

Studying of Some Physiological Parameters in Patients with Inflammatory Bowel Disease (IBD) in Al-Anbar Province

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Abstract

This study was carried out to determine some hematological, parameters in patients with IBD. the total number were 100 blood samples, 60 samples from patients with IBD (cases), while the remaining 40 samples from persons without IBD (control), Ages ranged from 15 to 60 years. who attended general teaching hospital in Ramadi city in Al-Anbar governorate. a comparison in hematological parameters was carried between the two groups with each other showed that there was significant difference between patients and control with ($p < 0.05$). and the means levels for hemoglobin HB (10.09 g/dl), (13.18 g/dl) \ there was significant difference between patients and control with ($p < 0.05$). and the means levels for red blood cells RBC (3.194×10^6 c/ mm³), (5.291×10^6 c/ mm³) \ there was significant difference between patients and control with ($p < 0.05$). and the means levels for white blood cells WBC (12.39×10^3 c/ mm³), (7.300×10^3 c/ mm³) there was significant difference between patients and control with ($p < 0.05$). and the means levels for \platelet (561.2×10^3 c/ mm³), (258.4×10^3 c/ mm³).

Key words : Hb, PLT, WBC, RBC, IBD

Introduction

Inflammatory bowel disease (IBD): a multifactorial immune disorder characterized by persistent intestinal relapsing inflammation of unclear etiology and characterized by an alternate duration of recurrence and alleviation, The major clinical symptoms of IBD are gastrointestinal diarrhea, bloody stool and weight loss ,Other autoimmune disorders, such as cholangitis, primary sclerosing psoria and ankylosing spondylitis, also occur in IBD patients ⁽¹⁾. The blood tests used most often in IBD are levels of the three main types of blood cells (red cells, white cells, and platelets), The amount of white blood cells can indicate if there is any inflammation or infection in the body; More over PLT are small nuclear fragments derived from megakaryocytes, an increase

in the number of platelets (small cells involved in blood clotting) can also be a sign of inflammation, As well as detect anemia by calculating the level of hemoglobin, Anemia is a common extraintestinal indicator of IBD affecting up to 75% of patients ⁽²⁾. Its pathogenesis is multifactorial, due to iron deficiency and also chronic inflammation, chronic blood loss is a common systemic complication of IBD, insufficient intake or absorption of nutrients and the effect of inflammation on the bone marrow and the handling/ transport of iron and can be one of the earliest signs of the disease⁽³⁾ .With marginal contribution of folic acid and vitamin B12 deficiencies \A growing body of evidence suggests that the neutrophilelymphocyte ratio (NLR) is a useful biomarker of systemic inflammation responses ⁽⁴⁾ . Leucocytes are a collection of cells involved in the immune defense mechanisms against

non-self antigens that challenge the immune system , The neutrophils are mainly involved in a non-specific immune function that is phagocytosis, which is also shared by monocytes, but the latter are involved in antigen presenting, and are known as macrophages or antigen presenting cells; The lymphocytes are the cellular elements in the specific cellular and humoral immune responses ⁽⁵⁾ .

Materials and Methods

Patients and Controls :

The study included (60)patients in different age(15-60) who were suffering of inflammatory bowel disease , who attended general teaching hospital in Ramadi city in Al-Anbar governorate during the period extended from the 1st of May 2020 to the 1st of January 2021. The samples of patients were selected According to the diagnosis of gastroenterologists. While control included (40) healthy persons in different age from (15-60) years. They were considered as negative control group as they did not show history of inflammatory bowel disease after investigation by gastroenterologists.

Ten ml of venous blood was collected from a suitable vein. Tourniquet was applied about (4-5) finger width above the selected venipuncture site and disinfected by 70% of Ethanol for 30 second, and allowed to dry completely, the blood was divided into two type of tubes, the first one; 2.5 ml whole blood was dispensed in in tow tubes with ethylene diamine tetra acetic acid tube (EDTA-tube) and mixed gently, In second tube; Residual part of the blood sample was transferred to it (free of anticoagulation) and let to coagulate for serum separation by using centrifuge at (4000 rpm) for 5 min, The isolated serum was collected in a sterile clean white tube to be used for serological studies Then tubes were placed in a cool-box under aseptic condition and stored in the freezer at (-20°C) until further processing ⁽⁶⁾.

