

## Frequency of Iron Deficiency Anemia in Patients of Inflammatory Bowel Disease at Pak Emirates Military Hospital, Rawalpindi

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### ABSTRACT

**Objective:** To determine the presence of iron deficiency anemia and assess the relationship of various factors with the presence of anemia among the patients of inflammatory bowel disease reporting to Military Hospital, Rawalpindi.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** Department of General Medicine, Pak Emirates Military Hospital Rawalpindi, from Jan to Dec 2018.

**Methodology:** Two hundred cases were recruited in this study, which were diagnosed as inflammatory bowel disease in medical outpatient department (OPD) by a consultant medical specialist or gastroenterologist. Iron deficiency anemia was diagnosed on the basis of hemoglobin and ferritin levels. Relationship of age, gender, duration of inflammatory bowel disease, type of inflammatory bowel disease and poly-pharmacy was taken into account with the presence of iron deficiency anemia among the patients suffering from inflammatory bowel disease.

**Results:** A total of 106 patients were males and 94 were females. Most common type of inflammatory bowel disease was ulcerative colitis 118 (59%). Out of 200 patients of inflammatory bowel disease, 111 (44.5%) showed the presence of iron deficiency anemia while 89 (55.5%). Long duration of illness and poly-pharmacy had a significant correlation ( $p$ -value <0.05) with the presence of iron deficiency anemia among the patients of Crohn's disease or ulcerative colitis.

**Conclusion:** High frequency of iron deficiency anemia was observed in the patients of inflammatory bowel disease in a tertiary care hospital of our country. Patients with long standing inflammatory diseases or using multiple pharmacological agents for the control of their disease had more risk for developing the anemia.

**Keywords:** Anemia, Factors, Inflammatory bowel disease.

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### INTRODUCTION

Iron deficiency anemia has been a problem faced by the patients in all parts of the world especially the population of developing countries with limited resources.<sup>1</sup> Blood indices have been affected by a number of medical, gastroenterological and neurological illnesses. Few diseases which commonly affect the individuals in respect to blood counts include chronic renal disease, endocrinopathies, liver disease, autoimmune diseases and migraine.<sup>2,5</sup>

Inflammatory bowel disease is a fairly common diagnosis in gastroenterology set ups in all parts of the world.<sup>6,7</sup> A huge number of patients suffering from Crohn's disease or ulcerative colitis also suffer from the extra intestinal manifestations.<sup>8</sup> These manifestations may be either be due to lesions in the intestines or direct immunological basis of the illness. Skin, joints, eye, liver and pancreas are the common extra

intestinal sites which get affected due to this set of chronic immunological illnesses.<sup>9</sup>

All the nutrients present in the food which after processing become part of various chemicals of our body had to be absorbed from the intestine in the first stage. It seems logical that if absorption capacity of intestines is compromised due to any clinical condition it will alter the state of absorption and result in various deficiencies. Iron deficiency leading to anemia can be one of the consequences. Lee *et al*, concluded that anemia has been a common finding among the patients of Crohn's disease and ulcerative colitis and in Crohn's disease it is linked with the hospital admission. Iron deficiency anemia was the commonest type of anemia among the patients studied in this analysis.<sup>10</sup> One study came up with slight different results regarding the prevalence and outcome of anemia. It was concluded that anemia was seen more among the patients of Crohn's disease as compared to ulcerative colitis and associated with poor treatment outcome as well. A Turkish study concluded that around half of the patients suffering from inflammatory bowel disease

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have anemia and iron deficiency anemia was the commonest type among these patients.<sup>6</sup>

Multiple etiologies predispose patients of inflammatory bowel disease towards the development of iron deficiency leading to anemia. Dietary deficiency and blood loss due to shedding of mucosal surfaces may cause iron deficiency anemia either due to decreased intake or increased loss from the body.

