ORIGINAL ARTICLE

Mean Platelet Volume (MPV): Usefulness in Ulcerative Colitis

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ABSTRACT

Background: Ulcerative colitis (UC) is a chronic inflammatory bowel disease of unknown cause. The clinical course is characterized by exacerbations and remissions.
Aim: To assess mean platelet volume as a non invasive and cost-effective biomarker of disease activity.
Methods: It was a cross sectional study.180 patients of UC from Jinnah hospital Lahore were enrolled and their mean platelet volume was measured.
Results: From 180 patients, the minimum age was 15 years and maximum age was 56 years with mean±standard deviation as 36.71±12.42 years. The minimum duration of ulcerative colitis was 2 months and maximum duration was 6 months with mean±standard deviation as 4.00±1.42 months The minimum mean platelet volume was 7.06 $f1^3$ and maximum age was 9.50$f1^3$ with mean±standard deviation as 8.49±65 $f1^3$. There were 51.7% male patients and 48.3% females. 62.8% patients had active phase whereas 37.2% patients had remission phase. By using independent sample t-test, there was significant difference between phase of ulcerative and mean platelet volume.
Conclusion: Mean platelet volume was significantly lower in patients with active phase than in remission phase of disease. Thus, MPV can be used as a cost effective and non invasive biomarker for monitoring disease activity.
Keywords: Ulcerative Colitis, Active and Remission Phase, MPV.

INTRODUCTION

Ulcerative colitis (UC) is a chronic inflammatory bowel disease (IBD) of unknown cause. It has insidious onset usually, but it can start abruptly and sometimes even present as fulminant disease affecting mucosa of large bowel[1]. The clinical course is characterized by exacerbations and spontaneous or therapeutically-induced remissions[1,2,3]. Age of onset follows a bimodal pattern[4]. It peaks at 15-25 years and a smaller one at 55-65 years, although the disease can occur in people of any age[5]. Cytokines are important in the pathogenesis of IBDs and their therapeutic manipulation has helped successfully in reducing disease severity and maintaining remission[6]. It was seen that about 44% of the patients presenting with bloody diarrhea in Pakistan had ulcerative colitis diagnosed by biopsy as underlying cause[7].

Definitive diagnosis of ulcerative colitis (UC) is usually based on colonoscopy which is an invasive procedure. The search for a non-invasive biomarker that indicates the activity of disease, prognosis and response to therapy has been a focus for long time[8].

The main function of Platelets is homeostasis but recent studies have shown that they also have an important role in inflammation[9,10,11]. In case of an inflammatory reaction platelets undergo structural modification and secrete various cytokines which causes a decrease in mean platelet volume[12]. Studies have been conducted on platelet indices as marker of in inflammatory bowel disease but the results of these are inconclusive[13,14].

In this study we investigated mean platelet volume (MPV) in patients with UC. Rationale of this study was to determine the mean platelet volume and to compare it among patients with active versus remission phase of ulcerative colitis. To the best of our knowledge, literature regarding the derangement of platelet indices in ulcerative colitis is quite variable and inconsistent with no local literature available so far. Thus this study will bridge this gap and will give information to the clinicians regarding the changes in platelet indices in patients with ulcerative colitis and its relation with the disease activity status. This will give baseline information to do further research regarding use of platelet indices in the management and follow up of the disease through a non-invasive, simple and cost effective hematological test. It will decrease the morbidity and financial burden on patients in already resource limited health care setup of Pakistan.

MATERIAL AND METHODS

It was a cross sectional study which was conducted from 19-10-2015 to 19-04-2016.180 patients of ulcerative colitis presenting to the medical and surgical units of Jinnah hospital Lahore and fulfilling the selection criteria were approached. Informed consent was taken from patients before enrolling in the study. Information regarding the study variable was obtained by the researcher and was noted in the Performa. 3 ml of blood was taken in a EDTA anticoagulant vial under aseptic measure. Samples were taken to the Allama Iqbal Medical College laboratory for measurement of mean platelet volume by automated analyzer (KX-21). Data was entered and analyzed using SPSS version 17.0. Numerical variables i.e. age, platelet volume were summarized as mean and standard deviation. Qualitative variables like sex and disease status (active and remission phase) were presented in the form of frequency and percentages. Comparison of mean platelet volume was done among patients in active and remission phase of ulcerative colitis and student's t test was applied to check statistical significance. P-value <0.05 was used as statistically significant.

