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Evaluation of Patients with Anemia with Regard to Etiology and Risk Factors

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Original Research Article

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Abstract: As a significant public health problem in our country and the world, anemia is defined as hemoglobin levels below normal standards associated with age and gender. This study aims to determine the etiology of anemia and effective risk factors in patients diagnosed with anemia. This study was conducted by inspecting the recorded data and patient files of 174 randomly selected patients above the age of 18 years who had presented to our polyclinic between May 2018-October 2018 and had received a diagnosis of anemia. In the evaluation of findings, SPSS for Windows 22 package software was utilized for statistical analyses. Of the 174 patients who participated, 19 (10.9%) were male with a median age of 69 years and 155 (89.1%) were female with a median age of 37 years. The distribution of anemia types based on gender revealed that; 6 male patients (31.5%) and 33 female patients (21.2%) had vitamin B12 deficiency anemia (BDA), no male patients and 4 female patients (2.5%) had folic acid deficiency anemia (FADA), 14 male patients (73.6%) and 150 female patients (96.7%) had ıron deficiency anemia (IDA), and 6 male patients (31.5%) and 25 female patients (16.1%) had dimorphic anemia. There was a significant difference between males and females regarding the prevalence of vitamin B12 deficiency- and folic acid deficiency-related anemia; respectively $p<0.001$ and $p<0.001$. Iron deficiency anemia was more prevalent in females than in males and the difference was determined to be significant; $p<0.001$. Evaluations concerning the etiology of anemia revealed disorders of the gastrointestinal system in 103 patients (59%), with gastritis and HP infections as the most common disorders. We detected combined helicobacter pylori and gastritis in 28 (16%), gastritis alone in 33 (18.9%), h.pylori alone in 42 (24.1%), peptic ulcer in 3 (1.7%), hemorrhoid in 22 (12.6%), and inflammatory bowel disease in 8 patients (4.5%). By identifying the etiological factors and eliminating these potential causes or establishing preventive measures, the complications that can arise due to anemia will also be avoided.
Keywords: Anemia, hemoglobin, iron deficiency, vitamin deficiency, risk factors, etiology.

INTRODUCTION

Anemia is defined as hemoglobin levels below normal standards associated with age and gender [1]. World Health Organization (WHO) has defined hemoglobin concentrations below 12 gr/dL in adult females and 13 gr/dL in adult males as anemia [2, 3].

In developed countries, more than 30% of patients who present to the hospital for any reason were reported to have anemia and it was stated that this rate was higher in developing countries [4]. Iron deficiency anemia is the most prevalent type of anemia across the world [5]. The prevalence of iron deficiency was reported to vary between 30% and 70% in developing countries and the highest prevalence was seen in those with low-iron diets, with blood loss due to chronic gastrointestinal bleeding caused by helminthic infections. On the other hand, the most prominent etiological factors in developed countries are gynecological bleeding in women during the menstrual period and blood loss through the gastrointestinal system (GIS) in men and post-menopausal women [6].

Vitamin B12 deficiency anemia (BDA) is encountered at a rate between 3% and 40% in the general population and between 10-15% in individuals above the age of 60. Deficiency may be related to nutrition (alcoholism, advanced age, vegetarian diet), malabsorption (atrophic gastritis, long-term proton-pump inhibitor use etc.), and other reasons (enteritis, excess bacterial growth etc.) [7].

Folic acid deficiency anemia (FADA) has a prevalence of 2-5% in the general population. Inadequate dietary intake, absorption disorders, increased need (pregnancy, growth, hemodialysis etc.) are the leading causes of deficiency [7].

The treatment of anemia, which is a significant public health problem, is complicated by factors such as

patient noncompliance, inappropriate treatments, and lack of investigations concerning the etiological cause.

MATERIALS AND METHODS

This study was conducted by inspecting the recorded data and patient files of 174 randomly selected patients above the age of 18 years who had presented to the Internal Medicine Polyclinic at Firat University Medical Faculty Hospital between May 2018-October 2018 and had received a diagnosis of anemia.

Anemia was diagnosed based on the definition found in the WHO guide, and hemoglobin concentrations below 12 mg/dl in females, 11 mg/dl in pregnant females, and 13 mg/dl in males were considered to indicate anemia.

For all patients included in the study; age, gender, medication use if present, place of residence, full blood count, serum iron, total iron binding capacity (TIBC), ferritin, vitamin B12, and folic acid values were acquired from the patient files. Results from tests administered at initial admission and during follow-up were obtained from the hospital information system. For patients examined for iron deficiency anemia; Hb, Hct, MCV, MCHC, RBC, reticulocyte, leukocyte, granulocyte, lymphocyte, and thrombocyte counts were recorded. Serum iron and serum total iron binding capacity (TIBC) were used to calculate transferrin saturation. With regard to patient history; the presence of gastrointestinal disorders (gastritis, ulcer, polyp, diverticulum, arteriovenous malformation, malignancy, inflammatory bowel disease (IBD), hemorrhoid, presence of Helicobacter Pylori, celiac disease) and gynecological diseases (uterine benign anomalies, malign gynecological diseases, hypermenorrhea, menometrorrhagia) were determined based on data in patient files.

