Original Article

Uncomplicated Peptic Ulcer Disease and Its Impact on Haematological Parameters

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Abstract

Background: Peptic ulcer disease (PUD) is one of the most common diseases consisting of gastric and duodenal ulcers affecting the gastrointestinal tract of many people of the world which may affect haematological parameters of the patients.

Objective: To explore the impact of uncomplicated PUD on haematological parameters.

Methods: This observational study was based on data obtained from the Department of Medicine (Gastroenterology) of Jahurul Islam Medical College Hospital (JIMCH), Bajitpur, Kishoregonj from May 2013 to October 2013. A total of 156 participants; 77 uncomplicated PUD patients (39 females and 38 males) and 79 healthy adults as control groups (40 females and 39 males) were included in this study. Subjects visiting the outpatient department of Medicine (Gastroenterology) with epigastric symptoms between the age group of 25 and 60 years who underwent upper gastrointestinal endoscopy were included in the study (with diagnosed uncomplicated PUD). Moreover, blood samples of all participants were taken for biochemical analysis and complete blood parameters were evaluated in the hematology laboratory of JIMCH. All data were expressed as mean±SD. For statistical analysis, Chi-square test (χ^2) was used to compare categorical variables. An independent sample 't' test was used to compare normally distributed variables between two groups.

Results: The mean values of Hgb, RBC, Hct, MCV, MCH, MCHC were observed to be significantly lower in uncomplicated PUD when compared to control group. However, the mean values of neutrophil count, monocyte count, neutrophil-to-lymphocyte ratio (NLR) and monocyte-to-lymphocyte ratio (MLR) were significantly higher in uncomplicated PUD patients than that of the control group. On the other hand, mean values of platelet count and (platelet-to-lymphocyte ratio) PLR were lower in uncomplicated PUD patients in comparison to control group which were statistically non significant.

Conclusion: In summary, findings of the study reveal that uncomplicated PUD may cause reduction of RBC parameters and may increase the mean value of peripheral white blood cell counts for neutrophils, monocytes, platelets; NLR, MLR and PLR also may increase. Therefore, hematological parameters of uncomplicated PUD show a significant variation that should be considered for proper diagnosis and management of PUD.

Keywords: Peptic ulcer disease, Red blood cell, Leukocyte, Platelet, Monocyte, Lymphocyte.

Introduction

PUD is a common digestive system disease that includes gastric and duodenal ulcer.[1,2] It is a condition in which painful sores or ulcers develop in the lining of the stomach or the first part of the small intestine (the duodenum).[2] Normally, a thick layer of mucus protects the stomach lining from the effect of its digestive juices. But many associated factors reduce this protective layer, allowing stomach acid to damage the tissue. Histologically, peptic ulcer is identified as necrosis of the mucosa which produces lesions equal to or greater than 0.5 cm; it causes inflammatory injuries in either the gastric or duodenal mucosa with extension beyond the submucosa into the muscularis mucosa.[3] It is the most common ulcer of an area of the gastrointestinal tract which is usually acidic and thus extremely painful. Helicobacter pylori is one of the most common causes of PUD; ulcers can also be caused or worsened by drugs such as aspirin, ibuprofen and other NSAIDs.[1,3] The prevalence of PUD is approximately 4.1% and approximately 10% of people develop PUD in their lifetime and in the United States (US), approximately 15-18 million people develop PUD in their lifetime.[4-6]

Several studies reported an association between PUD and hematologic disorders including thrombocytopenia.[7] An improvement of the number of platelets has been observed after successful recovery from PUD.[8] Red blood cell parameters have also been evaluated in correlation with digestive disorders. PUD due to H pylori has been shown to lower values of the hematocrit (Hct), hemoglobin (Hgb) and erythrocyte count.[9] Novel inflammatory biomarkers, including NLR, MLR and PLR have been used as non-invasive predictors for systemic inflammation in various conditions,

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including gastritis.[10] Those parameters were assessed so far only in association with gastritis and the role of PLR has been reported so far only in adults. Thus, a higher PLR has been described due to increase in thrombocyte count and a decrease in lymphocyte count.[10] Interestingly, these findings are controversial since several previous studies observed that PUD is associated with thrombocytopenia.[7]

This study aimed to assess the impact of PUD related inflammation on the levels of erythrocytes, leukocytes, thrombocytes, Hgb, Htc, mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), NLR, MLR and PLR. Moreover, the intention was to identify whether the changes in these parameters depend on the presence of H pylori infection, or they are related only to the gastric and duodenal inflammation.