Damage to the absorption capacity of intestine is also one of the major factors which lead to various deficiencies among these patients; iron deficiency is one of these deficiencies. Surgical resection of intestine as part of treatment plan may add to this problem. Poly-pharmacy can also contribute in this regard and the nature and number of drugs used to treat the inflammatory bowel disease or other comorbidities may lead to iron deficiency anemia in these patients.<sup>7,8</sup>

Data from Pakistan is deficient in this aspect of inflammatory bowel diseases. Some work has been done on other aspects like epidemiology or clinical presentations,<sup>10</sup> but very limited work has been done to establish any link of these chronic diseases with the fall in hematological parameters especially the hemoglobin and the iron indices. This study was planned with the objective to assess the prevalence of iron deficiency anemia among the patients of inflammatory bowel disease and analyze the factors associated with anemia among these patients.

### METHODOLOGY

This study was planned with the correlational study design for one year duration in medicine department of our tertiary care hospital. WHO Sample Size Calculator was the tool used to calculate the size of the sample for this analysis. Study of Lee *et al*, was used as reference study to calculate the sample size by WHO calculator with prevalence of 41.6%.<sup>10</sup> Unit of General Medicine in Pak Emriats Military Hospital Rawalpindi was designated at the study setting from January to December 2018. Non probability Consecutive sampling technique was used to enroll the sample.

**Inclusion Criteria:** Patients between the age of 18 and 60 years with inflammatory bowel disease diagnosed by a consultant medical specialist or gastroenterologist based on the clinical picture, radiological findings, colonoscopy findings and the histopathology report.

**Exclusion Criteria:** Patients who were pregnant or breast feeding, had B-12 or folate deficiency or replacement therapy, had recent surgery, had NSAIDs abuse

or any autoimmune disorder were not included in the study.

Ethical review board committee of the hospital was approached to get the ethical approval for this study. Written informed consent was taken from all the potential participants of this study before the start of study after complete description of the study. Venous blood was taken from the participants between 9 and 11 a.m. after 12 hours of fasting.

Complete blood count (CBC), serum ferritin, vitamin B12, and folic acid were measured. CBC was measured using a flow cytometer and an automated analyzer. Serum ferritin was measured using a radioimmunoassay method.<sup>12,13</sup> Variables in the study included age, gender, duration of irritable bowel disease, type of irritable bowel disease and polypharmacy. Confounding variables were identified and adjusted by detailed history taking, examination and review of all the old documents possessed by the patient.

Iron deficiency anemia was defined as blood hemoglobin values of <12 g/dl and serum ferritin levels 15 ng/mL.<sup>14,15</sup> Statistical analysis for this study was done by using the software Statistical Package for the Social Sciences (SPSS) version 23. Data sheets were directly made on SPSS and processed. Descriptive statistics were used initially for the variables. Frequency and percentages were calculated for variables like patients with anemia and gender.

As establishing correlation of various factors with the presence of iron deficiency anemia was part of the objective so Pearson chi-square test was used for this purpose. The *p*-value less than or equal to 0.05 was considered as significant.

### RESULTS

Two hundred and seven patients of inflammatory bowel disease presented to us in the given time. Three were not agreeing to participate in this study. Two had recent surgery. One was pregnant and one had history of illicit substance use. Two hundred patients were included in the study after all the criteria application. disease, 89 (44.5%) patients showed the presence of iron deficiency anemia while 111 (55.5%) patients had no anemia. One hundred and six patients (53%) were males and ninety four (47%) were females. Mean age of the study participants was 36.2 ( $\pm$  4.362) Most common type of inflammatory bowel disease was ulcerative colitis 118 (59%). Long duration of illness and polypharmacy were significantly associated with the presence

of iron deficiency anemia when chi-square was applied ( $p$ -value <0.05).

**Table: Characteristics of the study group and their hemoglobin level.**

Sociodemographic Factors	No Iron Deficiency Anemia	Iron Deficiency Anemia	$p$ -value
Total	n (%) 111 (55.5)	n (%) 89 (44.5)	
<b>Age</b>			
40 year or less	48 (43.2)	39 (43.8)	0.42
40-60	63 (56.7)	50 (56.2)	
<b>Gender</b>			
Male	65 (58.5)	41 (46.1)	0.078
female	46 (41.5)	48 (53.9)	
<b>Type of Disease</b>			
Crohn's disease	44 (39.6)	32 (35.9)	0.593
Ulcerative colitis	67 (60.4)	57 (64.1)	
<b>Poly-pharmacy</b>			
No	64 (57.6)	33 (37.1)	0.004
Yes	47 (42.4)	56 (62.9)	
<b>Duration of Illness</b>			
<5 year	101 (90.9)	58 (65.1)	<0.001
5 years or more	10 (9.1)	31 (34.9)	