For patients detected to have gastrointestinal system disorders, results of endoscopy and colonoscopy done by the gastroenterology department; and for patients detected to have gynecological diseases, results from obstetrical and gynecological consultations were recorded. We noted the treatments administered subsequently to the identification of anemia etiology. Biochemical data of our patients were obtained from the data system that holds the test results we routinely order for anemia from the biochemistry laboratory at our hospital.

All statistical analyses were performed using computer software package programs (SPSS-22). Tests used in the evaluation of experimental data included descriptive statistical methods [Mean ($\bar{x}$), Standard deviation (SD)]; while quantitative data was analyzed using the Student's t-test in testing parameters that show normal distribution, one-way variance analysis in comparisons across groups (One-way ANOVA), and Wilcoxon matched pairs test that tests the significance of the difference between pairs; whereas in the comparison of qualitative data, the chi-square test was utilized and the results were evaluated with a 95% confidence interval and a $p<0.05$ level of significance.

RESULTS

Of the 174 patients who participated, 19 (10.9%) were male with a median age of 69 years (min:66 and max:85) and 155 (89.1%) were female with a median age of 37 years (min:18 and max:91). The median age of all patients included in the study was determined as 47.1 years. According to the evaluation of the patients' place of residence, 78.7% resided in the city center and 21.2% in the countryside. Based on the inspection of patient habits, 38.8% cases who smoked one or more cigarettes per day were considered active smokers, and 88.5% consumed more than 3 cups of tea and/or coffee.

Chronic accompanying diseases such as diabetes mellitus (DM), hypertension (HT), heart failure, and thyroid disorders were present in 17 (9.7%) cases. Of our cases, 16.6% used proton pump inhibitor (PPI), 8.6% nonsteroidal anti-inflammatory medication (NSAID), 6.3% aspirin, and 2.8% NSAID and PPI. When evaluated based on their history and physical exam results; 94.8% of the cases presented fatigue, 65.5% dizziness, 40% paresthesia, 14.9% changes in nails, 13.2% history of pica, 52.8% hair loss or breaking, 20.6% palpitations, and 6.8% syncope or presyncope. Laboratory test values of our cases obtained at admission to our polyclinic have been presented in Table 1. The distribution of anemia types based on gender revealed that; 6 male patients (31.5%) and 33 female patients (21.2%) had BDA, no male patients and 4 female patients (2.5%) had FADA, 14 male patients (73.6%) and 150 female patients (96.7%) had IDA, and 6 male patients (31.5%) and 25 female patients (16.1%) had dimorphic anemia. There was a significant difference between males and females regarding the prevalence of vitamin B12 deficiency- and folic acid deficiency-related anemia; respectively $p<0.001$ and $p<0.001$. Iron deficiency anemia was more prevalent in females than in males and the difference was determined to be significant; $p<0.001$.

According to the evaluation of anemia etiology; 103 patients (59%) had disorders of the gastrointestinal system, with gastritis and HP infection leading in prevalence. Combined helicobacter pylori and gastritis was detected in 28 (16%), gastritis alone in 33 (18.9%), %), h. pylori alone in 42 (24.1%), peptic ulcer in 3 (1.7%), hemorrhoid in 22 (12.6%), and inflammatory bowel disease in 8 patients (4.5%). Angiodysplasia, malignant kidney neoplasm, malignant neoplasm of rectum, and celiac disease were detected in 1 patient each and the associated prevalence was determined as 0.5%. Of our female patients, 50 (32.2%) experienced menstrual irregularities. In their

gynecological examinations, 15 female patients (9.6%) had benign uterine disorders detected and 1 patient gynecological malignancy, with a prevalence of 0.6%.

The distribution of anemia types based on gastrointestinal system disorders detected in our patients has been presented in Table 2.

Table-1: Laboratory test values of 174 study patients obtained at the time of admission

Parameter (unit)	Lowest value	Highest value	Mean
Hb(g/dl)	3,7	11,8	8,9
MCV(fl)	54,9	125,5	72,5
Iron(µg /dl)	3	174	20,7
TIBC (µg/dl)	240	560	410,4
Ferritin (ng/ml)	0,7	301,8	15,6
Folic acid (ng/ml)	0,94	22,9	8,1
B12(pg/ml)	94	1432	305,4

A remarkable finding was that the presence of Helicobacter pylori was associated with IDA and BDA at a much higher rate compared to other etiologies. Cases with gastritis ranked second. Similarly, this group of patients manifested IDA and BDA at higher rates compared to other disease groups. Although combined gastritis and FADA was also detected at high rates, this was concluded to be related to the number of patients and restricted data available for this group.

