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ORIGINAL ARTICLE

Mean Platelet Volume in Patients of Psoriasis in a Tertiary Care Hospital

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ABSTRACT

Objective: To determine mean platelet volume in patients of psoriasis
Study Design: Cross sectional study
Place and duration of study: Dermatology Department, Pak Emirates Military Hospital Rawalpindi from August 2017 to January 2018.
Methodology: Approval from the hospital ethical review committee was taken and a total of 100 patients were enrolled by non-probability consecutive sampling. After an informed written consent, name, gender, age, hospital record number, and phone number of each individual were noted. At the time of enrollment, all the individuals were subjected to complete blood count, bleeding time, fasting blood sugar, fasting lipid profile, renal and liver function tests. Patients with abnormal parameters were excluded from the study. A two ml venous blood sample was drawn from each patient and sent in CP bottle to the laboratory of Armed Forces Institute of Pathology for blood complete analysis by hematology analyzer machine. Data analysis was done using SPSS version 22.
Results: In this study mean age was 40 ± 10.40 years. 54% patients were male and 46% patients were female. Mean platelet volume in patients presenting with psoriasis was 9.10fL with SD ± 2.12.
Conclusion: Our study concludes that the mean platelet volume in patients presenting with psoriasis was 9.10fL with SD ± 2.12 which is in the normal range. Therefore, mean platelet volume is not affected by psoriasis.
Key words: Mean platelet volume, psoriasis, severity, cross-sectional study

INTRODUCTION

Psoriasis is a chronic, inflammatory condition of skin characterized by erythematous, well defined, scaly, indurated plaques presenting predominantly over the extensor surfaces of the body and scalp.[1] It affects about 3.2% of the population.[1,2] The prevalence in India is estimated to be 0.8% [3] but there is paucity of studies from Pakistan. The severity of disease varies from person to person and also waxes and wanes over time in the same individual. Both genetic and environmental influences have been implicated in the etiology and pathogenesis of the disease.[4]

It was once thought to be a disease primarily of the skin but now it is well known that patients with psoriasis experience systemic inflammation leading to increased morbidity and mortality from involvement of internal organ systems.[5] There is an increased risk of cardiovascular events in patients of psoriasis[6] and the risk appears to be greatest in those with severe disease or with psoriatic arthritis.[7] The process of atherosclerosis is accelerated in these patients and carotid intima and media thickness has been found to be increased in psoriasis patients.[8] There is also an increased risk of cerebrovascular accidents, peripheral vascular disease and venous thromboembolism.[9]

The pathogenesis of systemic involvement in psoriasis is complex and involves systemic inflammation.[10] Participation of blood cells such as platelets have been found to play a crucial role. It is a well-known fact that platelet activation and aggregation play an important role in development of atherosclerosis and thromboembolic phenomenon.[11] Mean platelet volume (MPV) is a measure of the average size of the platelets. Various platelet indices such as MPV and Platelet Distribution Width (PDW) are used as markers of activation of platelets. So higher the MPV, the greater the risk of cardiovascular events.[6]

Studies have found MPV to be higher in psoriasis as compared to healthy individuals.[11] Limited studies of this kind have been done in Asia so far. So, we planned to conduct this study in our hospital to determine MPV in patients of psoriasis. MPV is a simple test done in laboratory as a part of complete blood picture. By calculating the MPV, we could be able to determine the risk of cardiovascular complications in patients of psoriasis. If proved, it would open ways for new research in future on preventive measures such as the role of anti-platelet agents in psoriasis.

METHODOLOGY

After taking approval from the hospital ethical review committee, this cross sectional study was carried out at Dermatology Department, Pak Emirates Military Hospital, Rawalpindi over a period of six months from 4th August 2017 to 4th February 2018. The sample size was calculated by using WHO sample size calculator, taking Level of significance 5%, power of test 95%, Population SD =2.10, Population mean = 13.49,[11] Minimum Sample size 'n' = 100. Non-probability consecutive sampling was done. Both male and female patients with chronic plaque psoriasis diagnosed clinically within age range of 30 to 60 years and disease duration equal to or greater than 5 years were included in the study after taking informed consent. Patients with known diabetes mellitus, hypertension, dyslipidemias, obesity (BMI greater than 30 kg/m^2), those with renal or hepatic disease or suffering from malignancy or those who had a recent major surgery or illness in the last three months were excluded from the study. Patients with history of venous thromboembolism, myocardial infarction, cerebrovascular accidents in the past, those with

known platelet abnormalities like idiopathic thrombocytopenic purpura or those on antiplatelet drugs and pregnant and lactating patients were also excluded.