Diagnostic Methodes :

The following diagnostic methods were used :

A method used the blood cells counter and diluent solution (Turke, s fluid) to calculate the total number of white blood cells The total WBC was calculated in the study samples using the following equation:

$$\text{WBCs/mm}^3 = \text{Number Cells Counted} \times 50 \quad (7)$$

The blood cells counter and diluent solution (Hayem's Solution) were used to calculate the number of the Red blood cells The total RBC was calculated in the study samples using the following equation:

$$\text{RBCs/mm}^3 = \text{Number Cells Counted} \times 10000 \quad (7)$$

Cyanomethemoglobin Method was used to measure Haemoglobin concentration in the blood sample, using Drabkin, s solution as a diluent. The concentration of Heamoglobin was determined in the study samples using the following equation:

$$\text{Haemoglobin (g/dl)} = \text{Absorbance}(\text{Test/Standar}) \times \text{Hb.Standar} \quad (8)$$

The blood cells counter and diluent solution (Ammonium oxalate) were used to calculate the number of platelets cells Platelets was calculated in the study samples using the following equation:

$$\text{Platelets/mm}^3 = \text{Number Cells Counted} \times 1000 \quad (9)$$

Results and Discussion

The total number of persons included in the study was (100) samples which included (60) patients were found to have inflammatory bowel disease (cases) and (40) normal persons as control.

Distribution of Study Population According to Age groups:

According to ages, study population was grouped

into 9 groups as described in figure (1). The older groups included the highest number of patient and the groups included the highest number of patient and the

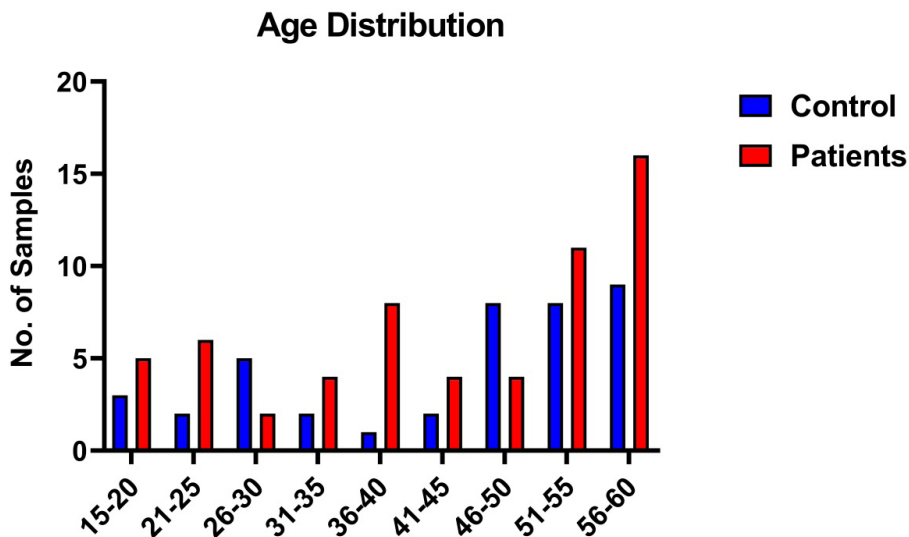


Figure (1): Distribution of Study Population According to Age Groups

The present study showed the prevalence of IBD among the elderly. in elderly more young persons.

The present study is consistent with the study of Stephanie *et al.*,⁽¹⁰⁾ which showed the Prevalence of IBD is increasing in all age groups, but particularly

Distribution of Study Population According to Residency:

Figure (2) illustrates the number of Urban patients was 47 (78%), and the number of Rural patients was 13 (22%).

