EVALUATION OF THE POSSIBLE RELATION BETWEEN HELICOBACTER PYLORI GASTRITIS AND MEAN PLATELET VOLUME AMONG CHILDREN: AN OBSERVATIONAL STUDY

Original Article

HELİCOBACTER PYLORİ GASTRİTİ İLE ORTALAMA TROMBOSİT HACMİ ARASINDAKİ OLASI BAĞLANTININ DEĞERLENDİRİLMESİ: GÖZLEMSEL BİR ÇALIŞMA

Meltem Ugras

Yeditepe University Faculty of Medicine, Department of Pediatrics, Division Pediatric Gastroenterology and Hepatology, Istanbul, Turkey

Ayhan Vurmaz

Afyon Kocatepe University, Faculty of Medicine, Department of Medical Biochemistry, Afyonkarahisar, Turkey

Cigdem Tokyol

Afyon Kocatepe University, Faculty of Medicine, Department of Pathology, Afyonkarahisar, Turkey

Suat Bicer

Yeditepe University Faculty of Medicine, Department of Pediatrics, Istanbul, Turkey

Corresponding Author

Suat Bicer
Yeditepe University Hospital, Devlet Yolu Ankara Cad, No:102-104 Kozyatagi 34752 Istanbul Turkey
Tel: +90 505 450 93 36
Email: suat.bicer@yeditepe.edu.tr

ABSTRACT

Introduction: *Helicobacter pylori* cause chronic inflammation. Mean platelet volume (MPV) is suggested to be a marker of inflammation including chronic inflammation. We aimed to evaluate any relation with *Helicobacter pylori* gastritis and MPV levels among children with *Helicobacter pylori* gastritis in this study.

Materials and Methods: This retrospective observational study was conducted at two center: Afyon Kocatepe University Faculty of Medicine (Afyonkarahisar) and Yeditepe University Faculty of Medicine (Istanbul). The patients were divided into three groups; Group 1 (patients having Helicobacter pylori positive gastritis), group 2 (patients having gastritis but Helicobacter pylori negative), and group 3 (control group). Helicobacter pylori gastritis was diagnosed by histologic examination of endoscopic material, and one of either urea breath test or immunochromatographic stool test is positive. MPV levels of cases in each group were obtained from The Sysmex-XE 2000i automated blood cell analyzer.

Results: The mean MPV values in group 1, group 2 and group 3 were 9.9±0.7, 10.5±0.7, and 9.8±0.9 fL, respectively. According to MPV values, there was statistically significant difference between group 1 and other groups; mean MPV levels of group 1 were smaller than group 2 and group 3; mean MPV levels of group 3 were smaller than group 2 ($p<0.05$). There was no correlation between MPV and histopathological parameters including inflammation, *Helicobacter pylori* density and activity.

Conclusion: We suggest that Helicobacter pylori gastritis causes an inflammatory response, however, does not affects MPV levels among children.

Key words: children, gastritis, Helicobacter pylori, mean platelet volume

ÖZET

Amaç: *Helicobacter pylori* kronik inflamasyona neden olur. Ortalama trombosit hacminin (OTH) kronik inflamasyon da dahil olmak üzere, inflamasyonun bir belirteci olduğu ileri sürülmektedir. Bu çalışmada, *Helicobacter pylori* gastriti olan çocuklarda *Helicobacter pylori* gastritis ile OTH arasındaki olası ilişkinin değerlendirilmesi amaçlandı.

Materyal ve Method: Bu geriye dönük gözlemsel çalışma iki merkezde gerçekleştirildi: Afyon Kocatepe Üniversitesi Tıp Fakültesi (Afyonkarahisar) ve Yeditepe Üniversitesi Tıp Fakültesi (İstanbul). Hastalar üç gruba ayrıldı: Grup 1 (*Helicobacter pylori* gastriti olanlar), grup 2 (gastriti olan ancak *Helicobacter pylori* saptanmayanlar), grup 3 (control grubu). *Helicobacter pylori* gastritinin tanısında endoskopide elde edilen materyalin histolojisi yanında, üre nefes testi ya da immunokromatografik dışkı testinden biri kullanıldı. Her gruptaki olguların OTH değerleri Sysmex-XE 2000i hemogram cihazından otomatik olarak elde edildi.