Name, gender, age, serial number, hospital record number, and phone number of each individual were noted on a specially designed proforma. At the time of enrollment, all the individuals were subjected to complete blood count, bleeding time, fasting blood sugar, fasting lipid profile, renal and liver function tests. Patients with abnormal parameters were excluded from the study. A two ml venous blood sample was drawn from each subject and sent in CP bottle to the main pathology laboratory of Armed Forces Institute of Pathology for blood complete analysis by hematology analyzer machine.

All data was entered using software SPSS version 22. Mean, standard deviation was used for age, MPV and duration of disease. Frequencies and percentages were calculated for qualitative data like gender, severity of psoriasis. Effect modifiers like age, gender, duration and severity of psoriasis were controlled by stratification. Post stratification independent sample T test was used to compare the MPV between the two groups. P value ≤0.05 was considered significant.

RESULTS

In this study, age distribution among 100 patients was analyzed. Forty two (42%) patients were in age range 30-45 years while 58(58%) patients were in age range 46-60 years. Mean age was 40 years with SD 10.40.

Analysis of gender distribution among 100 patients showed that 54(54%) patients were male and 46(46%) patients were female.

Table 1: Severity of Psoriasis (n=100)

Severity	Frequency n (%)
Mild (PASI <10)	40 (40%)
Moderate to severe (PASI >10)	60 (60%)
total	100 (100%)

Table 2: Stratification of confounders with respect to mean platelet volume (n=100)

Cofounders	Stratification	Frequency n (%)	Mean platelet volume: Mean ± SD	p-value
Age (in years)	30-45	42 (42%)	9.05 ± 2.02	0.8007
	46-60	58 (58%)	9.16 ± 2.23	
Gender	Male	54 (54%)	9.11 ± 2.10	0.9629
	Female	46 (46%)	9.13 ± 2.18	
Duration (in years)	5-10	38 (38%)	9.08 ± 2.09	0.9901
	11-15	62 (62%)	9.12 ± 2.16	
Severity	Mild (PASI <10)	40 (40%)	9.09 ± 2.10	0.9630
	Moderate to severe (PASI >10)	60 (60%)	9.11 ± 2.11	

Independent sample T-test was used to calculate p-values

38(38%) patients were found to have duration of disease ranging from 5-10 years while 62(62%) patients had prolonged disease between 11-15 years. Mean duration of disease was 12 years with SD 8.934.

Severity of psoriasis (based on PASI calculation) was analyzed in a similar manner and 40(40%) patients were found to have mild psoriasis (PASI <10) while **6**0(60%) patients had moderate to severe psoriasis (PASI >10) as shown in Table 1.

Mean platelet volume of 100 patients as calculated by hematology analyzer machine was recorded. Mean of MPV was found to be 9.10 with SD ± 2.12.

Stratification of mean platelet volume with age, gender, duration of disease and severity of psoriasis is given in Table 2.

DISCUSSION

Despite psoriasis being commonly known as a skin disease, recently a lot of interest has been generated due to its association with systemic diseases such as arthritis, diabetes, atherosclerosis and the metabolic syndrome and it has been labelled as a systemic inflammatory disease.[12,13] A number of cardiovascular complications have been reported in patients of psoriasis due to systemic inflammatory pathways.[14,15] Platelet indices such as MPV and Platelet Distribution Width (PDW) are indicators of activation of platelets. The risk of cardiovascular events rises with an increase in MPV. Therefore, it is important to study MPV in patients of psoriasis.

Our study showed that the mean age was 40 ± 10.40 years. A systematic review conducted by Iskandar et al on the incidence and prevalence of psoriasis by age and gender, stated that the available studies showed a bimodal pattern of age with the first peak at 30 to 39 years and the second at 60 to 69 years.[16] We missed the second peak in our study as we did not include patients greater than 60 years of age in our study. Such patients were not enrolled to minimize the bias from increased risk of cardiovascular diseases due to factors other than psoriasis which are prevalent in that age.

In our study, 54% patients were male and 46% patients were females. This is in accordance with the previous studies which show that the gender distribution in psoriasis is either equal[2] or there is slight male predominance.[16]

Mean of MPV in patients presenting with psoriasis was 9.10 fl with SD ± 2.12. This falls in the normal range which has been defined as 7.5 to 12.0 fl by Korniluk et al in their review on MPV.[17] In addition, there was no positive correlation between Psoriasis Area Severity Index (PASI) and MPV. When psoriasis patients were grouped into mild psoriasis (PASI<10) which accounted for 40% of the patients and moderate to severe psoriasis (PASI≥10) which included 60% of the patients in our study, the MPV of the latter group was not significantly elevated. A latest study by An et al showed that MPV was not affected by psoriasis which confirms the results of our study and it also showed that MPV remained the same before treatment and at 4 months after treatment with secukinumab.[18] However, Fan et al, in their recent review on platelet dysfunction in psoriasis, found that MPV was significantly raised in patients with psoriasis as compared

to the control groups.[19] This was contradictory to our results.

