5TH BIENNIAL CONFERENCE 2025

College of Biochemists of Sri Lanka (CBSL)

ISSN 2989-0780

CONFERENCE PROCEEDINGS

"Addressing Global Health Challenges, with Current Trends in Biochemistry and Molecular Biology"

27Th June 2025

Colombo, Sri Lanka

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Can the Stress Hyperglycaemia Ratio Predict Renal Function Decline in Patients with Diabetes Mellitus?

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Background: Diabetic nephropathy is a major cause of chronic kidney disease (CKD) and end-stage renal disease (ESRD) worldwide. The stress hyperglycaemia ratio (SHR) is a novel marker for adverse outcomes in diabetic patients. However, its role in predicting renal function decline remains underexplored.

Objective: To investigate the predictive role of SHR in renal function decline among diabetic patients.

Methods: A retrospective cohort study was conducted among diabetic patients at Teaching Hospital, Jaffna (2021–2023). SHR was calculated as fasting blood glucose (FBG) divided by estimated average glucose derived from glycated haemoglobin (HbA_{1c}). Renal function decline was assessed at the end of follow-up (2023) using any of the following criteria: (1) eGFR decline ≥30%, (2) progression to CKD stage 3a or higher, and (3) new onset of proteinuria. SHR was categorized into 3 tertiles: T1 (SHR<0.7), T2 (SHR ≥0.7 to <0.94) and T3 (SHR ≥0.94). Independent sample t-test, chi square test and receiver operating characteristic (ROC) curve analysis were employed.

Results: The mean SHR in year 2021 and 2023 were 0.73 ±0.21 and 0.74 ±0.21 respectively. SHR in 2023 showed a significant difference ($p = 0.013$) between patients with and without renal function decline, whereas no significant difference was observed in 2021 ($p > 0.05$). Furthermore, when SHR tertiles (T1, T2 & T3) were analyzed, a significant association with renal function decline was found in 2023 ($p = 0.007$), but not in 2021 ($p = 0.124$). ROC curve analysis demonstrated poor discriminatory power, with an area under curve (AUC) of 0.531.

Conclusion: Baseline SHR did not predict renal decline, unlike follow-up SHR. This discrepancy may be due to baseline SHR reflecting only transient glycaemic fluctuations, while follow-up SHR captures the impact of ongoing metabolic stress. These findings suggest that SHR may be a prognostic marker, warranting validation through larger and long-term studies.