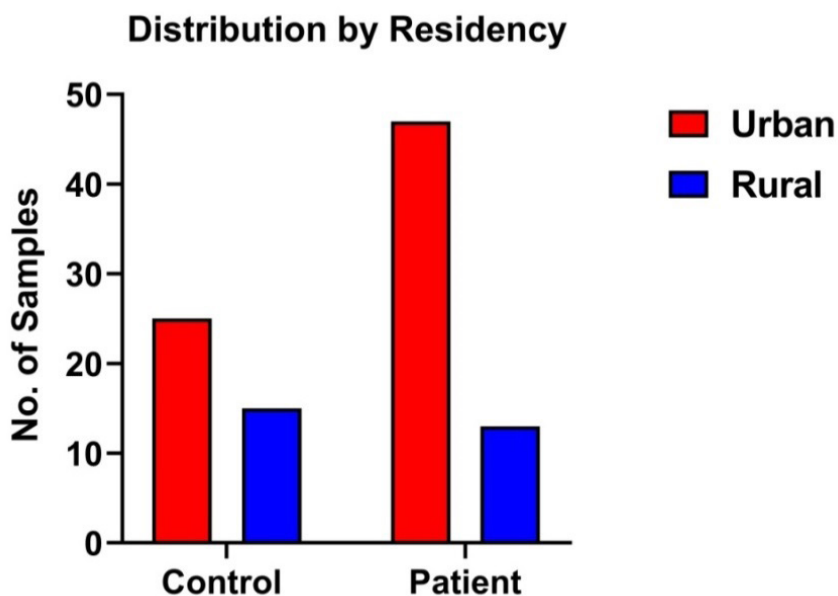


Figure (2): Distribution of Study Population According to Residency

The present study showed the prevalence of IBD in cities more than villages.

The present study is concordant with the study of Openshaw, ⁽¹¹⁾ which showed a lower incidence of rural IBD compared to urban residence.

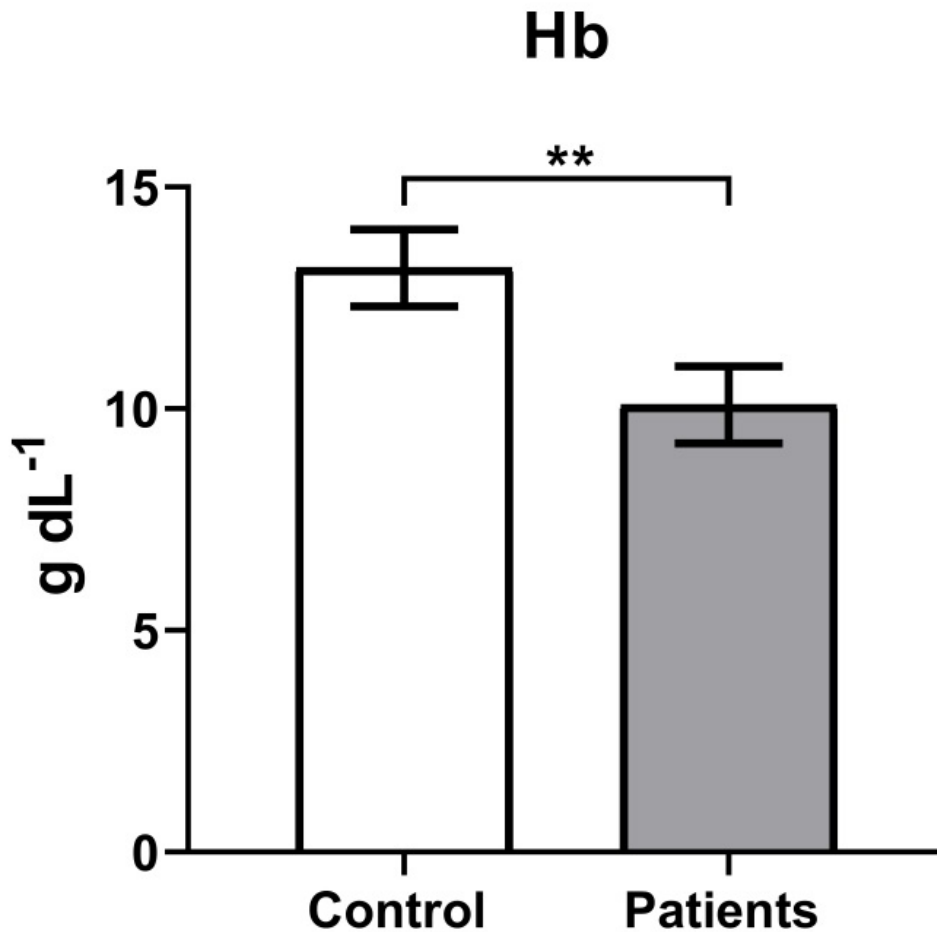
The urban diet may also influence the clinical course of IBD, as well as compared with its rural population, the urban diet contains significantly higher quantities of inert inorganic non-nutrient microparticles such as natural contaminants [soil and

