EVALUATION OF MEAN PLATELET VOLUME LEVEL AS A BIOMARKER IN ACUTE APPENDICITIS IN CHILDREN AND ADOLESCENT: A RETROSPECTIVE STUDY

ASHISH JAWARKAR1*, HIREN VAGHELA4*, KETAN MANGUKIYA2*
1Department of Pathology, Parul Institute of Medical Science and Research, Parul University, Vadodara, Gujarat, India. 2Department of Biochemistry, Kiran Medical College, Surat, Gujarat, India.
*Corresponding author: Ashish Jawarkar; Email: pathology2222@gmail.com
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ABSTRACT

Objective: This study aims to investigate the diagnostic value of mean platelet volume (MPV) in early diagnosis of acute appendicitis cases in children and adolescents.

Methods: 50 patients with the age of ≤20 years were chosen retrospectively from the case files of the patients admitted to the hospital between May 2021 and May 2022 in whom the definite diagnosis of acute appendicitis was confirmed with postoperative pathological examination. This group was labeled as case group. The control group consists of 50 patients with the age of ≤20 years who came for the regular health checkups at our institute. All blood samples were analyzed for complete blood count that includes MPV also in a fully automated 6-part hematology cell counter. These data of both the groups were analyzed statically to calculate p value using the online Student’s t-test calculator. The value p<0.05 is considered to be statistically significant.

Results: Majority of acute Appendicitis cases (n=30, 60%) belong to 16–20 years, followed by 24% in 11–15-year-age group. The mean age was 14.96±2.75 years. According to gender, 66% (n=33) were male. The mean platelet count in the case of group was 3.10±0.5 Lakhs/ml whereas in the case of Group was 2.86±0.7 lakhs/mL. There was no statistically significant difference among the group with respect to platelet count (p=0.188 >0.05) The MPV in the case of case Group was 7.92±0.3 fl whereas in the case of the control group was 8.62±0.4 fl. There was a statistically significant difference among the in terms of MPV (p=0.04 <0.05).

Conclusion: The diagnosis of acute appendicitis in children and adolescents is aided by a decrease in MPV. The rate of negative appendectomy in children and adolescents with suspected acute appendicitis may decrease if the clinician pays attention to the MPV (which is determined routinely as a part of automated count) alongside other parameters and clinical evaluations.

Keywords: Acute appendicitis, MPV, Platelet.

INTRODUCTION

A rapid identification of acute appendicitis, a common surgical illness of the abdomen, results in a significant drop in morbidity and death [1,2]. Acute appendicitis is typically diagnosed based on a brief history of stomach pain, nausea, pain that has moved to the right iliac fossa, and evidence of local peritonitis. Diagnostic accuracy based on these symptoms ranges from 70% to 80% [3]. As a result, diagnostic mistakes are frequent, leading to a median incidence of perforation of 20% and a range of 2–30% for negative laparotomies [1].

During normal blood counts, automatic blood count equipment calculates and provides a metric called mean platelet volume (MPV). MPV may be a sign of platelet activation, despite the fact that doctors rarely take it into account because big platelets are more reactive, release more prothrombotic factors, and aggregate more readily [4]. Since the 1970s, researchers have been examining how MPV affects thrombocyte activation and function [5]. Acute ischemic stroke, acute myocardial infarction, and pulmonary thromboembolism are examples of ischemic diseases, as are infectious endocarditis, helicobacter pylori gastritis, Behcet disease, ulcerative colitis (UC), rheumatoid arthritis, psoriatic arthritis, and Henoch-Schönlein purpura progressing with inflammation [6,7].

The aim of this study is the investigation of the diagnostic value of MPV in the early diagnosis of acute appendicitis cases in the pediatric age group.

METHODS

From May 2021 to May 2022, this retrospective study was carried out at the Parul Sevashram Hospital's Department of Pathology, Parul Institute of Medical Science and Research, Vadodara, Gujarat.

Fifty individuals under the age of 20 years were selected retrospectively from the case files of those who were admitted to the hospital between May 2021 and May 2022 and whose postoperative pathological examination verified their definitive diagnosis of acute appendicitis. The name of this group was case group.

Fifty patients under the age of 20 years who visited our hospital for routine health checks make up the control group.

Exclusion criteria

Patients suffering from bleeding disorders, other genetic disorders, diabetes mellitus, active infections, and other comorbidities were excluded from the study.

The venous blood sample was collected from both Group participants in EDTA Vacutainer and all samples were analyzed for complete blood count that includes MPV also in a fully automated 6-part hematology cell counter along with QC material.