Bulgular: Grup 1, grup 2 ve grup 3'teki olguların ortalama OTH değerleri sırasıyla 9.9±0.7, 10.5±0.7 ve 9.8±0.9 femtolitre idi. Grup 1 ve diğer gruplar arasında OTH değerleri bakımından anlamlı farklılık var olup, 1. gruptaki olguların OTH değerleri diğer gruplara göre daha düşüktü, 3. gruptaki olguların ortalama OTH değeri de 2. gruptakilerden daha düşüktü ($p<0.05$). İnflamasyonu gösteren histolojik parametreler, *Helicobacter pylori* yoğunluğu ve aktivitesi ile OTH arasında ise bağlantı saptanmadı.

Sonuç: *Helicobacter pylori* gastritinin çocuklarda inflamatuar yanıta neden olmasına karşın OTH değerlerini etkilemediği sonucuna varılmıştır.

Anahtar kelimeler: çocuk, gastrit, *Helicobacter pylori*, ortalama trombosit hacmi

INTRODUCTION

Helicobacter pylori (H. pylori) infection is associated with chronic gastritis, peptic ulcer disease and gastric cancer (1). The infection is still common in developing countries and among children. The infection causes not only gastritis but also extragastric manifestations such as cardiovascular disease, iron deficiency anemia, immune thrombopenic purpura (2). The underlying mechanism is proposed to be a low-grade persistent inflammatory situation (3). There is substantial evidence suggesting an important role of mean platelet volume (MPV) as a marker of inflammation, disease activity and efficacy of anti-inflammatory treatment in several chronic inflammatory disorders (4). The knowledge that MPV can be used to show inflammation goes back to the 1980's. (5). It is suggested that the size of circulating platelets is dependent on the intensity of systemic inflammation, with contrasting features of MPV in high- and low-grade inflammatory disorders and in the course of anti-inflammatory treatment. Disease-specific and cardiovascular confounding factors affect the direction of MPV changes. A recent large meta-analysis on MPV in cardiovascular disease provided evidence supporting the association of elevated MPV with myocardial infarction, restenosis after percutaneous coronary intervention and mortality (6). Based on observational studies, MPV has been identified as a marker of inflammatory bowel disease activity and the extent of intestinal inflammation, assessed clinically and endoscopically (4,7,8). Compared with acute-phase reactants, a higher predictive value of MPV was demonstrated in relation to disease activity in ulcerative colitis (4,8). In ulcerative colitis and Crohn's disease, MPV was inversely correlated with acute-phase reactants, beta-thromboglobulin and platelet-factor-4 (4,7). In patients with ulcerative colitis, a low MPV was recorded in those with extraintestinal inflammatory manifestations (8), suggesting an

intense consumption of large platelets. High-grade inflammation accompanies a decrease of MPV in rheumatoid arthritis, possibly due to the increased consumption of platelets at the sites of rheumatoid inflammation. A reverse shift of MPV results from the suppression of inflammation by disease-modifying and anti-tumor necrosis factor-alpha agents (9,10). The aim of the study is to investigate a relation between MPV and childhood gastritis.

MATERIALS AND METHODS

The hemograms of children who underwent an upper gastrointestinal system endoscopy were examined retrospectively. MPV levels in hemogram results were evaluated. Gastritis was scored using modified Sydney classification (11). The results of children who were admitted because of acute diseases made up the control group. Patients with any underlying chronic disease such as inflammatory bowel disease, familial Mediterranean fever, diabetes mellitus, hematological disease, renal insufficiency, cardiac failure, hypertension, and malignancy, were not taken into any of the groups. The results of patients with gastritis and controls were compared, and the degree and density of H. pylori gastritis reported by the Sydney score was compared statistically.

The Sysmex-XE 2000i automated blood cell analyzer (Sysmex, Kobe, Japan) was used to measure platelet indices. MPV was calculated by the following formula;

MPV (fL) = ((plateletcrit (%)/ platelet count (10^9/l)) x 10^5

The study was performed at Afyon Kocatepe University, Faculty of Medicine and Yeditepe University Faculty of Medicine in a time period of 18 months. Ethical approval for the study was taken from Afyon Kocatepe University Ethical Board for Clinical Investigations (No: 333, March 2013).

Statistical analysis was performed by using SPSS 15.0 statistics software. Results were indicated as mean ± standard deviation; ANOVA and the paired samples t-test was used for comparison between groups. Spearman's method was used for correlation and relation between indicated parameters. The provision of p value to be under 0.05 was requested for statistical significance.

