3 months. Photos were taken using a Canon camera "EOS 2000D, 24.1 MP, 18-55mm DSLR".

Statistical analysis

The statistical analyses of the results were performed using IBM Statistical Package for Social Sciences software (SPSS) version 23.0 for windows (SPSS Inc., Chicago, IL, USA). Normally distributed continuous data were expressed as mean ± standard deviation. Categorical data were displayed as frequency and percentage. Chi-squared test was used to compare the qualitative data expressed as numbers and percentages, wherever compatible. A comparison of numerical variables between the study groups was carried out using the Mann-Whitney U test for independent samples. Student's t-test and ANOVA test were used for normally distributed quantitative variables, to compare between more than two periods or stages. Whereas, the Friedman test was used for abnormally distributed quantitative variables, to compare between more than two periods or stages, and Post Hoc Test (Dunn's) for pairwise comparisons. Pearson coefficient was used to correlate between two normally distributed quantitative variables and Spearman coefficient to correlate between two distributed abnormally quantitative variables. P-values less than 0.05 were considered significant.

Results

25 psoriatic patients were enrolled in our study. 60% of patients were males and 40% were females with a mean age of 45.44 ± 13.62 years, with only one patient with a positive family history. One patient had mild psoriasis, 18 patients had moderate psoriasis and 6 patients had severe psoriasis. 60% of the patients had early onset of disease (before 40 years old) and 40% had late onset and the mean duration of disease was 9.44 ± 8.27. Most of the patients were clinically improved after NB-UVB treatment as shown in "fig.1-3"; also, there was a statistically significant improvement in PASI score after treatment. MPV was in the normal range in all psoriatic patients with no significant difference in MPV before and after treatment "Table 1". There was no statistically significant correlation between PASI score and MPV with the age of patients or the disease duration. In addition, there was no statistically significant relation between MPV and PASI whether before or after treatment "Table 2".

Table 1: PASI score and MPV in psoriatic patients before, during and after treatment with NB-UVB

PASI score	**Before treatment**	**After 1-month treatment**	**After 2-months treatment**	**After 3-months treatment**	**Fr**	**P**
Min.- Max.	3.90-40.40	2.20-32.70	1.40-31.90	9.17-13.10	75.530*	**0.001>***
Mean ± SD	17.91±10.31	13.31±8.54	9.68±8.24	10.46±1.09		
Median (IQR)	16.10 (14.4-29.4)	14.0 (9.4-23.8)	7.30 (5.5-17.5)	10.10 (4.2-12.8)		
Change		↓5.76±4.22	↓10.36±5.51	↓13.99±7.43		
P1		0.005*	<0.001*	<0.001*		
MPV	**Before treatment**	**After 1-month treatment**	**After 2-months treatment**	**After 3-months treatment**	**Fr**	**P**
Min.- Max.	9.17-13.10	7.91-13.20	8.83-12.30	8.12-12.30	0.782	**0.508**
Mean ± SD	10.46±1.09	10.29±1.30	10.70±1.0	10.48±1.32		
Median (IQR)	10.10 (9.55-11.2)	10.30 (9.45-10.7)	10.90 (9.9-11.3)	10.80 (9.45-11.2)		
Change		↓0.18±1.28	↑0.23±1.34	↑0.01±1.62		

*Fr: Friedman test, Sig. bet. periods were done using Post Hoc Test (Dunn's), P:P value for comparing between different periods, P1: P value for comparing between before treatment and each other group, *: statistically significant at p≤0.005.*

Discussion

To date, many markers related to psoriasis have been studied. However, a definite biomarker has not been identified. Because of its complex pathogenesis and its association with other comorbidities such as diabetes mellitus and metabolic syndrome, a conclusion suggesting that psoriasis is a systemic disease has been reached[7]. In previous studies, platelets, and platelet activation markers as MPV have been investigated in psoriatic patients and there are many conflicting results about the correlation of hematologic parameters and psoriasis. In this study, there was no significant difference in MPV before and after treatment, this agrees with a previous study that reported no difference in MPV between psoriasis patients and controls[8].

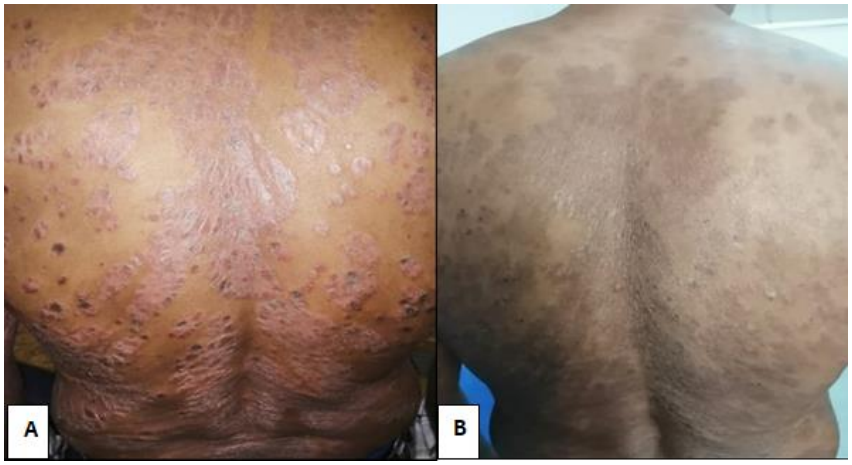

Fig.1. Male patient, 35 y old of 2 years duration showed marked improvement after 36 sessions.