dust] and food additives, which may combine with intestinal luminal components such as bacterial cell wall lipopolysaccharides to form antigenic particles.

Hematological Data Analysis :

Concentration of Hemoglobin (Hb) and Total Number of RBC :

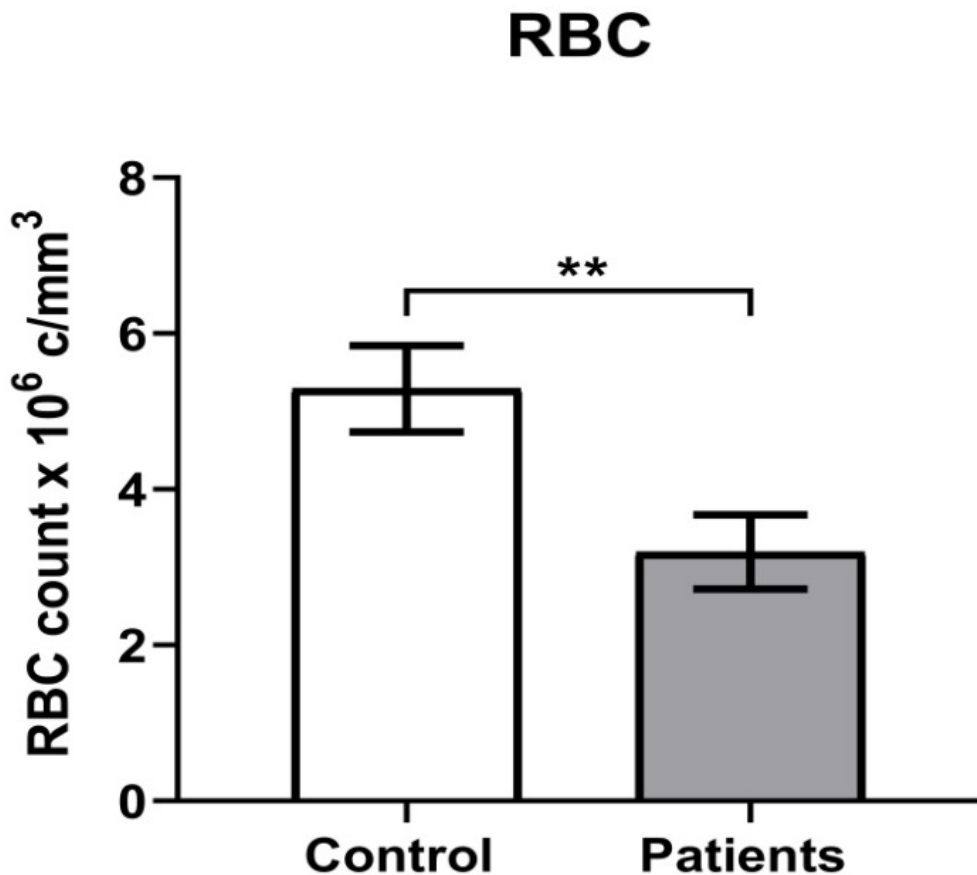
The present study showed significant difference in Hb concentration between cases and control with p-value(<0.05), the means of Hb for two groups respectively were (10.09 g/dl), (13.18 g/dl) , as shown in figure (3):



Std. Deviation: Control= 0.8658, patient = 0.8695

Figure (3): Mean levels of Hb in Patients and Control.

