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BRIEF REPORT

Mean platelet volume in Henoch-Schönlein purpura: relationship to gastrointestinal bleeding

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Abstract Henoch-Schönlein purpura (HSP) is the most common systemic vasculitis in children. Gastrointestinal (GI) bleeding is one of the major complications affecting one third of the cases which may cause serious morbidity. Platelet volume directly correlates with the platelet function and activation. Small platelets have lower functional capabilities than larger ones. The aim of this retrospective study was to evaluate levels of mean platelet volume (MPV) in patients with HSP compared with healthy controls and to investigate the relationship between MPV and gastrointestinal bleeding. The study consisted of 43 HSP patients (male/female=25/18, mean age=6.2±2.6 years) and 27 age-matched healthy children (male/female=14/13, mean age=6.9±2 years) as control group. HSP patients had significantly lower MPV levels than healthy controls (7.5±0.8 vs. 7.9±0.5, p=0.027). Thirteen of 43 patients had gastrointestinal bleeding. MPV was significantly lower in patients with GI bleeding than patients without bleeding (7.0±0.8 vs. 7.7±0.6, p=0.01). Platelet counts, white blood cell counts, and C-reactive protein levels were significantly higher in patients with GI bleeding when compared to patients without GI bleeding (p=0.03, p=0.004, and p=0.03, respectively). This study suggests that low MPV may contribute to GI bleeding in HSP.

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Introduction

Henoch-Schönlein purpura (HSP) is the most common systemic vasculitis of childhood. It is characterized by palpable purpura, arthritis and arthralgia, abdominal pain and gastrointestinal hemorrhage, and glomerulonephritis [1]. The rate of abdominal pain is 51–74% in children with HSP [2–7]. Gastrointestinal (GI) bleeding—more frequently occult or less commonly overt bleeding—occurs in 18–52% of the patients [2–5, 8]. Previously, few studies have shown that thrombocytosis is associated with more severe disease in HSP, particularly gastrointestinal hemorrhage [9, 10]. Platelet volume is correlated with platelet function and activation [11]. Small platelets have lower functional capabilities than larger ones [12]. Bleeding diathesis is seen more frequently in patients with low platelet size [13]. To our knowledge, there are no studies in the literature about mean platelet volume (MPV) levels in HSP patients. Therefore, the present study was designed to investigate the relationship between GI bleeding and MPV in HSP.

Patients and methods

Case records of all patients diagnosed as HSP in Pediatric Rheumatology Unit of Dokuz Eylül University Hospital (Izmir, Turkey) between January 2004 and November 2008 were reviewed. The EULAR/PRES diagnostic criteria for HSP published in 2006 [14] was palpable purpura (a mandatory criterion) in the presence of at least one of the following: (1) diffuse abdominal pain; (2) any biopsy

showing predominant IgA deposition; (3) arthritis or arthralgia; and (4) renal involvement (hematuria and/or proteinuria). However, some of our patients were diagnosed according to the old criteria of ACR [15] where at least two of the following are required: (1) age less than 20; (2) palpable purpura; (3) acute abdominal pain usually with hematochezia; and (4) granulocytic infiltration of arteriolar or venular walls. Therefore, patients who were diagnosed according to the old criteria and not fulfilling the recent criteria were not included. Finally, a total of 43 HSP patients (25 male and 18 female, mean age 6.2±2.6 years) were enrolled in the study. Demographic data and signs and symptoms of disease at the time of diagnosis were extracted from patient files. Following laboratory data at the time of diagnosis were recorded from the computerized patient database: erythrocyte sedimentation rate (ESR), C-reactive protein (CRP, normal range=0–8 mg/L), white blood cell count (WBC), platelet count, MPV, and hemoglobin level. Twenty-seven age- and sex-matched healthy children (14 male and 13 female, mean age 6.9±2 years) constituted the control group. Complete blood count parameters were recorded for healthy children from the same computerized database.

Gastrointestinal hemorrhage was defined as occult blood in stool, melena, or hematochezia. Glomerulonephritis was defined as the presence of hematuria (>5 red blood cells per high-power microscopic field in a centrifuged specimen), pyuria (>5 white blood cells per high-power microscopic field in a centrifuged specimen), or proteinuria (>300 mg/24 h).

Statistical analysis

Data were evaluated using the Statistical Package for Social Sciences 11.0 program for Windows and by analyzing descriptive statistics (means, standard deviation), comparing the means of quantitative data for dual groups using the Student *t* test or Mann–Whitney *U* test when appropriate. $P \leq 0.05$ was considered as significant. Intercorrelations between parameters were computed through the Pearson's correlation analysis. Correlation coefficient indicated low correlation at 0.10–0.29, medium correlation at 0.30–0.49, and high correlation at ≥0.50.

Table 1 Clinical characteristics of patients

Symptoms and signs	No of patients (%)
Purpura	43 (100)
Arthritis/arthralgia	33 (76.7)
Abdominal pain (with or without GI bleeding)	23 (53.5)
Gastrointestinal hemorrhage	13 (30.2)
Glomerulonephritis	5 (11.6)

Table 2 Comparison of complete blood count parameters between patients and controls

Parameter	HSP patients (n=43)	Healthy controls (n=27)	P value[a]
WBC ($\times 10^3/\mu L$)	12.2±5.2	7.9±2.6	0.000
PLT ($\times 10^3/\mu L$)	424.2±139.6	286.5±78.1	0.000
MPV (fL)	7.5±0.8	7.9±0.5	0.027
Hb (g/dL)	12.3±1.0	12.9±0.7	0.012

Data were presented as mean ± SD

[a] Student *t* test, $p<0.05$ is significant

Results

There were 25 boys and 18 girls with HSP and 14 boys and 13 girls in the healthy control group. Mean age of the HSP patients was 6.2±2.6 years, and controls were 6.9±2 years. No significant difference considering age and gender was found between the patients and the controls. The clinical characteristics of the patients were given in Table 1.

