

INTISARI

Latar Belakang:

Donor darah rentan mengalami defisiensi besi. Seleksi donor saat ini hanya mampu mendeteksi anemia dan belum menjadi prosedur rutin di unit pengelola darah (UPD). Feritin serum umum digunakan untuk mendeteksi defisiensi besi, tetapi tidak praktis dan mahal. *Extended parameter* hematologi *percentage of hypo-haemoglobinised red cells (%Hypo-He)* berpotensi menjadi penanda awal adanya defisiensi besi, pengerjaannya mudah, murah, dan cepat sehingga dapat digunakan untuk deteksi defisiensi besi pada donor.

Tujuan:

Mengkaji kemampuan *%Hypo-He* untuk deteksi defisiensi besi pada donor darah.

Metode:

Penelitian ini adalah uji diagnostik potong lintang di UPD RSUP Dr. Sardjito dari bulan Juli-Oktober 2023 dan melibatkan donor darah yang memenuhi kriteria seleksi donor sesuai PMK No.91 tahun 2015, tidak mengkonsumsi suplemen besi dan biotin. Subjek dengan CRP >5 mg/L dieksklusi dari penelitian. Pengukuran *%Hypo-He* dilakukan secara tersamar dengan alat Sysmex® XN-1000, metode *fluorescence flow-cytometry*. Evaluasi penampilan diagnostik dilakukan menggunakan analisis ROC dengan membandingkan *%Hypo-He* dengan feritin <20 ng/mL sebagai standar rujukan defisiensi besi, kemudian dicari *cut-off* paling optimal dan performans diagnostik meliputi Youden *indeks*, sensitivitas, spesifisitas, nilai ramal positif, nilai ramal negatif, *likelihood ratio* positif dan negatif.

Hasil:

Sebanyak 136 orang donor darah memenuhi kriteria inklusi dan eksklusi yang terdiri atas 108 orang laki-laki (79,4%) dan 28 orang perempuan (20,6%). Defisiensi besi ditemukan pada 13 orang (9,6%). Donor reguler tercatat 81 orang (70,4%) sementara interval donasi terbanyak lebih dari 6 bulan yang didapatkan pada 56 orang (48,7%). Analisis ROC mendapatkan nilai AUC sebesar 0,945 (IK 95%: 0,893-0,977) dan nilai *cut-off %Hypo-He* optimal >0,4% dengan sensitivitas 92,31%, spesifisitas 89,93% nilai ramal positif 48%, nilai ramal negatif 99,1%, *likelihood ratio* positif 8,73 dan *likelihood ratio* negatif 0,086.

Simpulan:

Penampilan diagnostik *%Hypo-He* pada penelitian ini menunjukkan hasil yang sangat baik dalam mendeteksi defisiensi besi pada populasi donor darah.

Kata Kunci: *%Hypo-He*, feritin serum, uji diagnostik, defisiensi besi, donor darah.

ABSTRACT

Background:

Iron deficiency is common consequence of blood donation. Currently, donor screening protocols is only able to detect individu with anemia and not routinely assess iron status. Serum ferritin is commonly used to detect iron deficiency, but its not practical and costly. The extended hematological parameter, percentage of hypo-haemoglobinised red cells (%Hypo-He), has the potential to serve as an early marker for iron deficiency. This parameter is easy to perform, cost-effective and time-efficient, making it suitable for detecting iron deficiency in blood donor.

Objective:

To evaluate the diagnostic performance of %Hypo-He in detecting iron deficiency in blood donor.

Method:

This cross-sectional diagnostic study was conducted at the blood transfusion unit in Dr. Sardjito General Hospital from July to October 2023, involving eligible blood donors who met the donor selection criteria according to PMK No.91 of 2015, did not take iron supplements or biotin. Subjects with CRP levels >5 mg/L were excluded. Parameter %Hypo-He levels were measured using Sysmex® XN-1000 hematology analyzer. Diagnostic performance was evaluated by comparing of %Hypo-He with ferritin <20 ng/mL as the reference standard for iron deficiency using ROC analysis. The most optimal cut-off value was determined and the diagnostic performance was assessed based on Youden's index, sensitivity (Sn), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (LR+) and negative likelihood ratio (LR-).

Result

Among 136 eligible donors who met inclusion and exclusion criteria, 108 subjects were male (79,4%) and 28 were female (20,6%), 13 subjects (9.6%) were found to have iron deficiency. Routine donor were 81 subjects (70,4%) with most donation interval >6 months in 56 subjects (48,7%). The ROC analysis showed an AUC value of 0.945 (95% CI: 0.893–0.977) and optimal cut-off value of %Hypo-He was $>0.4\%$, yielding Sn of 92.31%, Sp of 89.93%, positive PPV 48% and NPV 99,1%, LR+ 8.73 and LR- 0.086.

Conclusion:

The %Hypo-He shows excellent diagnostic performance in detecting iron deficiency among blood donor.

Keywords: %Hypo-He, serum ferritin, diagnostic test, iron deficiency, blood donor