The present study showed significantly decrease in the Number of RBC in cases and control with p-value was (<0.05). the means of RBC for two groups respectively were ($3.194 \times 10^6 \text{ c/mm}^3$), ($5.291 \times 10^6 \text{ c/mm}^3$) shown in figure (4).



Std. Deviation: Control= 0.5541, patient = 0.4767

Figure (4): Mean levels of RBC(c/mm³) in Patients and Control.

A major finding of the present study was the strong association between anemia and disease activity in IBD patients, Moderate disease activity was an independent factor that increased 3.5-fold the risk of anemia, patients with moderate activity have a higher prevalence of anemia than those in remission or presenting with mild activity ⁽¹²⁾. The present study is concordant with the study of Veli *et al.*, ⁽¹³⁾ which showed The frequency of anemia was higher in patients with IBD than in control The incidence rate

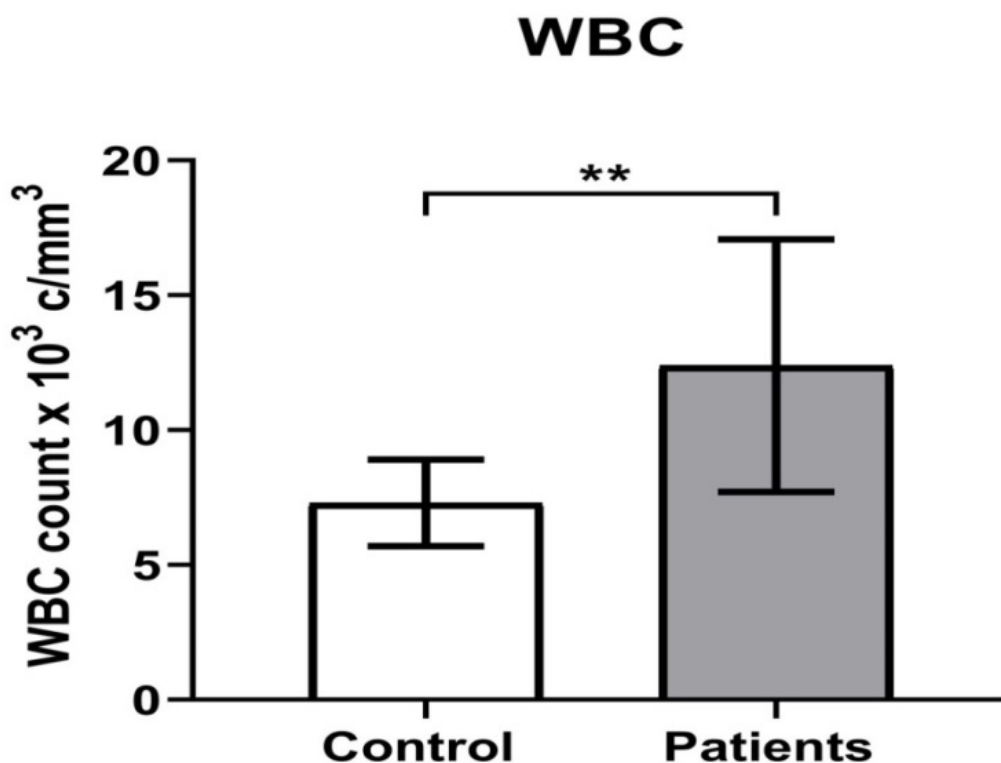
of anemia for the entire IBD was Hemoglobin 8.6 g/ Dl. The present study is also consistent with the study of Bergamaschi *et al.*, ⁽¹⁴⁾ which showed prevalence of anemia found in IBD patients with activity disease. Anemia in IBD seems to be multifactorial ⁽¹⁵⁾; As well as in conditions of B12 and folate deprivation, while it is known that the degree and severity of anemia in both Crohn’s disease (CD) and ulcerative colitis (UC) are linked to disease activity ⁽¹⁶⁾. Moreover, adequate supplementation of food was decreased in IBD patients due to the associated anorexia Additionally,

