Serum Levels of C-Peptide and Oral Hypoglycemic Failure in Type 2 Diabetes

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Abstract

Objective: The study was conducted at St. Francis Hospital Nsambya in Uganda and aimed to evaluate the predictive value of fasting serum C-peptide levels for oral hypoglycemic failure in patients with Type 2 Diabetes Mellitus (T2DM).

Methods: The researchers conducted a prospective cohort study from January 1, 2023, to October 1, 2023, involving participants aged 40 years and above with poorly controlled T2DM (HbA1c > 10.0%) on oral hypoglycemic agents. After obtaining informed consent, participants underwent a semi-structured questionnaire to gather demographic and health-related information. Blood samples were collected for Fasting Blood Sugar (FBS) and C-peptide level determination. Participants were then prescribed a regimen of metformin, glimepiride, and teneglyptine, alongside diet and exercise counseling. Follow-up assessments were conducted monthly for three months, including FBS measurements and HbA1c at the study's end. The study enrolled 35 participants with T2DM, with an average age of 59.6 years and predominantly female (77.1%). Most participants were overweight or obese (42.9% and 45.7%, respectively), and 62.9% had a family history of diabetes. Clinical assessments revealed a median diabetes duration of 7 years and high blood pressure in 62.9% of participants. Metformin was the primary medication used (97.1%), followed by glibenclamide (28.6%) and vildagliptin (22.9%).

Results: At baseline, the mean fasting serum C-peptide level was 1.72 ng/ml, showing a statistically significant negative correlation with HbA1c at three months. There was a significant reduction in median fasting blood glucose levels from baseline (10.6 mmol/L) to three months (7.8 mmol/L) after targeted treatments. The Area Under the Curve (AUC) for C-peptide in predicting oral hypoglycemic response was 0.85, with an optimal cut-off of 1.7 ng/ml, showing high diagnostic accuracy. This level accurately identified individuals with good glycemic control (sensitivity of 89.5%, specificity of 81.2%).

Conclusions: The study concludes that fasting serum C-peptide levels could serve as a pivotal marker in guiding treatment decisions for T2DM patients not achieving desired glycemic control with oral agents, especially those with diabetes duration of five years or more. Clinicians are recommended to incorporate fasting serum C-peptide measurement into T2DM management protocols for better-tailored treatment strategies. Future research should focus on longitudinal studies to validate the prognostic value of C-peptide levels across diverse populations and explore mechanistic pathways influencing glycemic control for potential therapeutic targets in T2DM management.

Key words: Fasting serum C-peptide levels, Oral hypoglycemic failure, Type 2 diabetes