

## INTISARI

**Latar belakang:** Anemia defisiensi besi salah satu komplikasi yang sering ditemukan pada pasien penyakit ginjal kronik yang menjalani hemodialisis (PGK-HD). Pengukuran secara langsung konsentrasi hemoglobin rata-rata pada prekursor sel darah merah (retikulosit) dapat mengidentifikasi defisiensi besi namun ketersediaan alat hematologik untuk pengukuran konsentrasi hemoglobin retikulosit terbatas. Parameter *reticulocyte hemoglobin content* (CHr) dengan metode *electro-optical flowcytometry* dan *reticulocyte hemoglobin equivalent* (Ret-He) metode *fluorescent flowcytometry* dapat mengukur konsentrasi hemoglobin retikulosit. Pemeriksaan Ret-He berpotensi untuk dapat digunakan sebagai pemeriksaan rutin defisiensi besi.

**Tujuan :** Mengetahui korelasi Ret-He dan CHr, serta nilai *cut-off* Ret-He untuk diagnosis defisiensi besi sesuai pengukuran CHr pada *cut-off*  $\leq 29$  pg

**Metode :** Penelitian observasional untuk melihat korelasi Ret-He dan CHr serta penetapan *cut-off* menggunakan kurva ROC.

**Hasil :** Subjek penelitian sejumlah 125 pasien PGK-HD dengan rerata usia 50,62 tahun, laki-laki 75(60%), dengan penyakit etiologi terbanyak adalah hipertensi 59(47%), disusul diabetes melitus 39(31%). Sebanyak 92,8% pasien telah menjalani HD  $\geq 6$  bulan, dengan rerata Hb 9,34 g/dL. Korelasi Ret-He dan CHr sangat kuat (  $r = 0,8221$ ,  $p < 0,001$ ). Luas *area under curve* Ret-He adalah 0,889 untuk diagnosis defisiensi besi sesuai pemeriksaan CHr pada *cut-off*  $\leq 29$  pg. Pada *cut-off*  $\leq 29$  pg Ret-He menunjukkan sensitivitas (Sn), spesifisitas (Sp), nilai ramal positif (NRP), nilai ramal negatif (NRN), *positive likelihood ratio* (+LR), *negative likelihood ratio* (-LR) berturut-turut 48,84%, 97,56%, 91,3%, 78,4%, 20,02 dan 0,52, dan pada *cut-off*  $\leq 30,9$  pg Ret-He menunjukkan Sn, Sp, NRP, NRN, +LR, -LR berturut-turut 86,05%, 91,46%, 84,1%, 92,6%, 10,08 dan 0,15

**Simpulan :** Ret-He berkorelasi kuat dengan CHr. Pada *cut-off*  $\leq 29$  pg Ret-He memiliki spesifisitas  $\geq 90\%$  sesuai dengan CHr  $\leq 29$  pg, *cut-off* terbaik adalah  $\leq 30,9$  pg dengan Sn 86,05%, Sp 91,46%.

**Kata kunci :** Ret-He, anemia defisiensi besi, penyakit ginjal kronik, hemodialisis

## ABSTRACT

**Background:** Iron deficiency anemia is one of the most common complication in patients with chronic kidney disease undergoing hemodialysis (CKD-HD). Direct measurement of mean hemoglobin concentration in red blood cell precursors (reticulocytes) may identify iron deficiency but the availability of hematologic instrument for reticulocyte hemoglobin concentration measurement is limited. Parameters of reticulocyte hemoglobin content (CHr) by electro-optical flowcytometry and reticulocyte hemoglobin equivalent (Ret-He) by fluorescent flowcytometry method may measure reticulocyte hemoglobin concentration. Ret-He examination has the potential to be used as a routine measurement for iron deficiency.

**Objective:** To assess the correlation between RET-He and CHr, as well as identify the optimal cut-off value of RET-He for iron deficiency diagnosis that corresponds to  $\text{CHr} \leq 29$  pg

**Method:** An observational study to assess the correlation between Ret-He and CHr and the cut-off determination using the ROC curve.

**Results:** A total of 125 CKD-HD patients with mean age of 50.62 years, 75 men (60%), with the most common etiology being hypertension in 59 (47%) patients, followed by diabetes mellitus in 39 (31%) patients. As many as 92.8% of patients had undergone HD  $\geq 6$  months, with mean Hb of 9.34 g/dL. The Ret-He and CHr had very strong correlation ( $r = 0.8221$ ,  $p < 0.001$ ). The area under curve for Ret-He was 0.889 for iron deficiency diagnosis according to the CHr cut-off  $\leq 29$  pg. At cut-off  $\leq 29$  pg, Ret-He showed sensitivity (Sn), specificity (Sp), positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (+LR), negative likelihood ratio (-LR) 48, 84%, 97.56%, 91.3%, 78.4%, 20.02 and 0.52, respectively, and at the cut-off  $\leq 30.9$  pg Ret-He showed Sn, Sp, PPV, NPV, +LR, -LR respectively 86.05%, 91.46%, 84.1%, 92.6%, 10.08 and 0.15, respectively

**Conclusion:** Ret-He had strong correlation with CHr. At cut-off  $\leq 29$  pg, Ret-He had a specificity  $\geq 90\%$  according to  $\text{CHr} \leq 29$  pg, the optimal cut-off was  $\leq 30.9$  pg with Sn 86.05%, Sp 91.46%.

**Keywords :** Ret-He, iron-deficiency anemia, chronic kidney disease, hemodialysis