Types of Anemias with Low MCV Using Mentzer Index and RBC Count among Patients Seen in Basrah Al-Sadir Teaching Hospital

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Abstract

Objective: The aim of this study to give simple guide to primary care physician to know the common type of anemias from Hematological indices of ,low hemoglobin. low MCV, RBC count index above or below 5 million and Mentizer index above 13 or below 13.

Method:76 female ages between 18 -36 years with low Hemoglobin[below 10 gm/dl] and MCV below 65Fi were studied prospectively . RBC count and Mentzer index, which is the ratio of MCV/RBC count 13 or below 13, were taken as hematological indices for assessment the type of anemia.Three types of anemia have been studied, Iron deficiency anemia, Thalassemia trait and chronic anemia.

Results:48 patients[63.2%] where found to have iron deficiency anemia and all of them with Mentzer index above 13 and RBC count less than 5 million/cmm. While 10 patients[13.2%] were found to have beta Thalasemia minor and all of them with Mentzer index less than 13 and RBC count more than 5 million/cmm. The remaining 18 patients [23.7%] were found to have chronic anemia with variable Mentzer index and RBC count .WBC and platelet count were normal in all type of anemia.

Conclusion: The hematological markers of low MCV , RBC count above 5 million or below 5 million /cmm and Menzer index above 13 or below 13 can be used as a guide to primary care physician to know what is the most likely type of anemia especially in area where there is limitation in doing further investigations and avoid giving unnecessary medications. Iron deficiency anemia patients have high Menzer index and low RBC count while all Thalassemia trait patients have low Mentzer index and high RBC count Our study was revealed also that majority of anemia with low MCV is iron deficiency anemia.

الخلاصة

الاهداف:لغرض معرفة نوع فقر الدم من بين المرضى المصابين بفقر دم اقل من ١٠ غم باعتماد على معدل عدد كريات الدم الحمر والمنزر اندكس

الطريقه:جرى البحث على ٧٦ مريض مصابين فقردم اقل من ١٠ غم ومعدل عدد كريات الدم الحمر الحمر اقل من ٦٥ ادخلت ضمن البحث عدد كريات الدم الحمو ومنزر اندكس وهويساوى معدل حجم كريات الدم الحمر/عدد كريات الدم الحمراخدت كعلامات لمعرفة نوع فقر الدم

النتيجة:٤٨ مريض وجدوا مصابين يفقر الدم الناتج عن نقصان الحديد ووجد عندهم منزر اندكس اكثر من ١٣ بينما عدد كريات الدم الحمر اقل من ٥ ملايين كما تبين فى الدراسة ان ١٠من المرضى مصابين بحاملي صفت الثلاسمية حيث يكون المزر اندكس اقل من ١٣ وعدد كريات الدم الحمر اكثر من ٥ ملايين اما المتبقون من المرضى فعددهم ١٨ فمصابين بفقر الدم المزمن ولايمكن تميزهم بالاعتماد على المنزر اندكس اوعدد كربات الدم الحمر

الاستنتاج:العلامات الدم التي تشمل قيمة معدل حجم كريات الدم عدد كريات الدم الحمرومنزر `اندكس هو طريقة سهله يمكن الاعتماد عليها في المراكز الصحية باعطاء فكره ترجيحيه عن نوع فقر الدم وايضا بين البحث ان نوع الفقر الدم الناتج عن الحديد هو الاكثر نسبة.

Introduction

Anemia may be defined as state in which Hemoglobin below normal range. 30% of world populations might be effected at every now and then as estimated by world health organizations. Normal hemoglobin consists of four chain two alpha with 141 amino acids and two beta with 146 amino acids. More than 96% of normal Hemoglobin is A type [1].MCV(Mean Cell Volume)is one of the blood cell indices. Its normal value is 87 fi-103 fi. In adult. low MCV might be seen in Thalasemia trait, Iron deficiency anemia and siderobastic anemia[2,3]. High MCV suggest vitamin B12 defeciency, folic acid deficiency,liver disease and hypothyroidism[4].

Normal MCV is seen in majority of chronic anaemia due to chronic disease and only 20% have low MCV [3,5]

Different types of discrimination indices has been used in hematology likes Mentzer Index, Srivastava Index, Shine and Lal Index, green and king index , red blood cell (RBC) count, red blood cell distribution width and red blood cell blood distribution width index.[6]

None of them has sensitivity or specificity of 100%.Highest sensitivity and specificity of 82% and 80 % respectively when RBC count and distribution width index has been used.[6]

Mentzer index is ratio of MCV/RBC count when the quotient is less than 13 this finding is most likely seen in Thalassemia and if the quotient is greater than 13,this is most likely seen in iron deficiency anemia[7]

The iron deficiency anemia is hypochromic microcytic anemia with low MCV, low serum iron and low serum ferritin [8,9]

Beta Thalasemia trait is not rare in basrah. It is atype of hemolytic anemia which is microcytic anemia. It is genetic disease in which there is defect in synthesis of Beta chains. Most patients are asymptomatic and condition discovered on routine medical examination [10].

In alpha Thalassemia there is deletion of two alpha genes resulting in mild hypochromic anemia similar to beta Thalassemia,however hemoglobin A2 is high in beta Thalassemia and low in alpha Thalassemia.[10]

Chronic anemia is variable in severity and is thought to be due to reduction in RBC production by bone marrow and also shortening of RBC surviva. It is usually associated with normal MCV (normocytic normochromic), however 20% has low MCV. The factors responsible for the chromic anemia are trapping of iron in macrophage so that there is no iron available for hemoglobin synthesis and in some cases there is reduction of erythropoietin production [11].