Materials and Methods

This observational study was based on data obtained from the Department of Medicine (Gastroenterology) at Jahurul Islam Medical College Hospital (JIMCH), Bajitpur, Kishoregonj from May 2013 to October 2013. A total of 156 study participants; 77 uncomplicated PUD patients (39 females and 38 males) and 79 healthy adults as control groups (40 females and 39 males) were included in this study. Control groups were age sex matched healthy individuals who had no previous history of chronic disease that would affect the haematological parameters.

Patients with PUD having comorbidities, inflammatory or autoimmune diseases, severe systemic diseases and receiving medical treatment to affect the white blood cell counts or having hematopoietic system disorders, active infections, hypertension, diabetes mellitus, epilepsy, myocardial infarction, heart failure and other cardiac disease, hepatic failure, renal failure, alcohol or other substance addiction, severe head injury, mental retardation, pregnancy, obesity (BMI>30 kg/m^2) were excluded from the study.

All the selected patients were informed in detail about the aim, objectives and procedure of the study and were encouraged for their voluntary participation. Informed written consent was taken from all participants. Detail personal, medical, family, socioeconomic, occupational and drug history were taken as well. Thorough physical examinations of each patient were done and were also documented. Blood was taken for biochemical analyses. Blood samples of study subjects were taken from antecubital vein and stored in hemogram tubes (08 AM), after which complete blood parameters including RBC parameters, leukocyte values and platelet count were evaluated in the hematology laboratory of JIMCH. The study was approved by the local Ethics Committee.

All data were expressed as mean±SD. For statistical analysis, Chi-square test (χ^2) was used to compare categorical variables, frequencies, and ratios. An independent sample 't' test was used to compare normally distributed variables between two groups. Statistical analyses were performed by using SPSS v16. In the interpretation of results, p value of <0.05 was considered as statistically significant.

Results

In this study, baseline characteristics of study population in respect to gender, age, BMI, blood pressure, educational status, socioeconomic status and marital status were similar and their differences were statistically non-significant (Table-I).

The mean (SD) of the parameters related to hematology were also compared between uncomplicated peptic ulcer patients and control group. Accordingly statistically significant lower mean values of Hgb, RBC, Hct, MCV, MCH, MCHC were observed in uncomplicated PUD when compared to control group. However, the mean value of neutrophil count, monocyte count, NLR and MLR were higher in uncomplicated PUD patients than the control group, which were also statistically significant. On the other hand, the mean value of platelet count and PLR were lower in uncomplicated PUD patients in comparison to control group which were statistically non-significant.

Table-I: Distribution of the study participants on the basis of socio-demographic variables (n=156)

Variables	Categories	Uncomplicated PUD Patients Group (n=77)	Control Group (n=79)	*P* value
Gender	Female	39(51%)	40(23%)	0.213
	Male	38(49%)	39(77%)	0.312
Age (years)	25-35	19(25%)	19(24%)	0.542
	36-45	23(30%)	23(29%)	0.612
	46-60	35(45%)	37(47%)	0.213
BMI (kg/m^2)		22.12±3.10	23.8±4.10	0.161
Blood Pressure (mm Hg)	SBP	132±15	130±16	0.091
	DBP	84±12	83±10	0.083
Educational status	Illiterate	30(39%)	32(41%)	0.274
	Primary	20(26%)	19(24%)	0.721
	Secondary	15(20%)	16(20%)	0.623
	Higher level	12(15%)	12(15%)	0.927
Socioeconomic status (score)		1.48±0.31 (1-4)	1.52±0.28 (1-4)	0.259
Married		60(78.12%)	59(75.18%)	0.851

