Nat. Volatiles & Essent. Oils, 2021; 8(4): 15153-15160

NVEO
Natural Volatiles &
Essential Oils

Study Some Of Haematologicalin The Celiac Disease Patients Of AL, Muthannaprovince-Iraq

Ahmed A. N. ALFhade*, Yahya A. R. A. Al Khafaji* , Mohannad A. G. Al Nasarei*

* Department of Biology , College of Science, Thi-Qar Univirsity

Abstract

Objective: To identify the value some of haematologicalparametersexamination in diagnosis of celiac disease patients.

Patients and methods: A prospective case series study was conducted at private clinics in Al-Muthanna city during the period from July 2020 to March 2021. A total of 75 patients (35 males, 40 females) and total of 25 healthy individuals (13 males, 12 females). with symptoms suggestive of celiac disease were screened by haematological testing using Mythic™ 18 (RINGELSAN CO., Turkey) . Data were processed by using statistical program social science (SPSS 22). T test was used to find the P value of antiradar markers. The level of significance was 0.05 (or less) in all statistical testing, (p value less than 0.05).

Results:(RBC, HGB, MCV) was lower significant ($P < 0.05$) in the patients group, male patients and female patients than the control group, male control and female control. (RDW) was significant increase ($P < 0.05$) in the patients group, male patients and female patients , compared with the control group, male control and female control . All the parameters non-significant ($P < 0.05$) difference between male patient and female patient.

Keywords : Celiac, RBC, HGB, MCV, RDW

Introduction

Celiac disease is a genetically predisposed disorder characterized by villous atrophy, crypt hyperplasia, and lymphocyte infiltration in the small intestine in response to gluten-containing foods such as wheat, rye, oats, and barley (1).Celiac disease, on the other hand, is a systemic ailment that can affect organs other than the small intestine, including the colon, thyroid, skin, pancreas, and liver (2).Gluten's immune reactivity progresses over time, resulting in pathological alterations (3). Wheat gluten proteins, which cause celiac disease, are the grain's primary storage proteins, which are further divided into gliadins and glutenins (4). The global prevalence of celiac disease in the general population is estimated to be between 1% to 2% (5). Celiac disease develops as a result of damage to the mucosa of the upper small intestine caused by gluten (6). the most considerably seen hematological disorder seen in celiac disease (7). Anemia is the presenting symptom in at least 10%–20% of CD patients, and iron deficiency is the major cause (8).There is directory supporting that diverse environmental factors, such as recurrent gastrointestinal infections or early infant weaned may also contribute to triggering the celiac disease (9).

Material and methods

Subjects

One hundred children , adolescents, adults and elderly from three year to fifty five years were enrolled in this study, including seventy five celiac patients and twenty five healthy individuals as control group.All patients in the study were referred and diagnosed by serological marker in the celiac in Al-Hussein teaching hospital in Al-Muthannaand in Al-Muthannachildren's Hospital and some specialized medical clinics in Al-Muthanna.

Serum Sampling

Blood samples were taken from all patients and healthy individuals in this study for serological studies. Approximately six milliliters of blood samples was collected intravenous from patient and control groups. Blood was divided into two parts: two milliliters of the blood was immediately transferred into EDTA tube, 10µl placed in EDTA tubes for measurement of haematological parameters.

Classification Criteria:

The seventy five celiac patients were classified into two groups according to the gender as follows:

1. Group female (F): Forty patients.
2. Group male (M): Thirty five patients.

The twenty five healthy individuals were classified into two groups according to the gender as follows:

1. Group female (F): Twelve healthy individuals.
2. Group male (M): Thirteen healthy individuals.

Methods

The haematological parameters were performed on EDTA blood using Mythic™ 18 (RINGELSAN CO., Turkey) in Haematology Laboratory of Al-Hussein teaching hospital in Al-Muthannagovernorate. Mythic 18 is a fully automated haematology analyzer performing complete blood count (CBC) on EDTA anticoagulated blood. This instrument was used widely in human medicine.

Statistical analysis

Data were processed by using statistical program social science (SPSS 22). T test was used to find the P value of antiradar markers. The level of significance was 0.05 (or less) in all statistical testing, (p value less than 0.05).

Results and discussion

Determine the number of red blood cells in the celiac patients with the control group (male and female):

As provided in table (1-1), the mean counts of (RBC) was lower significant ($P < 0.05$) in the patients group, male patients and female patients (4.23 ±0.1, 4.23 ±0.1, 4.24 ±0.1) respectively,than the control group, male control and female control (4.70 ±0.1, 4.72 ±0.2, 4.68 ±0.1) respectively.