the immunosuppressive drugs given for IBD patients may result in iron malabsorption⁽¹⁶⁾. Moreover active IBD with inflammation activates the inflammatory cytokine e.g., interleukins-6 and TNF-alpha, among others), which causes elevated hepcidin levels, To one side from blocking the intestinal iron absorption, hepcidin also causes reduced release of iron from iron storing cells, leading to functional iron deficiency

leading to anemia ; also Higher oxidative stress may decrease erythrocyte life span⁽¹⁷⁾.

Total Number of WBC and Platelet:

The present study showed significantly increase in the Number of WBC in cases and control with p-value was (<0.05). the means of WBC for two groups respectively were ($12.39 \times 10^3 \text{ c/mm}^3$), ($7.300 \times 10^3 \text{ c/mm}^3$), as shown in figure (5).



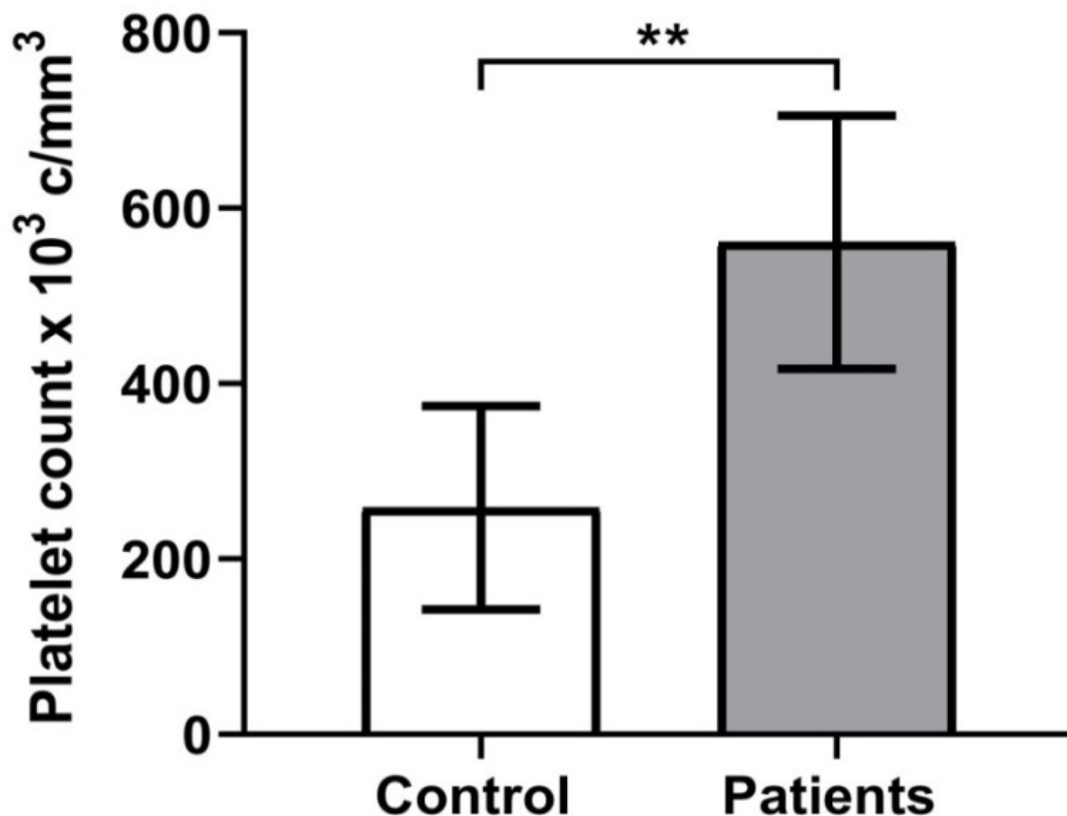
Std. Deviation: Control= 1.600, patient = 4.684

Figure (5): Mean levels of WBC(c/mm³) in Patients and Control.

