

INTISARI

Latar Belakang: Defisiensi besi merupakan masalah gizi paling umum di dunia dan dapat terjadi pada semua kelompok usia, termasuk dokter dan mahasiswa kedokteran. Prevalensi anemia defisiensi besi di dunia berkisar 15–20%. Defisiensi besi tanpa anemia bahkan terjadi lebih umum dan seringkali kurang mendapat perhatian. Skrining defisiensi besi penting untuk mencegah dampak negatif terhadap fungsi kognitif dan produktivitas. Pemeriksaan hematologi lengkap mudah diakses akan tetapi pemanfaatan indeks eritrosit seperti MCV, MCH, dan RDW-CV belum sepenuhnya dioptimalkan dalam proses skrining defisiensi besi

Tujuan: Mengevaluasi akurasi dan reliabilitas indeks eritrosit sebagai alat skrining defisiensi besi tanpa anemia pada dokter dan mahasiswa kedokteran.

Metode: Penelitian observasional analitik ini dilakukan dengan rancangan potong lintang uji diagnostik, dimana indeks eritrosit dievaluasi akurasi dibandingkan dengan saturasi transferin sebagai baku emas dan defisiensi besi jika saturasi transferrin $\leq 20\%$. Subjek penelitian adalah individu usia ≥ 18 tahun yang menjalani pemeriksaan kesehatan di Departemen Patologi Klinik dan Kedokteran Laboratorium FK-KMK UGM Yogyakarta. Kriteria inklusi meliputi kondisi sehat dan kesediaan menjadi partisipan, kriteria eksklusi mencakup menstruasi, kehamilan, sedang/riwayat terapi besi, riwayat transfusi dalam tiga bulan terakhir, kadar CRP > 5 mg/L, hasil HbA₂ $> 3,5\%$ dan anemia. Pengukuran indeks eritrosit (MCV, MCH) dan CCI dengan perhitungan. Pengukuran RDW-CV dengan metode *impedance*. Analisis ROC digunakan untuk mengevaluasi akurasi indeks eritrosit. Uji reliabilitas dengan *Cohen's Kappa*.

Hasil: Penelitian ini melibatkan 640 subjek berusia ≥ 18 tahun yang memenuhi kriteria inklusi. Total 339 subjek dikeluarkan karena hasil CRP > 5 mg/L (249 subjek), HbA₂ $> 3,5\%$ (27 subjek), CRP > 5 mg/L dan HbA₂ $> 3,5\%$ (18 subjek), 2 subjek data tidak lengkap, 34 subjek anemia dan 9 subjek dengan hasil feritin serum dan TSAT yang tidak sinkron. Kelompok defisiensi besi sebanyak 75 orang dan tidak defisiensi besi sebanyak 226 orang. Akurasi dan reliabilitas (indeks kappa) indeks eritrosit secara berturut-turut adalah MCV (59,8%;0,143), MCH (64,78%;0,219), RDW-CV (56,81%;0,114) dan CCI (60,13%;0,153).

Simpulan: Indeks eritrosit memiliki akurasi dan reliabilitas yang rendah dalam skrining defisiensi besi, dimana MCH menunjukkan performa terbaik (akurasi: 64,78%; indeks Kappa: 0,219), meskipun belum mencapai tingkat yang memadai untuk dijadikan alat skrining tunggal.

Kata kunci: defisiensi besi, indeks eritrosit, saturasi transferin

ABSTRACT

Background: Iron deficiency is the most common nutritional problem worldwide and can occur in all age groups, including physicians and medical students. The global prevalence of iron deficiency anemia is around 15–20%. Iron deficiency without anemia is even more common and often receives less attention. Screening for iron deficiency is important to prevent negative impacts on cognitive function and productivity. Complete blood count (CBC) tests are widely available; however, the utilization of erythrocyte indices such as MCV, MCH, and RDW-CV has not been fully optimized in the screening process for iron deficiency.

Objective: To evaluate the accuracy and reliability of red blood cell indices as a screening tool for iron deficiency without anemia among physicians and medical students.

Method: This observational analytic study used a cross-sectional diagnostic test design, where the accuracy of erythrocyte indices was evaluated against transferrin saturation as the gold standard. Iron deficiency was defined as transferrin saturation <20%. The study population included individuals aged ≥ 18 years undergoing health examinations at the Department of Clinical Pathology and Laboratory Medicine, Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada, Yogyakarta. Inclusion criteria were healthy individuals willing to participate; exclusion criteria included menstruation, pregnancy, current or previous iron therapy, blood transfusion within the last three months, CRP >5 mg/L, HbA₂ >3.5%, and anemia. Erythrocyte indices (MCV, MCH) and CCI were calculated, while RDW-CV was measured using the impedance method. ROC analysis was used to evaluate the accuracy of erythrocyte indices, and Cohen's Kappa was used to assess reliability.

Results: This study involved 640 participants aged ≥ 18 years who met the inclusion criteria. A total of 339 participants were excluded due to CRP >5 mg/L (249 participants), HbA₂ >3.5% (27 participants), both CRP >5 mg/L and HbA₂ >3.5% (18 participants), incomplete data (2 participants), anemia (34 participants), and discordant serum ferritin and TSAT results (9 participants). The iron deficiency group included 75 participants, while the non-iron deficiency group included 226 participants. The accuracy and reliability (kappa index) of erythrocyte indices were as follows: MCV (59.8%; 0.143), MCH (64.78%; 0.219), RDW-CV (56.81%; 0.114), and CCI (60.13%; 0.153), respectively.

Conclusion: Erythrocyte indices demonstrated low accuracy and reliability in screening for iron deficiency, with MCH showing the best performance (accuracy: 64.78%; kappa index: 0.219), although it has not yet reached an adequate level to serve as a stand-alone screening tool.

Keywords: iron deficiency, erythrocyte indices, transferrin saturation