Mean Platelet Volume as an inflammatory marker in Cholecystitis : A prospective study at a tertiary care hospital

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ABSTRACT

Background: Inflammatory disease of the gallbladder is called cholecystitis. Platelets plays a key role in both vascular and inflammatory diseases.Mean platelet volume (MPV) value is proposed to be an indicator of inflammation.

Objective : To evaluate MPV values in patients with acute and chronic cholecystitis

Materials & Methods: The present study is a prospective study conducted between April2015 to April 2016 in a tertiary care rural hospital . All gallbladder specimens received after cholecystectomy surgery were submitted to detail gross and microscopic examination. MPV values were collected preoperatively from routine Complete Blood Picture report in PENTRA 60 HORIBA haematology analyzer on that same day. Statistical analysis was done using MS Excel and SPSS software.

Results: In the present study samples from 24 acute cholecystitis patients, 28 chronic cholecystitis patients and 30 healthy controls were analysed for MPV and WBC counts. MPV values were detected as 6.6±0.2 in acute cholecystitis group, 8.5±0.2 in chronic cholecystitis group, and 8.5±0.3 in control group.

Conclusion: Values of MPV are variable and individuals with AcuteCholecystitis are having low MPV values when compared with Chronic cholecystitis individuals and controls respectively.

Keywords: Mean platelet volume, White blood cell counts, Inflammatory markers , Cholecystitis

INTRODUCTION

Cholecystitis is an inflammatory disease of the gallbladder. It is usually associated with impacted gallstone in either neck or cystic duct and may precipitate acute or chronic cholecystitis[1].It is a clinical emergenc,y the diagnosis usually made by ultrasound[2].Inflammatory marker such as White blood cell (WBC) counts helps to support the diagnosis[3].

Platelets play a key role in inflammatory diseases [4,5]. Mean platelet volume (MPV) value is indicator of platelet function and activation[6]. MPV is a machine calculated mean thrombocyte volume. Being an inexpensive and easily generated by automated blood count analyzeras part of complete blood count (CBC) test, present study is focusing on MPV as another inflammatory marker to diagnose cholecystitis[3]. MPV has diagnostic role in many other inflammatory conditions like celiac disease, ulcerative colitis and rheumatoid arthritis[3,7-11]. However there are limitedstudies that have investigated MPV changes in acute and chronic cholecystitis[1].

In the present study, our aim is to evaluate MPV values in patients with acute and chronic cholecystitis to see whether it will provide additional benefit in the diagnosis.

METHODS & MATERIALS

This is a prospective study conducted between April2015 to April 2016 in a tertiary care rural hospital . All cases clinically diagnosed as Cholecystitis, subject cholecystectomy during the said period were included in the study. Individuals with a history of coronary or cerebrovascular events and patients on anticoagulants or non-steroidal anti-inflammatory medications were excluded. Gallbladder specimens after surgery were sent for histopathological examination. All cholecystectomy specimens received are submitted to detailed gross and microscopy examination after routine processing followed by haematoxylin and eosin stain. The values of MPV of these patients from routine pre-operativeComplete Blood Picture (CBP) report on PENTRA ES 60 HORIBA that same day. Reference range value for MPV according to local calibration from our hospital laboratory was 8-11 fl. Histopathology and haematology was routinely performed in all the cases included in the study.

RESULTS

In the present study 52 patients were included all age groups of both sexes.Samples from 24 acute cholecystitis

patients, 28 chronic cholecystitis patients and 30 healthy controls were analysed for MPV and WBC counts. There were 8 male and 16 females with acute cholecystitisand 10 males and 18 females with chronic cholecystitis, whereas 15 females and 15 males in healthy controls.

In the present study, the age ranged from 43 to 76 years. The acute cholecystitis group consisted of 24 patients (8 males and 16 females) with mean age of 55.75 ± 7.69 years. The chronic cholecystitis group consisted of 28 patients (10 male and 18 female) with mean age of 57.32±6.07. The control group consisted of 30 healthy individuals (15females ad 15 males) with mean age of 54.56±7.46. There was no significant difference between the groups regarding age distribution.(Table-1)

Table1: Comparison of groups regarding Demographic variables

	Mean± SD	Male	Female
CONTROL (n=30)	54.56±7.46	15	15
ACUTE CHOLECYSTITIS (n=24)	55.75±7.69	08	16
CHRONIC CHOLE-CYSTITIS (n=28)	57.32±6.07	10	18