The present study showed significantly increase in the Number of PLTs in cases and control with p-value was (<0.05). the means of PLTs for two groups

respectively were ($561.2 \times 10^3 \text{ c/mm}^3$), ($258.4 \times 10^3 \text{ c/mm}^3$), as shown in figure (6).

Platelet



Std. Deviation: Control= 116.1, patient = 144.4

Figure (6): Mean levels of platelet (c/mm³) in patients and control .

The leukocyte count has emerged as a marker of inflammation. the number of WBC proliferations significantly during infections, and useful information about the health status at the organismal and population level ⁽¹⁸⁾. For example autoimmune diseases, are accompanied by increased systemic inflammation and elevated leukocyte counts ⁽¹⁹⁾. The present study is concordant with the study of Veli et al., ⁽¹³⁾ which showed the number of White blood cell was higher in patients with IBD than in control the incidence rate was 16.710 mm³. The present study is also concordant with the study of Liaz *et al.*, ⁽²⁰⁾ which

showed the number of White blood cell was higher in patients with IBD than in control. An elevated WBC count is prevalence in patients with active IBD and high leukocyte count is also common in patients taking steroids due to drug-induced mobilization of marginated neutrophils ⁽²¹⁾. Elevations in WBCs and is associated with several chronic conditions ⁽²²⁾ that does consistent with present study. The typical laboratory findings of IBD are elevated in leukocytes number ⁽²³⁾ that does consistent with present study. An increase in the circulating white blood-cell count It may reveal a primary disorder of bone marrow

production response to a disease process, drug, or toxin⁽²¹⁾. The number of white blood cells increases during the acute phase response and is also influenced by the drugs utilized in IBD, as glucocorticoids⁽²²⁾. Platelets play an important role in pathogenesis of IBD, platelets are involved in the pathogenesis of chronic inflammations such as IBD⁽²⁴⁾. The present study is concordant with the study of Veli *et al.*,⁽¹³⁾ which showed the number of platelets was higher in patients with IBD than in control the incidence rate was 434,000 mm³. The present study is concordant with the study of Liaz *et al.*,⁽²⁰⁾ which showed The number of platelets was higher in patients with IBD the mean with p-value 0.006 The PLT value may be increased if inflammation occurs, Both CD and UC are associated with abnormalities in the number and function of platelets⁽²⁴⁾ that does consistent with present study. The present study is concordant with the study of Frolkis *et al.*,⁽²⁵⁾ which showed the obtained results indicate that the level is significantly higher in the IBD patients group. The present study is also concordant with the study of Tayyibe *et al.*,⁽²⁶⁾ which showed The number of PLT is significantly higher in the IBD patients which was 316.66 group comparison with control which was 265.68 .

Injury site molecules such as subendothelial collagen, activated leukocyte cytokines and endothelial cells, increased local adenosine diphosphate (ADP) concentration due to reduced capillary blood flow, substances released from neighboring cells, arachidonic acid, activating factor PLT, and thrombin production increase the accumulation and activation of PLT in the intestinal microvasculature⁽²⁷⁾.

Thrombocyte activation seen in the active period of disease not only regulates coagulation also improves mucosal inflammation, Platelets initiate and support inflammatory processes by secretion of numerous biologically active substances like platelet activation factor, platelet-derived growth factor,

platelets factor 4, IL-1, beta-tromboglobulin The increased concentration of circulating PLT activation markers in the systemic circulation of patients was confirmed in several studies⁽²⁸⁾.

PLT misses its typical discoid shape during activation, obtains projecting forms called pseudopodia, releases an increased number of microparticles and increases in size and density, several metabolic reactions occur within their cytoplasm, where different inflammatory mediators are produced⁽²⁴⁾.

Conclusions

1-prevalence of Inflammatory Bowel Disease I(BD) in elderly persons, and in cities more than villages .

2- There was significant difference in hematological parameters levels (Hb ,WBC ,RBC ,PLT) between patients with IBD and control.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

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