RESULTS

The patients were divided into three groups; Group 1: patients having H. pylori positive gastritis, group 2: patients having gastritis but H. pylori negative, group 3: patients with no gastrointestinal system complaints; these patients did not undergo endoscopy. H. pylori gastritis means histology and one of either urea breath test or stool test is positive. H. pylori negative gastritis means noninvasive tests are negative and histopathological evaluation reveals no H. pylori but gastritis.

The mean MPV values in group 1, group 2 and group 3 were 9.9±0.7 fL; 10.5±0.7 fL and 9.8±0.9, respectively. According to MPV values, there was statistically significant difference between group 1 and group 2; mean MPV levels of group 1 were smaller than group 2; and group 2 and group 3; mean MPV levels of group 3 were smaller than group 2 ($p<0.05$). There was no statistical difference between groups when compared according to platelet counts. The minimum, maximum, mean and standard deviation values of each group are recorded in Table 1. There was no correlation between MPV and histopathological parameters including inflammation, H. pylori density and activity.

		MPV (fL)			P	Platelets (mm^3)			p
		Min.	Max.	Mean ± SD		Min.	Max.	Mean ± SD	
Group (n=30)	**1**	8.44	11.3	9.9 ± 0.73	< 0.005 [a]	129000	476000	293.400 ± 76.443	> 0.005
Group (n=30)	**2**	9.50	11.7	10.4 ± 0.69	> 0.005 [b]	229000	460000	291.266 ± 85.770	> 0.005
Group (n=30)	**3**	8.60	11.7	9.7 ± 0.95	< 0.005 [c]	190000	473000	317.333 ± 70.447	> 0.05

Table 1. Comparison of laboratory results of patients with hepatosteatosis and without hepatosteatosis

MPV: Mean platelet volume, Min.: Minimum, Max.: Maximum, SD: Standard deviation
a: Statistical significance between group 1 and group 2 ($p < 0.005$)
b: No statistical significance between group 1 and group 3 ($p > 0.005$)
c: Statistical significance between group 2 and group 3 ($p < 0.005$)

Group 1: Children having *H. pylori* gastritis
Group 2: Children having gastritis, *H. pylori* negative
Group 3: Children with no chronic or ongoing disease.

DISCUSSION

The relation between H. pylori and inflammation is not yet well established. The possibility of that idea makes us speculate any relation between H. pylori and some extragastric diseases such as atherosclerosis. Studies show that H. pylori infection had to be acquired in early childhood so one can suggest there is plenty of time for inflammation (12).

MPV is a new marker for inflammation. There are some studies showing the relation between MPV and some illnesses among children. Sert A et al. (13) have shown that during the acute stage of acute rheumatic fever, MPV values were lower when compared to controls. Chen J et al. (14) have reported that MPV was associated with Kawasaki disease. The MPV values among asthmatic children during the asthmatic attack and asymptomatic period showed no difference (15). Arslan et al. (16) showed that MPV was significantly higher in obese adolescents than their healthy peers. The authors also showed that there was positive correlation between HOMA-IR, and negative correlation between high-density cholesterol. Uysal et al. (17) evaluated children with cystic fibrosis having acute exacerbation and compared them with healthy controls. The children with exacerbation had significantly lower MPV compared to the controls. The authors also reported that children with cystic fibrosis even in the non-exacerbation period had significantly lower MPV compared to healthy children. The results of those studies are conflicting but most of them show a difference between normal

controls; either lower or higher. Our result showed that MPV was lower in healthy children, and higher in children with gastritis. According to our results, H. pylori did not change MPV values as MPV values were similar with the control group but there was a negative correlation between inflammation of gastric tissue defined by modified Sydney score and MPV.

To our knowledge, there is no study about MPV and gastritis among children. There is one study evaluating this relation among adults. Topal et al. (18) evaluated the relation between MPV and H. pylori gastritis. The authors have evaluated the MPV values of adult patients and searched for any relation regarding each score on the Sydney classification system and consequently found no association among MPV, intensity of H. pylori and gastric inflammation. The authors reported that although no statistical significant difference was observed, MPV levels were lower in moderate to severe inflammation. They also showed that patients with lymphoid follicle had lower MPV values than the ones without.

One drawback of our study may be that the MPV values of the eradicated cases were not added but there was no need to make a hemogram; so, there was no laboratory data.

CONCLUSION

In conclusion, we suggest that H. pylori gastritis causes an inflammatory response but that does not affect MPV levels among children.