WBC and MPV results of all groups included. MPV values were detected as 6.6±0.2fl in acute cholecystitis group, 8.5±0.2fl in chronic cholecystitis group, and 8.5±0.3fl in control group. When MPV value was assessed among groups , found to be significantly lower in acute cholecystitis group (p< 0.001).Mean white blood count (WBC) values were 14.05±6.43 × 10^3/µl in patients with acute cholecystitis ,8.68±4.99× 10^3/µl in chronic cholecystitis patients and 7.05±9.79× 10^3/µl in control group(Table-2).As expected, WBC counts were found to be significantly higher in patients in acute cholecystitis group than those in patients in chronic cholecystitis and control groups (P< 0.001)

Table 2:Comparision of groups regarding WBC and MPV

Sl.No.	Acute cholecystitis	Chronic Cholecystitis	Controls	P value
MPV	6.6±0.2	8.5±0.2	8.5±0.3	<0.001
WBC	14.05±6.43	8.68±4.99	7.05±9.79	<0.001

Table 3: Relationship between MPV and WBC

Sl.No.	Variable	Mean± SD	Correlation Coefficient	P value
1	MPV	7.9±0.9	-0.910	<0.001
2	WBC	9660.77±3018.32		

In our study, correlation was found between MPV value and results of WBC. In other words, It was found that as MPV value decreased WBC count value increased(Table-3).

DISCUSSION

Our aim is to evaluate the values of MPV in the diagnosis of acute and chronic cholecystitis. Cholecystitis is inflammatory disease of the gallbladder. Acute cholecystitis an acute inflammatory disease of gallbladder with abrupt onset within hours where as chronic cholecystitis is a prolonged inflammatory process[1,12].

The diagnosis of cholecystitis is based on clinical signs, laboratory findings and ultrasonography. The Murphy's sign is helpful as local inflammatory sign, where as systemic inflammatory signs include elevated CRP (C-Reactive Protien) ,ESR (Erythrocyte Sedimentation Rate)and WBC[13]. Ultrasonography is the initial most important imaging method in the diagnosis when cholecystitis was clinically suspected[1].

Laboratory parameters such as ESR and CRP are also used as inflammatory markers to support the diagnosis[14,15]. However ESR varies with age and sex.CRP has similar disadvantages like ESR and also it begins to raise only after 48 hours of the disease onset. Acute cholecystitisis an emergency situation needs an early inflammatory marker to support the diagnosis[16-18].

Recent studies shows there is association between MPV and inflammation[19-21]. MPV is one of the most widely used surrogate maker of platelet activation and it is easily measured in CBC analysis[3].The primary function of platelets is haemostasis in addition platelets has role in inflammatory process.Conflicting results exist in the literature that links to both increased and decreased MPV to inflammation. Decreased MPV seen in high grade inflammatory conditions where as increased MPV seen in low grade inflammatory conditions such as chronic diseases[22]. High grade inflammatory conditions like Rheumatoid arthritis, ankylosing spondylitis, crohn's and ulcerative colitis showing decrease MPV. [10,11,23,24]

In present study WBC counts were higher in patients with acute and chronic cholecystitis. In fact an increase in WBC counts are considered to be in parallel to the increase in the severity of inflammation .MPV values were significantly lower in patients with acute cholecystitis. There is no significant difference between patients with chronic cholecystitis and healthy controls. A negative correlation is observed between WBC and MPV values.

Sayit et al compared MPV levels in acute cholecystitis patients and control group. The statistical significant declined MPV value in acute cholecystitis patients observed in the present study is in accordance with findings of Sayit et al[25].

Sekar et al analysed MPV value in 33 patients with acute cholecystitis, 32 patients with chronic cholecystitis and 28 healthy individuals.In acute cholecystitis group MPV values were significantly lower when compared to those in chronic cholecystitis and control group($p<0.05$). The sample size was almost similar between our study and Sekar et al. The present study is in accordance with findings of Sekar et al[1]. There are also studies showing inconsistent results between MPV and inflammation. It should be emphasized that they are very limited studies on cholecystitis.

Two theories have been proposed in literature as explanation for decrease in MPV in inflammation. In the first theory decrease in MPV results from increased consumption of platelets in inflammatory disease[26].The second theory proposes that interleukin-6 causes a decrease in MPV value in reducing platelet production[7,10,22,24]. Therefore the physician can take MPV into account when there is a clinical suspicion of acute cholecystitis.

CONCLUSION

Our study shows a decline of MPV in acute cholecystitis in contrast to the MPV in patients with chronic cholecystitis. When compared with other markers MPV is inexpensive, feasible and better inflammatory marker in not only supporting the diagnosis acute cholecystitis but also differentiating it from chronic cholecystitis . Further large sample studies are expected to investigate the real diversity between acute and chronic cholecystitis.

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