Methods

76 female patients were seen Alsadir Basrah Teaching Hospital south of Iraq and have been studied prospectively from July 2011- July 2012, their ages between 18-36 years. All these patient came for general check up or they came with general symptoms of anemia like fatigability, headache or dizziness.

Some cases, they came with other systems involvement or referred cases of anemia for investigations .Sample of blood was taken from each patient and sent to hematology department for checking, Hemoglobin level ,RBC count and MCV using Ruby machine (cell-Dyn Abbot Diagnostic machine). Blood sample was also sent for Hemoglobin electrophoresis ,serum iron, serum ferritin and blood film morphology. Only those patient with low Hemoglobin below 10g/dl and MCV below 65 fi were entered in our study. Three types of anemia were

studied iron deficiency anemia, Thalassemia trait and chronic anemia while Thalassemic major or sickle cell disease has been excluded.
RBC count and Mentzer index which is the ratio of MCV/RBC count has been used for evaluation of anemia in our study. Statistical analysis was carried out using SPSS version 15.For all statistical analysis P value less than 0.05 was considered as statistically significant. Approval of this study was taken from Department of Medicine, College of Medicine, Basrah University.

Result

Table 1shows demographic characteristics of studied patients . 48patients(63.2%) among total of 76 found to have iron deficiency anemia and it is the most common type of anemia. 18 patients (23.6%) have chronic anemia and 10 patients (13.2%) have beta Thalassemia trait

Table 1 Demographic characteristics of studied patients

Types of anemia	percentage
Iron deficiency anemia	[48]63.2%
Chronic anemia	[18]23.6%
Beta Thalassemia trait	[13.2]13.2%
Total 76	100

Table 2 shows All patients with iron deficiency anemia have low serum iron and low serum ferritin while all patients with beta Thalassemia trait have upper limit of normal for both serum iron and serum ferritin. Chronic anemia have normal serum iron and high serum ferritin.

Table 2 serum iron and seum ferritain in these types of anaemias

Type of anemia	Serum iron	Serum ferritin	Total
Iron deficiency anemia patients	Low	low	48[63.2%]
Chronic anemia	Low	normal	18[23.6%]
Beta Thalassemia trait patients .	Upper limit of normal	upper limit of normal	10[13.2%]

Table 3 demonstrated that all 48[63.2%] patients with iron deficiency anemia have RBC count less than 5 million/cmm. while all 10[13.2%] patient with beta Thalassemia trait have RBC count more than 5 million/cmm. These findings are statistically significant[P value less than 0.05] 18 [22.6%] patients with chronic anemia have variable RBC count.10 patient have RBC count above 5 million and 8 patients have RBC count below 5 million . These findings were not statistically significant

Table 3 Types of RBC count and type of anemia

Types of anemia	RBC count/cmm	percentage	P value
Iron deficiency anemia 48	All below 5 million/cmm	63.2%	<0.05
Chronic anemia 18	Variables . 10 patients above 5 million --8 patients below 5 million--	13.1% 10.5%	variable
Beta Thalasemia trait 10 patients	All above 5 million/cmm	13.2%	<0.05

Table 4-All patients with iron deficiency 48 [63.2%] have Mentzer index more than 13 and all beta Thalassemia trait 10 patients[13.2%] have Mentzer index less than 13.These findings were statistically significant [p value < 0.05].Chronic anemia has variable Mentzer index.10 patients with Mentzer index above 13 while 8 patients have Mentzer index a below 13 which is not statistically significant.

Table 4 Mntzer index

Types of anemia	Mentzer index	P value
Iron deficiency anemia 48 patients[63.2%]	All Above 13	<0.05
Chronic anemia 18 patints [23.6%]	10 above 13 8 below 13	variable
Thalasemia trait 10 patients [13.2%]	All below13	<0.05

Discussion

This study shows that RBC count index and mentzer index can give information about the type of anemia with low MCV .Mentzer index more than 13 and RBC count less than 5 million seen in all patients with iron deficiency anemia because of decrease RBC formation leading to low RBC count .On the other hand, all patients with beta Thalassemia trait have RBC count more than 5 million due to bone marrow stimulation as a result of hemolysis.

Majority of anemia with low hemoglobin and low MCV in this study is due to iron deficiency anemia[63.2%]. These findings are similar to other studies that iron deficiency anemia is most common type of anemia all over the world [12,13].

All beta Thalasemia trait in this study[13.2%] have mentzer index less than 13 and RBC count more than 5 million/ cmm. These findings are similar to other studied [7,14]

All the studied patients were received empirically treatment at primary care center with iron table or injectable iron, thinking that their anemia are iron deficiency anemia. It is harmful for example to give Thalassemia trait patient iron because serum iron and ferritin are normal unless they have blood loss.There is no body defense mechanism to get rid of extra iron and it will be deposited in liver and spleen causing damage and fibrosis[14].

All studied patients with chronic anemia and low MCV have variable Mentzer index and variable RBC count. and not statistically significant to depend on these indices to detect this type of anemia. The diagnosis of this kind of anemia was done by exclusion other types of anemias .In difficult cases serum iron and serum

ferritin and Hemoglobin electrophoresis may be requested.

Conclusion and recommendation The positive findings in this paper can be used practically in primary care center or in crowded outpatient or medical centers at periphery where are limitations in doing further tests like serum iron, serum ferritin, Hb-electrophoresis or blood film morphology.

The result of this study is to provide provisional diagnosis about type of anemia with low MCV and to give safe treatment just by looking at hemoglobin level,,low MCV ,RBC count and ratio of mentzier index. IF RBC count is low and mentzier more than 13,these findings go with iron deficiency anemia. While the findings of high RBC count and mentzier. ratio less than 13,these result present in Thalasemia trait .When the figure does not fit with any of these two, possibly these anima might go with chronic anemia.

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