Table-II: Comparison of mean values of haematological parameters of different study groups (n=156)

Variables	Uncomplicated PUD Patients Group (n=77)	Control Group (n=79)	*P* value
Hgb (gm/dL)	11.73±2.10	13.50±2.2	0.001**
RBC count (x10^{12}/L)	3.81±0.80	4.54±0.61	0.001**
Hct (%)	36.33±4.20	41.10±4.72	0.001**
MCV (fL)	86.03±5.83	87.84±6.70	0.002**
MCH (pg)	27.91±2.51	28.21±2.73	0.004**
MCHC (gm/dL)	31.12±1.70	32.20±1.70	0.002**
WBC count (x10^9/L)	6.10±1.73	5.30±1.80	0.260
Neutrophil (%)	60.01±8.70	58.0±5.71	0.124
Neutrophil count (x10^3)	3.70±1.45	3.10±1.30	0.006**
Lymphocyte (%)	35.11±6.10	34.01±7.20	0.341
Lymphocyte count (x10^9/L)	2.13±0.70	2.11±0.51	0.217
Monocyte count (x10^9/L)	0.44±0.17	0.34±0.16	0.01*
Monocyte (%)	7.02±2.12	6.11±2.14	0.01*
PLT count (x10^9/L)	245.21±55.20	252.14±57.44	0.081
NLR	1.73±0.51	1.47±0.48	0.003**
MLR	0.22±0.70	0.17±0.03	0.03*
PLR	115.11±42.41	119±39.40	0.162

WBC: white blood cell; RBC: red blood cell; Hgb: hemoglobin; Hct: hematocrit; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; PLT: platelet; SD: standard deviation. Data were expressed as mean±SD. Figures in parentheses indicate ranges. Statistical analysis was done with independent sample 't' test and Chi-square test.

Discussion

In the present study, we identified the haematological and biochemical changes in uncomplicated PUD patients and found significant lower mean values of Hgb, RBC, Hct, MCV, MCH, MCHC in PUD patients when compared with the control group. This is in concordance with Xu et al[11] Gheibi et al[12] DeLoughery[13] Mubarak et al[14] who found that the prevalence of iron-deficiency anemia in the PUD patients was significantly higher than in healthy individual. Similar observations were reported in several studies.[15] Ciacci et al in 2004, suggested a possible pathogenic mechanism of anemia in PUD and explained it by blood loss secondary to chronic erosive gastritis and decreased iron absorption secondary to chronic gastritis and hypochlorohydria.[16]

The pathogenic mechanisms by which PUD may contribute to anemia in asymptomatic people are not well understood and may be owing to several explanations such as a chronic idiopathic iron deficiency represented by autoimmune atrophic gastritis, which had been shown to be responsible for refractory iron-deficiency anemia in more than 20% of patients with no evidence of gastrointestinal blood loss.[17]

An increased number of peripheral blood leukocytes is a major characteristic of infectious and inflammatory diseases. PUD chronically infects the stomach and induces marked leukocyte infiltration into the gastric mucosa and potentially affects the number of peripheral blood leukocytes.[18] In this study, we evaluated and found the means value of neutrophil count, monocyte count, NLR and MLR to be higher in uncomplicated PUD patients than that of the control group, which were also statistically significant. Another study revealed similar observations regarding the leukocyte parameters in PUD patients.[19] The generation of leukocytes from bone marrow stem cells is potentiated by proinflammatory cytokines, such as tumor necrosis factor (TNF), interleukin (IL)-1 and IL-6.[18,19]

On the other hand, the study observed that the mean values of platelet count and PLR were lower in uncomplicated PUD patients in comparison to control group which were statistically non-significant. Previous studies showed significant relationship between PUD due to H. pylori infection and thrombocytopenia.[17]

Conclusion

The study findings reveal that uncomplicated PUD may cause reduction of RBC parameters and increase the mean values of peripheral white blood cell counts for neutrophils, monocytes and platelets; NLR, MLR and PLR value may also increase. Therefore, haematological parameters of uncomplicated PUD show significant variation which should be considered for proper diagnosis and management of PUD.

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