Table-2: Distribution of anemia types based on gastrointestinal system disorders detected in our study patients

GIS Disorder		BDA		FADA		IDA
	n	%	n	%	n	%
Gastritis	13	33,3	2	66,6	46	31
Ulcer	0	0	0	0	2	1,3
Polyp	3	7,6	0	0	19	12,8
H. Pylori	20	51,2	0	0	50	33,7
IBD	0	0	1	33,3	7	4,7
Hemorrhoid	2	5,1	0	0	22	14,8
Malignancy	1	2,5	0	0	1	0,6
Celiac	0	0	0	0	1	0,6

GIS: Gastrointestinal system, BDA: Vitamin B12 deficiency anemia, FADA: Folic acid deficiency anemia, IDA: Iron deficiency anemia, IBD: Inflammatory bowel disease

DISCUSSION

With a prevalence of 51% across the world, iron deficiency anemia is the most frequently encountered nutritional problem. According to the World Health Organization, 21-80% of all women in the world are anemic. Iron deficiency anemia comprises 40-89% of this rate. WHO reports this rate as 22.9% in Europe and 24.3% in Turkey [8]. IDA, which affects 30% of the world population based on data from the World Health Organization, affects 47.4% of preschool children and 41.8% of pregnant women [8].

The female/male ratio of DEA was determined to be between 1.3 and 2.1 in the United States of America [9]. Two studies conducted in our country reported rates of 1.48 and 2.21 [4, 10]. In our study, the female/male ratio was found to be higher than stated in the literature to favor females. This may be linked to the fact that our study is not a field survey, that evaluations were made only on patients who presented to the polyclinic, and that male patients have lower rates of presentation to the hospital than females.

In their study, Caneroglu and colleagues stated that 80.5% of the cases diagnosed with IDA resided in the city center and 56.5% had an education level of middle school or higher [11]. Similar results were obtained in our study and 137 (78.7%) of the enrolled 174 patients were found to reside in the city center.

Al-Quaiz reported the prevalence of antacid use at the time of admission as 16% and NSAID use as 30% [12]. NSAID use was detected as 35.3% in cases detected to have anemia in another study [11], and while the rate of patients who use PPI in our study was consistent with the literature (16.6%), the rate of NSAID use was lower (8.6%).

At the time of admission, our patients with anemia presented fatigue (94.8%) and dizziness (65.5%) as the most prevalent chief symptoms. Neurological and cardiological symptoms such as paresthesia (40%), palpitation (20.6%), and syncope (6.8%) were observed less frequently.

In the study Saruc and colleagues conducted on cases with anemia with regard to gastrointestinal causes, GIS pathology was detected in 61.7% of the patients, with gastritis and ulcers being the most common pathologies [13]. Paralleling the literature, our

study determined H. pylori positivity with or without gastritis (40.2%) and gastritis independent of H. pylori (18.9%) as the most common causes. Menstrual irregularity (32.2%) was observed to be one of significant etiological causes of iron deficiency anemia in female patients in our study.

In conclusion; iron deficiency was the most common cause of anemia in anemic patients who presented to the hematology polyclinic. BDA and FADA rarely occur alone, and usually manifest alongside IDA as dimorphic anemia. Iron deficiency anemia is a prominent health problem in developed and developing nations. As this study has also shown, anemia is a health problem that affects the entire society, particularly those with a high level of education and those who reside in the city center. It is more prevalent among females than in males. Increased tea-coffee consumption and tobacco-alcohol use is paralleled by an increase in the prevalence of anemia. Anemia is detected incidentally in some patients as they present to a physician for other reasons, however most patients present with symptoms associated with anemia. Accordingly, the symptoms encountered most frequently in this study consisted of fatigue, dizziness, paresthesia, changes in nails (spoon nails), pica, hair loss, palpitations, and syncope-presyncope. Loss through the gastrointestinal channel is the most significant cause of iron deficiency anemia. Medications used by the patients manifest as causes in the etiology of anemia as NSAIDs and aspirin cause both GIS bleeding and decrease iron absorption, and PPIs decrease iron absorption. The use of aspirin, other antiaggregant medications and anti-coagulants increases at advanced age as cardiovascular diseases become more common, leading to an increase in gastrointestinal complaints.

In anemia, which has become a public health issue and can be treated at primary health institutions, the most notable problem that results in treatment failure and causes recurrence to be encountered quite frequently appears to be patient compliance to treatment. Identifying etiological factors and eliminating these potential causes or establishing preventative measures will also prevent the complications that may appear as a consequence of anemia.

Ethics Committee Approval: was obtained from Firat University Medical Faculty Hospital Ethics Committee, dated 09.10.2018 and numbered 17/04.

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