Data recorded from the groups included age, gender, platelet count, and MPV. These data of both the groups were analyzed statically to calculate
p value using online Student’s t test calculator. The value p<0.05 is considered to be statistically significant.

RESULTS
Study includes a total of 100 participants among them 50 were in the case group and 50 were in the control group of the age group <20 years.

Age and sex-wise distribution of participants is shown in Tables 1 and 2.

Majority of acute appendicitis cases (n=30, 60%) belong to 16–20 years, followed by 24% in 11–15 years of age group. The mean age was 14.96±2.75 years.

According to gender, 66% (n=33) were male.

Male: Female ratio was 1.9:1 (Table 2).

The mean platelet count in the case of group was 3.10±0.5 Lakhs/mL whereas in the Control Group was 2.86±0.7 lakhs/mL. There was no statistically significant difference among the Group with respect to platelet count (p=0.188>0.05) (Table 3).

The MPV in the case of case Group was 7.92±0.3 fL whereas in the case of control group was 8.62±0.4 fl. There was a statistically significant difference among the in terms of MPV (p=0.04 <0.05) (Table 4 and Graph 1).

A link in the pathophysiology of illnesses that are prone to thrombosis and inflammation is platelet activation. MPV, among other platelet indicators, has been studied in relation to both thrombosis and inflammation. Low-grade inflammatory diseases predisposed to arterial and venous thromboses, cardio-and cerebrovascular illnesses and high MPV are all associated with a known risk factors. Low levels of MPV are observed in high-grade inflammatory disorders and high MPV are all associated with a number of known risk factors.

DISCUSSION
The pathophysiology of acute appendicitis is characterized by the mucosal ischemia of the appendix that results from ongoing mucus secretion from the appendiceal mucosa distal to an obstruction of the lumen, elevating intraluminal and, in turn, venous pressures. Once luminal pressure exceeds 85 mmHg, venules that drain the appendix become thrombosed and, in the setting of continued arteriolar flow vessel congestion and engorgement of the appendix become manifest. Infection is added to the inflammation of appendicitis [8].

A link in the pathophysiology of illnesses that are prone to thrombosis and inflammation is platelet activation. MPV, among other platelet indicators, has been studied in relation to both thrombosis and inflammation. Low-grade inflammatory diseases predisposed to arterial and venous thromboses, cardio-and cerebrovascular illnesses and high MPV are all associated with a known risk factors. Low levels of MPV are observed in high-grade inflammatory disorders such as active rheumatoid arthritis or bouts of familial Mediterranean fever, but these levels rise with anti-inflammatory medication [9,10]. MPV rises in chronic events as opposed to falling in acute ones.

In active cases of ankylosing spondylitis and rheumatoid arthritis, Kisacik et al. discovered that the platelet volume was low; however, with treatment, MPV values rose and returned to normal [11]. According to several types of research, MPV declines in response to inflammation. For instance, it has been noted that MPV declines during the active stage of UC [12,13]. Makay et al. observed that MPV drops during the attacks significantly when compared to the control group in Familial Mediterranean fever. Similarly, Akelma et al. [14] shown that in children with chronic spontaneous urticaria, a drop in MPV may be taken into account as a sign of inflammation. The release of bioactive chemicals from inflammatory active platelets at the time of inflammation is likely to have been connected to this disorder. Danese et al. speculated that the decrease in the MPV value could be because of the consumption and sequestration of large active platelets in the vascular segments of the inflamed bowel [15].

In the current study, it was discovered that the MPV values were statistically lower in the group with acute appendicitis when compared to the control group, with a p value of 0.04 (<0.05). These data are consistent with research by Albayrak et al. on adult acute appendicitis patients and Bilici et al. on pediatric acute appendicitis patients [16]. However, the results of Uyanik et al. in kids with acute appendicitis are different from those of all the research mentioned above, including our own [17]. The MPV values in the research by Albayrak et al., Bilici et al., and Uyanik et al. were, in that order, 77.6, 7.55, and 7.6 fL. The new finding of 7.48 fL is closely supported by the first two numbers, but the last one will not agree as mentioned above because of its statistically insignificant p value. These findings of our study depict the lowered MPV values in the group case.
CONCLUSION

The diagnosis of acute appendicitis in children and adolescents is aided by a decrease in MPV. The rate of negative appendectomy in children and adolescents with suspected acute appendicitis may decrease if the clinician pays attention to the MPV (which is determined routinely as a part of automated count) alongside other parameters and clinical evaluations.

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CONFLICT OF INTEREST

None.

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REFERENCES