Table (1-1): A comparison between the number of (RBC) in the celiac patients, male and female, with the control group:

RBC $\times 10^9$/L	Patients n = 75	Control n = 25	male Patients n= 35	male Control n= 13	female Patients n= 40	female Control n= 12
Mean	4.23^a	4.70^b	4.23^a	4.72^b	4.24^a	4.68^b
± SE	0.1	0.1	0.1	0.2	0.1	0.1
p - value	<0.0001		0.003		0.009	

The same letters indicate non-significant difference between groups but different letters indicate significant between groups, based on t-test.

The present study indicated significant decrease in RBC count, in all groups of patients with celiac disease compared to healthy control group, the results obtained from this study matched with (9),who had stated the deterioration of the production of erythrocytes associated with autoimmune diseases, decrease in half-life of red blood cells and direct inhibition of hematopoiesis, and relative deficiency of erythropoietin which controls the formation of red blood cells by a process called Erythropoiesis.

This study suggest to deficiency ferritin levels of the celiac patients other words, iron-deficiency in the serum lead to decrease in RBC count, this inference were in identical with (10),who had stated the among people with iron-deficiency up to 9% will test positive for celiac disease the cause of their red blood cells less, because they're not absorbing enough iron
from the food they eat, that's because in CD, eating gluten-containing foods causes body to attack the lining of small gut, weaken ability to absorb nutrients (including iron).

May be occult blood loss in the gastrointestinal (GI) is why it decrease in RBC count, these results were in agreement with (11), who has stated there is occult gastrointestinal bleeding was seen in 25 percent to 54 percent of CD patients, depending on the degree of villous atrophy, also according to another study (12), who have stated in 26.7 percent of children with CD, occult GI blood loss was observed, and it appears to respond to therapy with a gluten-free diet GFD.

We believe the cause of the body does not receive a regular supply of necessary nutrients, the RBCs may become malformed or die off at a faster rate than the body can replace them, can give the low RBC levels, this is consistent with previous studies (13), who has stated the bone marrow continuously produces RBCs, and when it is not absorbed enough essential nutrients (Vitamin B-12 ,Iron, Copper) the RBCs may become malformed or die off at a faster rate than the body can replace them

Determine the levels of hemoglobinin the celiac patients with the control group (male and female):

The results of the current study showed that there is significant decrease ($P < 0.05$) in levels of hemoglobin(9.42 ±0.2, 9.40 ±0.3, 9.43 ±0.3) in the patients group, male patients and female patients respectively,Compared with the levels hemoglobin (13.68 ±0.3, 13.62 ±0.4, 13.74 ±0.4) in the control group, male control and female control respectively. As in the table (1-2).

Table (1-2): A comparison between the levels of hemoglobin in the celiac patients, male and female, with the control group:

HGB g/dl	Patients n = 75	Control n = 25	male Patients n= 35	male Control n= 13	female Patients n= 40	female Control n= 12
Mean	9.42^{a}	13.68^{b}	9.40^{a}	13.62^{b}	9.43^{a}	13.74^{b}
± SE	0.2	0.3	0.3	0.4	0.3	0.4
p - value	<0.0002		<0.0001		<0.0001	

The same letters indicate non-significant difference between groups but different letters indicate significant between groups, based on t-test.

Our findings are incoming ware the levels of hemoglobin decrease in the celiac patients, this is consistent with previous studies (14;15), who had stated this pathological process is characterized by the concentration of hemoglobin (Hb) is abnormally low because the production of smaller red cells. As well as (16), who have stated there is Low serum levels of hemoglobin, are more commonly detected in CD.

This study suggest occurring anemia in the celiac patients that occurs when blood production is disturbed, there is blood loss, and there is poor or a lack of iron absorption, The results obtained from this study matched with (17;18), who has stated the iron is an essential trace element that actsas a catalytic center for a broad spectrum of metabolic functions, iron, as a component of heme in hemoglobin, deficiency of iron, resulting in anemia. The anemic patients, defined by the World Health Organization (WHO, 2008) as those people of a haemoglobin concentration below 12 g/dl in women and 13 g/dl in men, they are the common people with celiac disease.

One of the most frequent causes of anemia in CD patients is iron deficiency anemia (IDA), also the results in this study were shown microcytic hypochromic anemia (decreased MCV) and this occur in iron deficiency anemia. The low level of the hormone Erythropoietin and malnutrition are the most important causes of a deficiency in hemoglobin, which leads to anemia (19).

Anemia can be caused by a drop in ferritin levels in the blood serum, as ferritin is the body's principal store of iron, and its lack causes iron deficiency anemia and this result was in agreement with study (20). Also these results were in agreement with (22),who have stated the most prevalent kind of anemia in humans is iron deficiency anemia (IDA), which is caused by either excessive iron loss or reduced iron absorption.In addition, the study (3), determined lower Hb, Hct and MPV values in the CD group.