Chandrashekar L et al.[11] showed that MPV was significantly higher in psoriasis (13.49±2.10 fl) as compared to healthy subjects (10.46± 1.70 fl) which was contrary to the results of our study.

Kilic et al.[20] included 116 patients with psoriatic arthritis (68 female, 48 male), 41 patients with chronic plaque psoriasis (19 female, 22 male), and 90 participants in the control group (55 female, 35 male). Data on the patients' demographics and disease duration, as well as their PASI scores, were analysed retrospectively. Mean platelet volume levels were considerably larger in the psoriasis vulgaris and the psoriatic arthritis groups, respectively, compared to the control group. According to the correlation study (r = 0.165; p = 0.046), there was a weak statistically positive association between the PASI and the MPV.

As previously documented in another study, platelet distribution width and MPV were larger in patients with psoriasis than controls. A favourable association was also found between the MPV and the Psoriasis Severity Index. The MPV of patients with moderate to severe psoriasis (PASI 10) was substantially higher than that of those with mild psoriasis (PASI 10). While patients with greater MPV levels did not show a higher PASI than those with lower MPV levels (MPV 10.4 fl), the difference was not statistically significant. After various treatments for psoriasis improved their condition, MPV levels dropped dramatically. Both MPV and PASI variants showed a strong connection.[21]

MPV data were gathered from the psoriasis vulgaris group (group 1) and the control group in another study by Canpolat F. et al.22 (group 2). Group 1 and 2's clinical characteristics and PASI scores were also documented. Patient's MPV was 8.7 +/- 0.9 fl greater than that of control participants, which was statistically insignificant (p = 0.01). For individuals with arthritis (9.5 +/- 0.8) and without (8.0 +/- 0.7) arthritis, there was statistically significant difference in the MPV levels. Psoriasis area and severity index score were favourably connected with MPV levels (p = 0.000, r = +0.735). Patients with higher levels of MPV (p = 0.01) were found to have longer disease durations (r = 0.512). Patients with psoriasis and psoriatic arthritis have elevated levels of MPV. The severity of psoriasis may be indicated by the level of MPV.

In another study conducted by Ahmad Z et al.[23] a total of 60 subjects, 30 patients with psoriasis and 30 healthy individuals participated in the study. Out of the 30 patients of psoriasis, the mean age was 40.23+10.40 years, the minimum age was 21 and maximum was 56 years. For the control group, the mean age of the healthy individuals was 35.20±9.73 years. The minimum age was 22 and maximum was 58 years. Out of 30 patients in the case group, 16 (53.3%) were males and 14 (46.7%) were females. In the control group, out of 30 individuals, 17 (56.7%) were males and 13 (43.3%) were females. It was found that MPV was higher in the subjects with psoriasis as compared to the healthy individuals. The mean value of MPV in psoriasis patients of case group was 8.24±1.22 fl. The mean MPV in healthy individuals of the control group was 7.29±0.77 fl. Comparison of means was done by using independent sample t-test. A significant difference in means (P=0.001) was found in the two groups.

In most of the studies mentioned above the mean of MPV of both the cases (psoriasis patients) and control groups (healthy controls) is falling in normal range according to reference values (7.5-12.0 fl) but they have considered the results of case group significant as they were higher than the control group.

The limitation of our study was that there was no control group. However, we will consider our results important as MPV of psoriasis patients in our study is falling in normal range.

CONCLUSION

Our study concludes that the Mean platelet volume in patients presenting with psoriasis was 9.10 fl with SD ± 2.12 which is in the normal range. Therefore, MPV is not affected by psoriasis. Moreover in our study MPV remains unchanged by disease parameters like severity and duration of the disease which means that MPV is normal even in prolonged and severe disease.

Additional researches are recommended with larger sample size and control group to study MPV in patients of psoriasis further.

