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Reticulocyte hemoglobin content as a best indicator of iron deficiency in female patients.

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Editorial Note

Iron deficiency is a well-known cause of diffuse non-scarring hair loss in women. One of the rapidly diving cells in the body is the hair follicle matrix cells and iron is a cofactor for the ribonucleotide reductase which is the rate-limiting enzyme for DNA synthesis and, also is a regulator for multiple genes in the hair follicles. Iron deficiency without anemia is far more prevalent and about two-folds higher than iron deficiency anemia and iron deficiency is more prevalent in women than men. Iron deficiency with or without anemia is more common in menstruating women, black race, athletes, vegetarians and obese or overweight. The most common cause of iron deficiency in premenopausal women is menstrual blood loss and in postmenopausal women is gastrointestinal blood loss. Laboratory markers for iron deficiency anemia include low hemoglobin levels, low Mean Corpuscular Volume (MCV) and Mean Corpuscular Hemoglobin (MCH), increase red cell distribution width, decrease serum ferritin, decrease Transferrin Saturation (TSAT) and low reticulocyte hemoglobin content. The purpose of the study is to evaluate the best laboratory markers of iron deficiency among women with diffuse non-scarring hair loss which was attributed to iron deficiency.

This was a cross-sectional descriptive study conducted on patients with diffuse hair loss consulted outpatient dermatology clinic at Al-Sader Teaching Hospital from October 1, 2020, to April 1, 2021. The study was approved by the Institutional Review Board of the University of Basra and Basra Heath Directorate of Ministry of Health. Patients more than 18 years old with diffuse hair loss presumed due to iron deficiency were included in the study. Patients with coexistent vitamin D and zinc deficiency and other medical causes of hair loss such as thyroid disease were excluded from the study. Data were collected on patients' age, gender, BMI and history of chronic medical diseases. Patients were examined for types of hair loss. Investigations were sent including CBC, serum ferritin, Transferrin Saturation (TSAT) and reticulocyte hemoglobin content (CHr). The CHr was reported from the CBC by using Siemens ADVIA 2120 (Siemens, Tarrytown, NY). Anemia was defined as hemoglobin concentration below 12.5 g/dl. Iron deficiency was defined as serum ferritin below 30 ng/ml, TSAT below 20% or CHr below 29 pg. Functional iron deficiency was diagnosed by low CHr and normal or high serum ferritin. Statistical analysis was descriptive in term of frequencies and percentages.

Hemoglobin may be normal because iron deficiency state may occur without anemia and in the present study, more than 50% of patients with proved iron deficiency have normal hemoglobin. Both MCV and MCH reflect iron availability for erythropoiesis but they have certain limitations for diagnosis of iron deficiency state include the followings: they are a late finding, slow to change, not reflect iron availability for erythropoiesis and not helpful in assessing response to therapy. Also, MCV may be normal in cases of iron deficiency during pregnancy, in an elderly with coexistent nutritional deficiency such as folic acid and B12 and in patients with medical diseases that already increase the MCV such as liver disease. So in our study, because of these limitations and inaccuracy of both MCV and MCH, we don't use these parameters for assessment of iron deficiency state. Serum ferritin is required for diagnosis of iron deficiency state and it reflect iron store (15). It is a stable glycoprotein and not affected by recent iron ingestion (18). It is an acute phase reactant and increased in inflammatory conditions making it invaluable for diagnosis of iron deficiency. In our study, more than 50% of cases with proved iron deficiency state have normal or even higher serum ferritin so normal serum ferritin is not helpful to rule out iron deficiency state. Serum iron has many limitations for diagnosis of iron deficiency: it is affected by recent iron ingestion and has diurnal variation. The TSAT indicate iron deficient erythropoiesis rather than iron depletion state. It is also reduced in inflammation. The CHr measures the hemoglobin content of the newest RBCs thus indicating the iron availability over the previous 3-4 days so it reflect a real-time assessment of iron deficient erythropoiesis and assess response to iron therapy. Its levels are only slightly reduced in inflammation. It is helpful in

diagnosis of both absolute and functional iron deficiency state when serum ferritin and TSAT are unhelpful. First, it is a cross-sectional descriptive study and not a prospective study or randomized controlled trial. Second, no control groups were taken so we can't determine the positive and negative predictive value of the tests studied. Third, no follow up measurement of these parameters to assess response to iron therapy.

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