Determine the levelof mean corpuscular volumein the celiac patients with the control group (male and female):

The results of the current study showed that there is significant decrease ($P < 0.05$) in levels of mean corpuscularvolume(68.88 ±1.3, 68.78 ±1.7, 68.99 ±1.8) in the patients group, male patients and female patients respectively,Compared with the levels of mean corpuscularvolume(89.12 ±0.9, 89.02 ±1.3, 89.21 ±1.2) in the control group, male control and female control respectively.

Table (1-3):A comparison between the levelof mean cell volume in the celiac patients, male and female, with the control group:

MCV fl	Patients n = 75	Control n = 25	male Patients n= 35	male Control n= 13	female Patients n= 40	female Control n= 12
Mean	68.88^{a}	89.12^{b}	68.78^{a}	89.02^{b}	68.99^{a}	89.21^{b}
± SE	1.3	0.9	1.7	1.3	1.8	1.2
p -value	<0.0001		<0.0002		<0.0001	

The same letters indicate non-significant difference between groups but different letters indicate significant between groups, based on t-test.

As in the table (1-3).

It's probably the reason which mentioned (20 ; 21), in the study who have stated there is as a decrease in (Basophilic erythroblast) causes a decrease in the red blood cells count, which is mainly reflected in the values of MCV, which causes a decrease, and this is what was observed in the results of the current study which the level of mean corpuscularvolume (M.C.V) was significant decrease in the patients group comparison with the control group.

The results of the current study indicated that there was a significant decrease in the concentration of hemoglobin, and this could lead to a significant decrease (P <0.05) in the level of mean cell volume (M.C.V) and the mean of cellular hemoglobin (M.C.H), These results were similar to him (23) and (24).

Determine the percent ofred cell distribution widthin the celiac patients with the control group (male and female):

The results of the current study showed that there is significant increase (P < 0.05) in percent ofred cell distribution width(16.3 ±0.3, 16.21 ±0.3, 16.42 ±1.8) in the patients group, male patients and female patients respectively,Compared with the percent of red cell distribution width(89.12 ±0.9, 89.02 ±1.3, 89.21 ±0.5) in the control group, male control and female control respectively. As in the table (1-4).

Table (1-4): A comparison between the percent of red cell distribution width in the celiac patients, male and female, with the control group:

RDW %	Patients n = 75	Control n = 25	male Patients n= 35	male Control n= 13	female Patients n= 40	female Control n= 12
Mean	16.3^{a}	15.2^{b}	16.21^{a}	15.29^{b}	16.42^{a}	15.06^{b}
± SE	0.3	0.1	0.3	0.2	0.5	0.1
p - value	0.001		0.017		0.016	

The same letters indicate non-significant difference between groups but different letters indicate significant between groups, based on t-test.

The results of the current study showed that there is significant increase in (RDW) in the patients group compared with the (RDW) in the control group, Our findings are consistent with those of previous studies, which also reported high rates of elevated RDW in newly diagnosed CD patients (25; 26).

RDW is a good indicator of the degree of anisocytosis, may be the increase due to in iron deficiency, when there is defective and delayed synthesis of hemoglobin the continued cell division leads to microcytosis, similar results ware also reported by (27).

The increase was probably due to IDA can reveal anemia, low mean corpuscular volume (MCV) , low serum iron, low serum ferritin or anisocytosis, this study shows that increased red blood cell distribution width (RDW), this is consistent with previous studies (26),who have they concluded that in their studies.

References

1-Semwal P, Gupta RK, Sharma R, et al. (2018). Comparison of Endoscopic and Histological Findings between Typical and Atypical Celiac Disease in Children. PediatrGastroenterolHepatolNutr. 21:86-92.

2- Kim J.V. and Wu G.Y. (2021). Celiac Disease and Elevated Liver Enzymes: A Review. J ClinTranslHepatol. 9(1): 116–124.

3- Asik A., Dereci S., Tekin M. (2020). An evaluation of inflammation with mean platelet volume in children with celiac disease. Annals of Medical Research. 27(7):1977-1981.

4- Lindfors K, Ciacci C, Kurppa K, Lundin KEA, Makharia GK, Mearin ML, Murray JA, Verdu EF, Kaukinen K. (2019). Coeliac disease. Nat Rev Dis Primers. 10;5(1):3. doi: 10.1038/s41572-018-0054-z. PMID: 30631077.

5- Singh P, Arora A, Strand TA, Leffler DA, Catassi C, Green PH, Kelly CP, Ahuja V, Makharia GK. (2018). Global Prevalence of Celiac Disease: Systematic Review and Meta-analysis. ClinGastroenterolHepatol. 16(6):823-836.

6- Jericho H, Guandalini S. (2018). Extra-Intestinal Manifestation of Celiac Disease in Children. Nutrients .10:755.

