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SHORT COMMENTARY

Red Cell Indices in Screening of Thalassemia Trait During Antenatal Period

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Abstract

Baliyan et al. (in J Obstet Gynecol https://doi.org/10.1007/s13224-019-01220-8, 2019) in their study evaluated the sensitivity and specificity of MCV and MCH for the screening of the beta thalassemia trait in late pregnancy. However, they failed to rule out iron deficiency, which is a confounding factor for low MCV and MCH; as a result, they observed low specificity. Authors recommend ruling out iron deficiency prior to screening for beta thalassemia and preferably in the first trimester of pregnancy so that antenatal diagnosis can be performed in high-risk subjects if necessary.

Keywords Red cell indices · Beta thalassemia · Pregnancy

Baliyan et al. [1] recently published an article describing the red cell indices as a screening method for detecting beta thalassemia trait in antenatal anemic women. They predicted the beta thalassemia trait among anemic pregnant women of gestational age between 20 and 40 weeks using the combined cutoff values of mean corpuscular volume (MCV) (cutoff 74 fl) and mean corpuscular hemoglobin (MCH) (cutoff 28 pg) with a sensitivity and specificity of 94% and 21.2%, respectively. The low specificity observed may be due to non-exclusion of iron deficiency anemia in their analysis. There are several indices for differentiating the iron deficiency anemia from beta thalassemia with high sensitivity and specificity [2]. Baliyan et al., further reported that MCV is a better variable as compared to MCH for beta thalassemia screening. On the contrary, earlier studies have shown that MCH is more stable at room temperature; hence, it is more reliable for thalassemia diagnosis than the MCV [3]. Our studies have also shown that MCH values are more specific (95% specificity) as compared to MCV (85% specificity) (unpublished data) in thalassemia trait screening. It has to be borne in mind that in samples older than 24 h post-collection, the red cell indices can be misleading, as the MCV increases by up to 5 fl.

Table 1 shows expected erythrocyte parameters in thalassemia trait. RBC count, MCV and MCH are the altered parameters in beta thalassemia traits. Therefore, large-scale screening programs in resource-poor settings must consider these parameters for definitive results.

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Table 1 Red cell parameters in thalassemia trait

Parameter	Changes
Hemoglobin (Hb)	Normal or ± ↓
Red blood cell (RBC) count	↑
Hematocrit (HCT)	Normal
Mean corpuscular volume (MCV)	↓
Mean corpuscular hemoglobin (MCH)	↓
Mean corpuscular hemoglobin concentration (MCHC)	Normal
Red cell distribution width (RDW)	Normal
Reticulocyte count	Normal

Furthermore, in individuals with silent or milder mutation for beta thalassemia such as those in promoter region mutation, catabolite activator protein (CAP) site mutation, 5′ or 3′ untranslated mutation, the erythrocyte parameters may be near normal [4].

Lastly, iron deficiency is the most common cause of anemia due to the ever-increasing demand for fetal and placental growth. Often, this is a confounding factor in altered erythrocyte parameters when co-presented with beta thalassemia trait. Thus, screening methods for beta thalassemia based on low MCV and low MCH are useful only when iron deficiency is ruled out in the antenatal period. The hemoglobin electrophoresis or high-performance liquid chromatography is strongly recommended in all suspected cases of thalassemia trait for error-free diagnosis. Authors further recommend screening in first trimester of pregnancy to enable prenatal diagnosis if necessary in high-risk couples.

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Compliance with Ethical Standards

Conflict of interest All the authors included in the study have no conflict of interest.

Ethical Approval The manuscript follows the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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