All the patients had palpable purpura. Thirty-three patients (76.7%) had arthritis or arthralgia mostly in ankles, followed by knees. Twenty-three patients (53.5%) complained of abdominal pain, and 13 of them (30.2%) had GI bleeding. Seven of them had occult bleeding, and six of them had melena or hematochezia. Only one patient presented with intussusception. Glomerulonephritis was found in five patients (11.6%).

HSP patients had significantly lower MPV levels than healthy controls (7.5±0.8 vs. 7.9±0.5, p=0.027). Platelet and white blood cell counts were significantly higher in patients with HSP than healthy controls (p values are 0.000; Table 2).

MPV was significantly lower in patients with GI bleeding than patients without bleeding (7.0±0.8 vs. 7.7±0.6, p=0.01; Table 3). Platelet counts, white blood cell

Table 3 Comparison of laboratory parameters between patients with and without GI bleeding

Parameter	Patients without GI bleeding (n=30)	Patients with GI bleeding (n=13)	P value[a]
Age (years)	6.4±2.8	5.8±2.3	0.61
ESR (mm/h)	33.8±17.1	34.4±29.2	0.84
CRP (mg/L)	19.9±18.5	41.6±30.3	0.03
WBC ($\times 10^3/\mu L$)	10.7±3.8	15.9±6.3	0.004
PLT ($\times 10^3/\mu L$)	396.1±122.2	489.3±159.8	0.03
MPV (fL)	7.7±0.6	7.0±0.8	0.01
Hb (g/dL)	12.4±0.9	11.9±1.3	0.9

Data were presented as mean ± SD

[a] Mann–Whitney *U* test, $p<0.05$ is significant

counts, and C-reactive protein levels were significantly higher in patients with GI bleeding when compared to patients without GI bleeding (p=0.03, p=0.004, and p=0.03, respectively; Table 3). Eleven of 13 patients with GI bleeding had high CRP levels while 13 of 30 patients without GI bleeding had high CRP levels. MPV levels were similar between healthy controls and HSP patients without GI bleeding (p=0.25)

Platelet number was higher than normal (>400×10^3/μL, the upper limit of the normal value in the laboratory of the center) in nine of 13 (69%) patients with GI bleeding and ten of 30 (33%) patients without GI bleeding. MPV was lower than normal (<7.0 fL, the lower limit of the normal value in the laboratory of the center) in seven of 13 (54%) patients with GI bleeding and three of 30 (10%) patients without GI bleeding. However; there was no significant correlation between MPV and platelet counts (p=0.09, r=−0.26). Besides, there was a positive correlation between platelet counts and white blood cell counts (p=0.001, r=0.50).

Discussion

Previous studies suggested that thrombocytosis, leukocytosis, and high CRP levels were associated with GI bleeding in HSP patients [10, 16]. The significantly increased platelet and leukocyte count and CRP levels in HSP patients with GI bleeding observed in this study are in agreement with those in previous literature [10, 16]. This study further revealed that MPV levels were found as decreased in HSP patients with GI bleeding when compared to patients without GI bleeding. To our knowledge, this is the first study evaluating the MPV levels in HSP patients. Regarding small platelets have lower functional capabilities than larger ones and bleeding diathesis is seen more frequently in patients with low platelet size [13], low MPV observed in HSP may, in part, explain the GI bleeding frequently seen in these patients.

Decreased MPV had also been reported in other inflammatory diseases affecting gastrointestinal tract such as ulcerative colitis and Crohn's disease, and this decrease was mainly associated with active disease [17, 18]. Interestingly, GI bleeding frequently occurs in active inflammatory bowel disease patients [19, 20], probably associated with low MPV. Besides, MPV was shown to be significantly lower in ankylosing spondylitis patients and rheumatoid arthritis patients with active disease as compared to controls [21].

It may be speculated that some cytokines that are elevated during inflammatory process of HSP may influence platelet count and volume. Interleukin-6 (IL-6) is an important proinflammatory cytokine that can induce thrombocytosis also affecting the platelet volume [22, 23]. Administration of IL-6 was shown to cause an increase in platelet number as well as a decrease in MPV in cancer patients [23, 24]. We speculate that thrombocytosis and low MPV in HSP may be related to IL-6. Recently, Lin et al. showed that serum IL-6 levels were significantly elevated in HSP patients when compared to healthy controls [25]. However, IL-6 levels of HSP patients complicated with GI bleeding or glomerulonephritis were found significantly lower than those patients without these internal organ involvements. The authors speculated that IL-6 might be consumed at the later stages of inflammation and it might have protective effects against the disease status complicated with internal organ involvement. Given the average lifespan of platelets 7–10 days, it is probable that IL-6-induced decrease in MPV may continue even if serum IL-6 levels return to normal.

In conclusion, this study suggests that MPV may be an indicator of GI bleeding in HSP. The use of this parameter adds no extra cost and technical effort. Further prospective studies investigating the factors affecting the platelet size in HSP is required to determine whether MPV has a clinical implication in this disease.

Disclosures None

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