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Underestimation of chronic kidney disease staging in diabetic patients: Evidences from a comparative creatinine analysis by enzymatic and Jaffe methods

Gunarathna YM¹, Hettiarachchi TC^{1*}, Vithanage N², Uluwaduge DI³, Bandara EMS¹

¹Department of Medical Laboratory Sciences, Faculty of Allied Health Sciences, University of Sri Jayewardenepura, Sri Lanka, ²Biochemistry Laboratory, Sri Jayawardanapura General Hospital, Sri Lanka, ³Department of Basic Sciences, Faculty of Allied Health Sciences, University of Sri Jayewardenepura, Sri Lanka.

Background: Serum creatinine is an important laboratory marker for kidney function. Kinetic Jaffe and enzymatic methods are used to measure serum creatinine in the laboratory set-up in Sri Lanka. Kinetic Jaffe is the most common method due to low cost and simplicity, although the anticipated interference by glucose and other substances (protein, acetone, and bilirubin). The most accurate enzymatic method is not used routinely owing to its high cost. The accurate creatinine measurements are necessary in Chronic Kidney Disease (CKD) staging.

Objective: To compare the serum creatinine values and estimated Glomerular Filtration Rate (eGFR) values obtained by Jaffe and enzymatic method of non-fasting serum samples from diabetic patients.

Method: A cross-sectional analytical study was conducted in 83 (52 males, 31 females) adult diabetic patients with serum glucose level >180 mg/dL. Interference by other substances were not considered since there was no history of other associated disease conditions according to patient's clinical records. Serum creatinine was measured by both methods. Serum glucose levels were also measured in the same sample concurrently. eGFR was calculated using CKD-EPI formula. Significant differences ($p < 0.05$) were analysed by using non-parametric Wilcoxon signed-rank test.

Results: Serum creatinine values obtained by Jaffe method (4.2 ± 3.0 mg/dL) were significantly higher than values obtained by enzymatic method (3.4 ± 2.5 mg/dL). Serum creatinine values were 19.2% overestimated by Jaffe test results. There was a significant difference between eGFR values when calculated by Jaffe (28.9 ± 28.7 ml/min/1.73m²), and enzymatic (38.0 ± 39.1 ml/min/1.73m²) test results [$P < 0.05$]. eGFR values were underestimated by 27.2% when using Jaffe test results.

Conclusion: Presence of high glucose (>180mg/dL) in non-fasting serum samples from diabetic patients may interfere with creatinine levels when estimated by Jaffe method and mislead the CKD staging. This emphasizes the application of a correction factor in creatinine measurement if creatinine values are obtained by Jaffe method in diabetic patients.