REFERENCES

1. Elmets CA, Korman NJ, Prater EF, Wong EB, Rupani RN, Kivelevitch D, et al. Joint AAD–NPF Guidelines of care for the management and treatment of psoriasis with topical therapy and alternative medicine modalities for psoriasis severity measures. J Am Acad Dermatol. 2021; 84(2):432-70. https://doi.org/10.1016/j.jaad.2020.07.087
2. Mehrmal S, Uppal P, Nedley N, Giesey RL, Delost GR. The global, regional, and national burden of psoriasis in 195 countries and territories, 1990 to 2017: a systematic analysis from the Global Burden of Disease Study 2017. J Am Acad Dermatol. 2021;84(1):46-52. https://doi.org/10.1016/j.jaad.2020.04.139
3. Midde HS, Priyadarssini M, Rajappa M, Munisamy M, Mohan Raj PS, Singh S, et al. Interleukin-9 serves as a key link between systemic inflammation and angiogenesis in psoriasis. Clin Exp Dermatol. 2021;46(1):50-7. doi:10.1111/ced.14335
4. Nussbaum L, Chen YL, Ogg GS. Role of regulatory T cells in psoriasis pathogenesis and treatment. Br J Dermatol. 2021;184(1):14-24. https://doi.org/10.1111/bjd.19380
5. Krueger JG, Brunner PM. Interleukin-17 alters the biology of many cell types involved in the genesis of psoriasis, systemic inflammation and associated comorbidities. Exp Dermatol. 2018;27(2):115-23.
6. Conic RR, Damiani G, Schrom KP, Ramser AE, Zheng C, Xu R, et al. Psoriasis and psoriatic arthritis cardiovascular disease endotypes identified by red blood cell distribution width and mean platelet volume. J clin med. 2020;9(1):186. https://doi.org/10.3390/jcm9010186
7. Ozkan SG,Yazisiz H,Behlul A,Gokbelen YA, Borlu F,Yazisiz V et al. Prevalence of metabolic syndrome and degree of cardiovascular disease risk in patients with Psoriatic arthritis.Eur J Rheumatol.2017;4:40-45.
8. Raaby L, Ahlehoff O, deThurah A. Psoriasis and cardiovascular events: updating the evidence. Arch Dermatol Res. 2017;309:225-8.
9. Kwa MC, Silverberg JI. Association between inflammatory skin disease and cardiovascular and cerebrovascular co-

morbidities in US adults: analysis of nationwide inpatient sample data. Am J Clin Dermatol. 2017 Dec 1;18(6):813-23.
10. Christophers E, van de Kerkhof PC. Severity, heterogeneity and systemic inflammation in psoriasis. J Eur Acad Dermatol Venereol. 2019 Apr;33(4):643-7.
11. Chandrashekar L, Rajappa M, Revathy G, Sundar I, Munisamy M, Ananthanarayanan PH et al. Is enhanced platelet activation the missing link leading to increased cardiovascular risk in psoriasis? Clin Chim Acta. 2015; 446:181-5.
12. Ghoreschi K, Balato A, Enerbäck C, Sabat R. Therapeutics targeting the IL-23 and IL-17 pathway in psoriasis. The Lancet. 2021; 397(10275): 754-766. https://doi.org/10.1016/S0140-6736(21)00184-7
13. Wang WM, Wu C, Gao YM, Li F, Yu XL, Jin HZ. Neutrophil to lymphocyte ratio, platelet to lymphocyte ratio, and other hematological parameters in psoriasis patients. BMC immunol. 2021; 22(1):1-7.
14. Rendon A, Schäkel K. Psoriasis pathogenesis and treatment. Int J Mol Sci. 2019; 20(6):1475.
15. Hawkes JE, Chan TC, Krueger JG. Psoriasis pathogenesis and the development of novel targeted immune therapies. J Allergy Clin Immunol. 2017 Sep 1;140(3):645-53.
16. Iskandar IY, Parisi R, Griffiths CE, Ashcroft DM, Global Psoriasis Atlas. Systematic review examining changes over time and variation in the incidence and prevalence of psoriasis by age and gender. Br J Dermatol. 2021;184(2):243-58. https://doi.org/10.1016/S0140-6736(21)00184-7
17. Korniluk A, Koper-Lenkiewicz OM, Kamińska J, Kemona H, Dymicka-Piekarska V. Mean platelet volume (MPV): new perspectives for an old marker in the course and prognosis of inflammatory conditions. Mediators Inflamm. 2019; Article ID 9213074, 14 pages, 2019. https://doi.org/10.1155/2019/9213074
18. An İ, Aksoy M, Ayhan E, Ozturk M. The effect of secukinumab treatment on inflammatory parameters in patients with psoriasis: A multicentre restrospective study. Intl J Clin Pract. 2021;75(6):e14114. https://doi.org/10.1111/ijcp.14114
19. Fan Z, Wang L, Jiang H, Lin Y, Wang Z. Platelet dysfunction and its role in the pathogenesis of psoriasis. Dermatology. 2021;237(1):56-65. https://doi.org/10.1159/000505536
20. Kilic et al. Association between mean platelet volume and disease severity in patients with psoriasis and psoriatic arthritis. Postepy Dermatol Alergol. 2017 Apr;34(2):126-130.
21. Kim DS, Lee J, Kim SH, Kim SM, Lee MG. Mean platelet volume is elevated in patients with psoriasis vulgaris. Yonsei Med J. 2015 May;56(3):712-8.
22. Canpolat F, Akpinar H, Eski. Mean platelet volume in psoriasis and psoriatic arthritis. Clin Rheumatol 2010 Mar;29(3):325-8.
Ahmad Z, Akhtar SJ, Maan MA, Khalid U, Hussain A. Comparison of mean platelet volume in patients with psoriasis and healthy individuals. J Pak Ass Dermatol.2017;24(1):4-7