

Estimated glomerular filtration rate and C-reactive protein measures enhance the specificity for left ventricular hypertrophy detection using electrocardiographic criteria

Journal of Biomedical Science and Public Health Special Issue 101-04/2015

Abstracts for Proceedings of the 4th Congress of the African Federation of Clinical Chemists;
Zimbabwe: 28-30 April 2015

Fabian Maunganidze, Angela J Woodiwiss, Muzi Maseko, Carlos Libhaber, Olebogeng H.I. Majane, Gavin R. Norton.

Introduction: Left ventricular hypertrophy (LVH), the detection of which is recommended for routine risk prediction by all guidelines, is more prevalent in groups of African ancestry. This is in-part attributed to higher prevalence rates of obesity. The detection of LVH using standard electrocardiographic (ECG) criteria (ECG-LVH) has poor sensitivity and specificity and therefore needs modification in groups of African ancestry.

Aim: To assess the usefulness of independent associations between Left Ventricular Mass Index (LVMI) and estimated glomerular filtration rate (eGFR) or serum C-reactive protein (CRP) concentrations to complement ECG criteria for LVH detection in predominantly obese African populations.

Method: LVH determined by ECG using at least 12 different criteria (formulae) was compared to LVH determined by echocardiography (LV mass index $>51\text{g}/\text{m}^2.7$) in a random sample of 358 participants from a prospective cohort from an urban, developing community of African ancestry in South Africa (41% obese) and used together with CRP concentrations and eGFR above or below the median for the sample.

Results: A combination of CRP concentrations and eGFR above or below the median for the sample respectively showed significant performance ($\text{AUC}=0.61\pm 0.03$, $p<0.0005$), but a low specificity (ability to report negative results as negative) for LVH detection (77%). When eGFR and CRP concentrations were employed to complement the R wave amplitude of the electrocardiographic lead aVL (RaVL) the specificity increased (93%), although the overall performance did not improve ($\text{AUC}=0.71\pm 0.03$, $p<0.0005$, RaVL alone: $\text{AUC}=0.70\pm 0.03$). The sensitivity (ability to report positive results as positive) of 25% was however in-line with previously reported sensitivities for LVH detection using ECG criteria in alternative population samples. However, without changing overall performance, eGFR together with RaVL increased the specificity to 88% and CRP concentrations when considered together with RaVL increased the specificity to 87%.

Summary: Routine measurements of CRP and GFR can be used to enhance the specificity of electrocardiographic tests for LVH (especially the RaVL criterion) in obese African patients since these exhibit poor results from ECG alone.

Conclusion: In groups of African ancestry, obesity contributes toward a poor validity and performance of all voltage criteria for the detection of LVH, but the use of eGFR and/or CRP concentrations to complement ECG criteria increases the specificity without altering the overall performance. **Learning Outcomes:** This study reveals the extra importance and usefulness of routine clinical laboratory tests in enhancing specialist diagnostic procedures.

