

# Pengaruh hemoglobin varian terhadap pengukuran hba1c metode high performance liquid chromatography hplc dan afinitas boronat point of care testing poct = The effect of hemoglobin varian on measurement of hba1c high performance liquid chromatography hplc and afnity boronat point of care testing poct

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## Abstrak

### <b>ABSTRAK</b><br>

Latar belakang Hemoglobin A1c HbA1c adalah pemeriksaan kontrol glikemik jangka panjang yang banyak digunakan. HbA1c berhubungan dengan risiko komplikasi diabetes. Akurasi pemeriksaan HbA1c dapat dipengaruhi kondisi hemoglobin varian. Hemoglobin varian adalah kelainan struktur hemoglobin. Di Indonesia, Hb E paling sering dijumpai. Sehingga peneliti ingin mengetahui prevalensi penderita hemoglobin varian pada pasien pemeriksaan HbA1c di RSUPNCM dan pengaruh hemoglobin varian terhadap pemeriksaan HbA1c metode afinitas boronat POCT dan ion-exchange HPLC dan gambaran mutasi gen hemoglobin varian heterozigot. Metode Dilakukan uji ketelitian between day serta uji ketepatan within run menggunakan kontrol normal dan patologis. Subjek uji prevalensi adalah seluruh pasien yang melakukan pemeriksaan HbA1c di RSUPNCM. Terhadap subjek tersebut dilakukan pemeriksaan HbA1c metode ion-exchange HPLC dan pada subjek yang didapatkan variant window dilakukan analisa hemoglobin metode ion-exchange HPLC. Dilakukan uji perbedaan dua rerata antar kelompok pemeriksaan, subjek didapatkan secara konsekutif yang memenuhi kriteria inklusi dan eksklusi. Terhadap subjek dilakukan pemeriksaan HbA1c metode ion-exchange HPLC, HbA1c metode afinitas boronat POCT Nycocard, dan HbA1c ion exchange extended HPLC dan dilakukan analisa hemoglobin metode ion-exchange HPLC. Analisa hemoglobin metode ion-exchange HPLC dilakukan terhadap seluruh subjek pada kedua kelompok. Dilakukan analisa DNA dengan metode PCR-RFLP dan metode DNA sequence untuk mengetahui gambaran mutasi hemoglobin varian heterozigot pada penelitian ini. Hasil Didapatkan proporsi penderita hemoglobin varian sebesar 17 per 994 pasien 1.8 pada pasien yang melakukan pemeriksaan HbA1c di RSUPNCM. Pada uji perbedaan rerata HbA1c, metode afinitas boronat POCT dibandingkan ion-exchange extended HPLC didapatkan nilai HbA1c lebih rendah bermakna secara statistik pada kelompok hemoglobin varian  $p=0.006$ . Uji perbedaan rerata HbA1c metode ion-exchange HPLC dibandingkan dengan metode ion-exchange extended HPLC tidak didapatkan perbedaan bermakna pada kelompok subjek hemoglobin normal  $p=0.534$  dan hemoglobin varian  $p=0.781$ . Uji perbedaan median HbA1c metode afinitas boronat dan ion exchange extended HPLC tidak bermakna pada kelompok hemoglobin normal  $p=0.006$ , dan terdapat perbedaan bermakna pada kelompok hemoglobin varian  $p=0.006$ . Hemoglobin varian heterozigot pada penelitian ini terdiri dari 2 subjek HbG Makassar dan 19 subjek Hb E heterozigot. Hasil DNA sequence dideteksi HbE homozigot dan Hb G Makassar. Hasil PCR-RFLP didapatkan HbE heterozigot Kesimpulan Proporsi hemoglobin varian pada pasien pemeriksaan HbA1c di RSUPNCM adalah 17 per 994 pasien 1.8. Hemoglobin varian menyebabkan nilai HbA1c lebih rendah bermakna secara statistik dan klinis pada pemeriksaan metode afinitas boronat POCT dibandingkan metode ion-exchange extended HPLC. Hasil pemeriksaan HbA1c metode ion-exchange HPLC dibandingkan ion-exchange extended HPLC

metode rujukan pada kedua kelompok tidak terdapat perbedaan bermakna. Hasil DNA sequence dideteksi HbE homozigot dan Hb G Makassar. Hasil PCR-RFLP didapatkan HbE heterozigot  
Kata Kunci : Hb G Makassar, Hb E, pemeriksaan HbA1c, ion-exchange extended HPLC.

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<b>ABSTRACT</b><br>

Background Hemoglobin A1c HbA1c is a widely used long term glycemic control check. HbA1c is associated with the risk of diabetes complications. Accuracy of HbA1c examination can be influenced by hemoglobin variant condition. Hemoglobin variant is a hemoglobin structure disorder. In Indonesia, Hb E is most commonly found. Researcher wanted to know the prevalence of hemoglobin variant patient in HbA1c examination patient at RSUPNCM and the influence of hemoglobin variant on HbA1c examination of POCT boronate affinity method and HPLC ion exchange and gene mutation heterogeneous hemoglobin variant Method Performed between day precision test and accuracy test within run using normal and pathological control. The subjects of prevalence test were all patients performing HbA1c examination at RSUPNCM. Against this subject, HbA1c examination of the HPLC ion exchange method and in the subjects obtained by the variant window was analyzed by the HPLC ion exchange method hemoglobin. The difference test was performed between the two groups, the subjects were obtained in a consecutive manner which fulfilled the inclusion and exclusion criteria. Subjects were subjected to HbA1c examination of the HPLC ion exchange method, HbA1c POCT Nycocard boronate affinity method, and HbA1c ion exchange extended HPLC and HPLC ion exchange hemoglobin analysis performed. The HPLC ion exchange method hemoglobin analysis was performed on all subjects in both groups. DNA analysis was performed using PCR RFLP method and DNA sequence method to find out the heterozygote hemoglobin mutations in this study. Result The proportion of variant hemoglobin patients was 17 per 994 patients 1.8 in patients who performed HbA1c examination at RSUPNCM. In the HbA1c mean difference test, the POCT boronate affinity method versus the HPLC extended exchange ion obtained significantly lower HbA1c values in the variant hemoglobin group  $p = 0.006$ . HbA1c difference test of the HPLC ion exchange method compared with the HPLC extended ion exchange method found no significant difference in the normal hemoglobin group  $p = 0.534$  and the variant hemoglobin group  $p = 0.781$ . The median HbA1c difference test of the boronate affinity method and the extended exchange ion HPLC was not significant in the normal hemoglobin group  $p = 0.006$ , and there was a significant difference in the variant hemoglobin group  $p = 0.006$ . Variant hemoglobin heterozygous in this study consisted of 2 subjects of HbG Makassar and 19 Hb E heterozygous subjects. The DNA sequence result was detected by HbE homozygote and Hb G Makassar. Results of PCR RFLP obtained HbE heterozygotes Conclusion The proportion of variant hemoglobin in HbA1c examination patients at RSUPNCM was 17 per 994 patients 1.8. Variant hemoglobin causes significantly lower HbA1c values statistically and clinically on examination of the POCT boronate affinity method than the HPLC extended exchange ion method. HbA1c examination of ion exchange HPLC method compared to HPLC extended exchange ion reference method in both groups was not significantly different. The DNA sequence result was detected by HbE homozygote and Hb G Makassar. Results of PCR RFLP obtained HbE heterozygotes  
Key Words Hb G Makassar, Hb E, HbA1c examination, ion exchange extended HPLC