## DISCUSSION

Anemia could be found in any chronic illness so design of the study was made such to include only the iron deficiency anemia. Crohn's disease and ulcerative colitis previously considered as GI tract diseases are no longer considered as gastroenterological diseases but have multi system involvement from the start of illness.<sup>8,16,17</sup> Inflammation of the colon with involvement of other systems may predispose the individual towards various conditions including the iron deficiency anemia. Around 45% of our target population showed the presence of iron deficiency anemia which is in accordance with the existing literature where 30-50 percent of the IBD patients showed anemia in different studies done on this subject.<sup>10,12</sup> Pathophysiology of iron deficiency anemia among these patients is multifactorial and need detail evaluation as well as management plan.<sup>13,15</sup>

Iron deficiency anemia is a multi-dimensional problem with physical, nutritional and physiological dimensions.<sup>18</sup> Inflammatory bowel disease or its treatment may be linked with problems in all the above mentioned areas and anemia not being the presenting sign may be missed by the physician which can lead to poor outcome and quality of life during the course of management. Normal blood counts and iron indices are required for good proper functioning of human body.<sup>19</sup> Therefore diagnosing the presence of anemia

especially iron deficiency anemia in time may save the patient from grave consequences who is suffering from a chronic illness like Crohn's disease or ulcerative colitis.

There was slight male predominance of males in our population and gender was also not linked with the presence of iron deficiency anemia in our target population. This fact has also been established before where Eriksson *et al*, and others have produced similar results in their studies.<sup>11,13</sup> Usually females have predominance in iron deficiency anemia in general population due to distinct physiology but our study clearly reflected that anemia due to inflammatory bowel disease is not affected by the gender and equally affects both the genders.

Most of the cytotoxic drugs or other drugs used in the treatment of inflammatory bowel disease interfere with the hematological profile of the individual and are related to the different types of anemia's in many ways. Poly-pharmacy i.e., if more than one pharmacological agent has been used by the treating physician to control the severity of illness; patient becomes more prone to develop the hematological adverse effects like iron deficiency anemia.<sup>11,12</sup> Our study findings supported the existing results of Eriksson *et al*, and poly-pharmacy emerged as strong predictor of iron deficiency anemia among the target population.

Ulcerative colitis was more common in our study population as compared to the Crohn's disease. There was no statistically significant relationship between type of illness and presence of iron deficiency anemia. Variables results have been reported in the past, few have similar results have that of ours and few have Crohn's diseases as strong predictor of anemia especially the study of Bengi *et al*, conducted in recent past.<sup>11,12</sup> More research in different populations can throw more light on this phenomenon.

Long duration of illness is usually associated with physical and psychological consequences. Our study results revealed that patients with long duration of illness had more chance of developing iron deficiency anemia as compared to patients with less duration of illness. Various studies done in 2018 had similar results in this regard. Longer duration of illness whether treated or untreated can have direct and indirect effects on the body which can give rise to various deficiencies including the anemia.<sup>11,12</sup>

Many diseases may not directly but indirectly can lead to anemia. This fact was not fully catered for in our study so this becomes one of the major limitations

of this study. Though exclusion criteria included the other chronic diseases but more detailed assessment required to rule out this confounding factor. Moreover socio-economic and nutritional status may serve as confounding factor which was not addressed. In order to generate the results which could be generalizable to the population we need randomized sampling from patients of inflammatory bowel disease from all over the country and a better study design with a large sample size.

### CONCLUSION

High frequency of iron deficiency anemia was observed in the sufferers of inflammatory bowel disease in a tertiary care hospital of our country. Gastroenterology clinics should incorporate anemia screening in their mandate especially for the patients with long standing inflammatory diseases or using multiple pharmacological agents for the control of their disease.

**Conflict of Interest:** None.

### Author's Contribution:

MHA: Direct contribution, IF, MWAL, RA, AA, MT: Intellectual contribution.

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