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RESULTS

From one hundred and eighty patients it was observed that the minimum age was 15 years and maximum age was 56 years with mean±standard deviation as 36.71±12.42 years. The minimum duration of ulcerative colitis was 2 months and maximum duration was 6 months with mean±standard deviation as 4.00±1.42 months. The minimum mean platelet volume was 7.06 fl^3 and maximum was 9.50fl^3 with mean±standard deviation as 8.49±.65 fl^3. There were 93(51.7%) male patients and 87 (48.3%) female patients. Active phase was found in 113 (62.8%) patients whereas remission phase was found in 67(37.2%) patients.

By using independent sample t-test, it was found that there was significant difference between phase of ulcerative and mean platelet volume having p-value as 0.000.Thus MPV is reduced in active phase than in remission phase of UC.

Table 1: Descriptive Statistics (n=180)

	Min.	Max.	Mean	Std. Deviation
Age (years)	15	56	36.71	12.42
Duration of Ulcerative colitis (months)	2	6	4.00	1.42
MPV (fl^3)	7.06	9.50	8.49	0.65

Table.2 Frequency and Percentage of Gender

Gender	Frequency	%age
Male		51.7
Female	87	48.3
Total	180	100.0

Table.3 Frequency and Percentage of Phase of Ulcerative Colitis

	Frequency	%age
Active Phase	113	62.8
Remission Phase	67	37.2
Total	180	100.0

Table.4 Comparison of MPV and phase of ulcerative colitis

Phase of Ulcerative colitis	n	MPV Mean ± Std. Deviation
Active Phase	113	8.32 ± 0.57
Remission Phase	67	8.77 ± 0.67

P value=0.000

DISCUSSION

In this study we investigated the MPV in patients with ulcerative colitis. UC is an inflammatory bowel disease. Its clinical course is characterized by remissions and relapses which may develop spontaneously or maybe drug induced. Early diagnosis and prompt treatment of disease are important steps for reducing morbidity and mortality[15]. Biopsy followed by histology remained the basic tool for determining the phase of the disease and further its management. The previous studies showed different serological markers have an important correlation with inflammatory bowel disease[16,7] and are useful in its diagnosis and monitoring response to therapy. Some of the markers that are associated with disease activity are CRP, ESR, antineutrophil cytoplasmic antibody (ANCA), anti-Saccharomyces cerevisiae antibody (ASCA), and antipancreatic antibody (PAB), mean platelet volume (MPV), fecal calprotectin[8,18-23], but each marker has its own limitations. MPV is a measurement of the size of platelets. MPV is associated with platelet function and its activation. We studied mean platelets volume as a marker for disease activity as it is widely available, non invasive and cost effective as compared to histology.

In our study we showed that MPV levels are significantly associated with active and remission phase of ulcerative colitis. In our study population of 180 patients with ulcerative colitis , MPV is reduced in active phase as compared to remission phase. It highlights the reliability of this simple non invasive marker that can be used instead of invasive procedures for determining the disease activity. These results are consistent with the some of the previous studies as well.

In a study conducted by Ozturk ZA, et al[24], "Could platelet indices be new biomarkers for inflammatory bowel" showed MPV is reduced in patients with ulcerative colitis patients(8.29+/-1.02fL) when compared with healthy controls (8.65+/-0.79fL) .Further they showed, MPV of active UC (8.06+/-1.19fL) patients were significantly lower than that of inactive UC (8.45+/-0.87 fL).

In another study by Yuksel et al, "An overlooked indicator of disease activity in ulcerative colitis: mean platelet volume"[25] statistically significant decrease in MPV was noted in patients with UC (8.29 +/-1.02 fL) compared with healthy controls (8.65 +/- 0.79fL). MPV of active UC (8.06 +/- 1.19 fL) patients were significantly lower than that of inactive UC (8.45+/-0.87fL).

Another study by Poliska et al[26] has also shown that MPV is reduced in active phase of ulcerative colitis as compared to remission phase of the disease. Similar results were given by some other studies[27].

However a study by Tayyibe Saler et al[28], did not show any significant difference among MPV of active and inactive inflammatory bowel disease patients. But there are some limitations in that study. First, it would have been more beneficial if the sample size had been larger. Second, it was a retrospective study. The result of a prospective study with larger sample size may be more useful.

CONCLUSION

In conclusion, new serological biomarkers are needed and should be used for predicting disease activity in many inflammatory diseases. Chronic inflammation in ulcerative colitis leads to significant changes in number and morphology of platelets. Being a cost effective and easily available marker, studies have focused special emphasis on MPV[29]. Although few studies show that MPV does not change in inflammation, it is still proved as a valid biomarker for follow up in cases of inflammatory bowel disease. According to the results of our study, we suggest the use of MPV as a non invasive biomarker in determination disease activity for ulcerative colitis.

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