

Tesis

**NILAI PREDIKTIF *RETICULOCYTE HEMOGLOBIN EQUIVALENT* DALAM SKRINING DEPLESI BESI
PADA PENDONOR DARAH RUTIN**



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NILAI PREDIKTIF *RETICULOCYTE HEMOGLOBIN EQUIVALENT* DALAM SKRINING DEPLESI BESI PADA PENDONOR DARAH RUTIN

Oleh:

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ABSTRAK

Latar Belakang: Pendonor darah rutin berisiko tinggi mengalami anemia defisiensi besi melalui kehilangan zat besi yang terikat pada hemoglobin. Pemeriksaan hemoglobin pada skrining pradonor mampu mendeteksi pendonor dengan anemia defisiensi besi, tetapi tidak mampu mendeteksi pendonor dengan depleksi besi. Dibutuhkan pemeriksaan yang dapat digunakan untuk skrining depleksi besi yang tidak invasif dan tidak dipengaruhi inflamasi, seperti Ret-He. Penelitian ini bertujuan untuk menganalisis nilai prediktif Ret-He dalam skrining depleksi besi pada pendonor darah rutin.

Metode: Penelitian analitik dengan rancangan potong lintang terhadap 168 pendonor darah rutin di Unit Pengelola Darah (UPD) RS M. Djamil Padang dari bulan Maret hingga November 2025. Parameter pemeriksaan adalah Ret-He dan feritin serum, masing-masing menggunakan metode flowsitometri dan *enzyme linked fluorescence assay* (ELFA). Data univariat disajikan sebagai median (minimum-maksimum) dan frekuensi (%). Data bivariat dianalisis menggunakan uji Mann-Whitney. Nilai prediktif Ret-He dianalisis dengan menentukan *cut-off* optimal berdasarkan Indeks Youden dan kurva ROC.

Hasil: Median usia subjek penelitian adalah 30 tahun, 54,8% diantaranya laki-laki. Interval donor terbanyak pada kelompok ≤ 3 bulan. Frekuensi donor terbanyak yaitu 2–5 kali. Pendonor depleksi besi sebanyak 37,5%. Median Ret-He pendonor darah rutin depleksi besi 30,8 (22,2–33,9) pg lebih rendah dibandingkan pendonor tidak depleksi besi 32,1 (28,2–35,0) pg, dan bermakna secara statistik ($p < 0,001$). *Cut-off point* Ret-He dalam skrining depleksi besi pada pendonor darah rutin didapatkan $< 31,75$ pg, dengan AUC 0,702 (IK95%: 0,618–0,785), sensitivitas 73,0%, dan spesifisitas 60,0%.

Simpulan: *Reticulocyte hemoglobin equivalent* dengan *cut-off point* $< 31,75$ pg menunjukkan kemampuan prediktif cukup baik dalam skrining depleksi besi pada pendonor darah rutin.

Kata Kunci : Ret-He, depleksi besi, pendonor darah rutin, feritin serum

PREDICTIVE VALUE OF RETICULOCYTE HEMOGLOBIN EQUIVALENT IN SCREENING IRON DEPLETION AMONG REGULAR BLOOD DONORS

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ABSTRACT

Background: Regular blood donors are at high risk of developing iron deficiency anemia due to the loss of iron bound to hemoglobin. Hemoglobin testing during pre-donor screening can detect donors with iron deficiency anemia, but it cannot detect donors with iron depletion. A screening test that is non-invasive and unaffected by inflammation, such as Ret-He, is needed to identify iron depletion. This study aims to analyze the predictive value of Ret-He in screening for iron depletion among regular blood donors.

Methods: An analytical study with a cross-sectional design was conducted on 168 regular blood donors at Blood Management Unit (UPD) of M. Djamil Hospital Padang from March to November 2025. Ret-He and serum ferritin measured using flow cytometry and enzyme-linked fluorescence assay (ELFA), respectively. Univariate data were presented as median (minimum–maximum) and frequency (%). Bivariate data were analyzed using Mann-Whitney test. Predictive value of Ret-He was analyzed by determining optimal cut-off based on the Youden Index and ROC curve.

Results: Median age of the study subjects was 30 years, with 54.8% being male. The most common donation interval was ≤ 3 months. The most frequent donation frequency was 2–5 times. Iron-depleted donors accounted for 37.5%. Median Ret-He in iron depletion regular blood donors was 30.8 (22.2–33.9) pg lower than non-depletion donors at 32.1 (28.2–35.0) pg, and statistically significant ($p < 0.001$). The cut-off point of Ret-He for screening iron depletion in regular blood donors was found to be < 31.75 pg, with an AUC of 0.702 (95% CI: 0.618–0.785), sensitivity of 73.0%, and specificity of 60.0%.

Conclusion: Reticulocyte Hemoglobin Equivalent with cut-off point < 31.75 pg demonstrates fair predictive ability in screening iron depletion among regular blood donors.

Keywords: Ret-He, iron depletion, regular blood donors, serum ferritin