ACKNOWLEDGEMENTS

We are grateful to Hakan Şentürk (Instructor of Writing Center of Yeditepe University) for the revision of this paper in English.

REFERENCES

1) *Drumm B, Koletzko S, Oderda G. Helicobacter pylori infection in children: a consensus statement. European Paediatric Task Force on Helicobacter pylori. J Pediatr Gastroenterol Nutr 2000; 30: 207-13.*
2) *Tan HJ, Goh KL. Extragastrointestinal manifestations of Helicobacter pylori infection: Facts or myth? A critical review. J Dig Dis 2012; 13: 342-9.*
3) *Tamer GS, Tengiz I, Ercan E, Duman C, Alioglu E, Turk UO. Hp seropositivity in patients with acute coronary syndromes. Dig Dis Sci 2009; 54: 1253-6.*
4) *Gasparyan AY, Ayvazyan L, Mikhailidis DP, Kitas GD. Mean Platelet Volume: A Link Between Thrombosis and Inflammation? Current Pharmaceutical Design 2011; 17: 47-58.*
5) *Bartolin R, Bouvenot G, Rolland P, Arnaud C. Research on statistical correlations between the mean platelet volume and the presence of anemia and/or biological inflammation. Presse Med 1983; 12: 1607-8.*
6) *Chu SG, Becker RC, Berger PB, Bhatt DL, Eikelboom JW, Konkle B, et al. Mean platelet volume as a predictor of cardiovascular risk: a systematic review and metaanalysis. J Thromb Haemost 2010; 8: 148-56.*
7) *Kapsoritakis AN, Koukourakis MI, Sfiridaki A, Potamianos SP, Kosmadaki MG, Koutroubakis IE, et al. Mean platelet volume: a useful marker of inflammatory bowel disease activity.Am J Gastroenterol 2001; 96: 776-81.*
8) *Yuksel O, Helvaci K, Basar O, Köklü S, Caner S, Helvaci N, et al. An overlooked indicator of disease activity in ulcerative colitis: mean platelet volume. Platelets 2009; 20: 277-281.*
9) *Kisacik B, Tufan A, Kalyoncu U, Karadag O, Akdogan A, Ozturk MA, et al. Mean platelet volume (MPV) as an inflammatory marker in ankylosing spondylitis and rheumatoid arthritis. Joint Bone Spine 2008; 75: 291-4.*
10) *Gasparyan AY, Sandoo A, Stavropoulos-Kalinoglou A, Kitas GD. Mean platelet volume in patients with rheumatoid arthritis: the effect of anti-TNF-alpha therapy. Rheumatol Int 2010; 30: 1125-9.*
11) *Dixon MF, Genta RM, Yardley JH, Correa P. Classification and grading of gastritis. The updated Sydney system. Am J Surg Pathol 1996; 20: 1161-81.*
12) *Roma E, Panayiotou J, Pachoula J, Kafritsa Y. Intrafamilial spread of Helicobacter pylori infection in Greece. J Clin Gastroenterol 2009; 43: 711-5.*
13) *Sert A, Aypar E, Odabas D. Mean platelet volume in acute rheumatic fever. Platelets 2013; 24: 378-82.*
14) *Chen J, Liu Y, Liu W, Wu Z. A meta-analysis of the biomarkers associated with coronary artery lesions secondary to Kawasaki disease in Chinese children. J Huazhong Univ Sci Technolog Med Sci 2011; 31: 705-11.*
15) *Tuncel T, Uysal P, Hocaoglu AB, Erge DO, Karaman O, Uzuner N. Change of mean platelet volume values in asthmatic children*

as an inflammatory marker. Allergol Immunopathol (Madr) 2012; 40: 104-7.

16) *Arslan N, Makay B. Mean platelet volume in obese adolescents with nonalcoholic fatty liver disease. J Pediatr Endocrinol Metab 2010; 23: 807-13.*
17) *Uysal P, Tuncel T, Olmez D, Babayigit A, Karaman O, Uzuner N. The role of mean platelet volume predicting acute exacerbations of cystic fibrosis in children. Ann Thorac Med 2011; 6: 227-30.*
18) *Topal F, Karaman K, Akbulut S, Dincer N, Dölek Y, Cosgun Y, et al. The relationship between mean platelet volume levels and the inflammation in Helicobacter pylori gastritis. J Natl Med Assoc 2010; 102: 726-30.*