7- Halfdanarson TR, Litzow MR, Murray JA. Hematologic manifestations of celiac disease. Blood 2007;109:412–21.

8- Harper JW, Holleran SF, Ramakrishnan R, Bhagat G, Green PH. (2007). "Anemia in celiac disease is multifactorial in etiology". Am J Hematol. 82:996-1000.

9- Mårild K, Dong F, Lund-Blix NA, Seifert J, BarónAE,Waugh KC, et al. Gluten intake and risk of Celiac disease. Am J Gastroenterol. (2019) 114:1307–14.

10- Abu dayaH, Lebwohl B, Lewis SK, Green PH. (2013). Celiac disease patients presenting with anemia have more severe disease than those presenting with diarrhea. ClinGastroenterolHepatol. 11(11):1472-7.

11- Fine KD. (1996)The prevalence of occult gastrointestinal bleeding in celiac sprue. N Engl J Med. 334:1163–1167.

12- Shamir R, Levine A, Yalon-Hacohen M, et al. (2000). Faecal occult blood in children with coeliac disease. Eur J Pediatr. 159:832–834.

13- Jon J., Medically reviewed by Kevin Martinez, M.D.(2020). How to increase red blood cell count. An article in the Journal Medical News Today. V.123, -293-353.

14- Martín-Masot R, Nestares MT, Diaz-Castro J, López-Aliaga I, Alférez MJM, Moreno-Fernandez J, Maldonado J. (2019). Multifactorial Etiology of Anemia in Celiac Disease and Effect of Gluten-Free Diet: A Comprehensive Review. Nutrients. (2019) Oct 23;11(11):2557.

15- Al-Rumaidh S.Z., Almuswie R.T., Lafta L.R. and Hafedh A.A. (2017). Effects of Metformin and diet on hemoglobin, cholesterol and triglyceride levels of Type 2 diabetic Patients. J.Thi-Qar Sci. Vol.6 (2). P.45-49.

16- Baydoun A, Maakaron JE, Halawi H, et al. (2012). Hematological manifestations of celiac disease. Scand J Gastroenterol. 47:1401–11.

17- Cashman K D. (2011).Trace Elements, Nutritional Significance (Encyclopedia of dairy sciences).University College Cork, Ireland. p. 933-940.

18- Nafaa F.M., Al-Tamemi M.B. and Al-Fartsoi K.G. (2015). The evaluation of some hematological parameters of human tuberculosis in Thi-Qar province. J.Thi-Qar Sci. Vol. 5(2). P. 27-30.

19- Checherita, I. A. ; Turcu, F. ; Dragomirescu, R. F. and Ciocalteu, A. (2010) . Chronic Complications in Hemodialysis : Correlations with Primary Renal Disease . Romanian Journal of Morphology and Embryology, 51(1) : 21–26 .

20- Porter, D.R.; Sturrock, R.D.andCapell, H.A.(1994). The use of serum ferritin estimation in the investigation of anaemia in patients with rheumatoid arthritis. ClinExpRheumatol. 12:179-182.

21- Ibraheem I.R. (2009). Some of Hematclogical and Biochemical Parameters of Children Infected with Anemia in Samawa City. J.Thi-Qar Sci. Vol.1 (4). P. 32-33.

22- Andrews NC. (2004). Disorders of iron metabolism and heme synthesis. In: Greer JP, Foerster J, Lukens JN, Rodgers GM, Paraskevas F, Glader B, editors. Wintrobe's Clinical Hematology. 11th ed. Vol 1. Philadelphia, PA: Lippincott Williams &Wilkins; pp. 979–1009.

23-Mohsen I. H. (2010). Effect of arithritis on some blood criteria in women in Najaf governorate. Submitted to the Council of the College of Science \ University of Kufa.In Partial Fulfillment of the Requirements for the Master Degree in Biology-Zoology.

24-Gibson,J.G. and Evans,W.A.(1973).Clinical studies of the blood volume. I. Clinical application of a method employing the azo dye "Evans Blue" and spectrophotometer. J. Clin. Investigation 18:301,317.

25 -Balaban DV, Popp A, Lungu AM, Costache RS, Anca IA, Jinga M. (2015). Ratio of spleen diameter to red blood cell distribution width: a novel indicator for celiac disease. Medicine (Baltimore). 94(15):e726.

26 - Balaban, D.V.; Popp, A.; Beata, A.; Vasilescu, F.; Jinga, M. (2018). Diagnostic accuracy of red blood cell distribution width-to-lymphocyte ratio for celiac disease. Rev. Romana Med. Lab. 26, 45–50.

27 - Sarma P. Ravi (1990). Clinical Methods: The History, Physical, and Laboratory Examinations, Chapter 152Red Cell Indices.3rd edition. Butterworth Publishers, a division of Reed Publishing. p. 720-723.