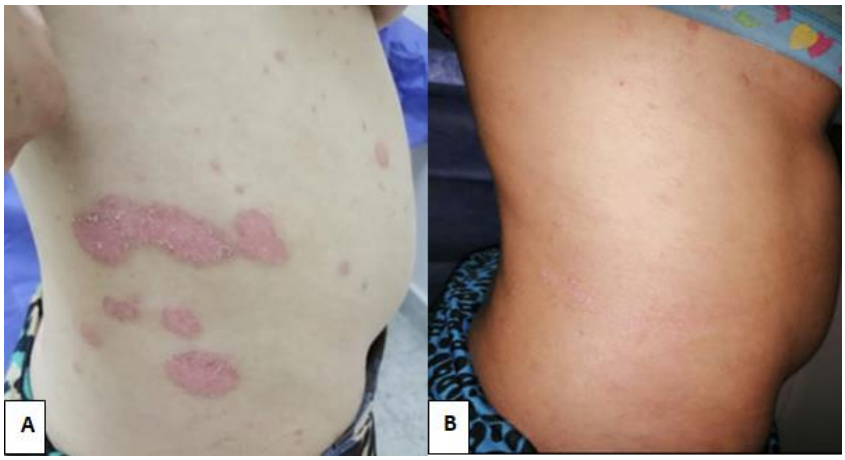

Fig.2. Female patient, 30 y old of 6 months duration showed a marked improvement after 24 sessions.

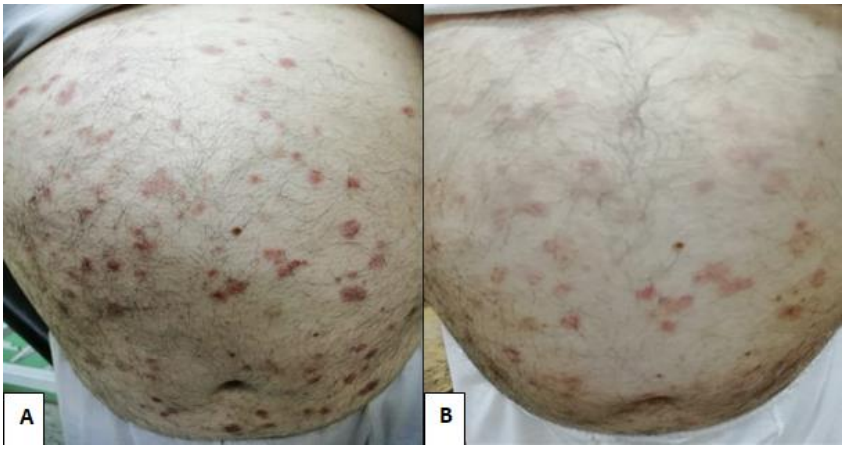

Fig.3. Male patient, 45 y old of 1-year duration showed moderate improvement after 36 sessions.

In contrast to our results, other studies demonstrated that MPV was significantly higher in psoriatic patients than that in controls, and was positively correlated with PASI score[9,10]. Ezgi and colleagues[7] demonstrated that MPV was significantly

higher in patients with psoriasis Vulgaris, suggesting that platelets play an important role in the pathogenesis of psoriasis and may help assess treatment outcomes.

Table 2: Correlation between psoriasis area severity index score and mean platelet volume (n=25)

MPV	PASI score			
	Before		Change	
	P	Rs	P	Rs
Before treatment	0.323	-0.206	0.631	-0.101
After1-month treatment	0.923	-0.020	0.846	-0.041
After 2-months treatment	0.508	-0.139	0.788	-0.057
After 3-months treatment	0.950	0.013	0.789	0.056

Rs: Spearman coefficient change: mean change in PASI or MPV for 3 months Follow-up treatment. P:P value for comparing between different periods.

In addition, Kiliç and his colleagues[11] showed significantly elevated MPV in both psoriatic patients and psoriatic arthritis patients. Unlike the previous results, Raghavan and colleagues[12] concluded that MPV was lower in patients than in controls with a strong positive correlation with the PASI score. In this study, the mean of MPV before treatment was 10.46 and increased to 10.48 after 3 months of treatment. This came in parallel with Ustuner and his colleagues[13] who reported that the mean of MPV at baseline was 9.22 and increased to 9.41 after 3 months of treatment, the increase in MPV associated with a decrease in PASI values that may represent contributing prognostic hematologic parameters to predict clinical progress and treatment response during the first 3 months of treatment. In this study, there was no significant relation between MPV, age, and disease duration before and after treatment. In agreement with these results, Unal and his colleagues[14] reported that MPV had no correlation with age of onset or disease duration. However, Mahrous[15] reported that MPV level was significantly positively correlated with age, disease duration, PASI score. Otherwise, Kim and his colleagues[16] reported no significant correlation between baseline PASI score and age, which came in agreement with our results. We observed that the mean of PASI score before treatment was 17.91 and after 3 months of treatment with was 10.46; showing a statistically significant improvement before and after treatment with NB-UVB. This came in parallel with Polańska and her colleagues[17]. Our study showed that the relation between MPV and PASI was statistically insignificant before and after NB-UVB treatment, to date, the previous studies assessed only the value of MPV in psoriatic patients without studying its relationship with different treatment modalities. To date, all the previous studies investigated the value of MPV in the serum of psoriatic patients without studying its association with the response to treatment.

Conclusion

NB-UVB was an effective and safe line of treatment for psoriasis. This study demonstrated an insignificant correlation between MPV levels and the PASI score of psoriatic patients before and after NBUVB treatment. So MPV could not be used as an indicator of Psoriasis severity. Further studies on a larger number of patients should be done to study the changes in MPV in psoriasis patients and its association with different treatment modalities.

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Conflict of interest: There is no conflict of interest.

Ethical approval: This study was approved by Medical Ethical Committee. Informed consent was taken from each patient before enrollment in the study. The patients in this manuscript have given written informed consent to the publication of their case details."

***Data availability*:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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