Association Between C-peptide Levels with Diabetic Neuropathy and Diabetic Retinopathy Among Type-2 Diabetes Mellitus Patients Attending the Jos University Teaching Hospital, Jos

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Background

Diabetes mellitus (DM) is a chronic non-communicable disease characterized by persistent hyperglycemia due to relative or/and absolute insulin deficiency. Diabetes mellitus affects various organs and tissues in the body including the nerves and eyes leading to disability and organ damage. Peripheral neuropathy (PN) severity can be categorized into mild, moderate and severe neuropathy based on the volts at loss of sensation using the biothensiometer while diabetic retinopathy (DR) is categorized into non-proliferative (mild, moderate and severe) and proliferative retinopathy using the international clinical diabetic retinopathy and diabetic macular edema disease severity scales. Beta cells of the pancreas secret insulin and c-peptide in equal amounts. C-peptide is a sensitive marker of beta cell function. C-peptide levels infer on the beta cell function; high c-peptide levels suggest insulin resistance, and low c-peptide levels suggest beta cell failure. C-peptide levels of 0.26 – 1.03nmol/L is considered normal, levels < 0.26nmol/L is low and levels > 1.03nmol/L is high. Assaying c-peptide levels could facilitate need for early treatment among diabetics, slowing the progression of complications.

Aim

To assess the association between C-peptide levels and diabetic neuropathy and diabetic retinopathy among patients with type-2 diabetes mellitus attending the Jos University Teaching Hospital, Jos

OBJECTIVE

. To assess the C-peptide levels among subjects with type-2 diabetes mellitus
. To determine the prevalence of diabetic neuropathy and diabetic retinopathy among type-2 DM
. To determine the association between c-peptide levels with DM neuropathy and DM retinopathy among type-2 DM

METHODOLOGY

This was a hospital-based analytical cross-sectional study. One hundred patient with type-2 DM was used for this study. Consecutive patients with type-2 DM attending the Diabetes Mellitus Out-Patient Clinic of the Jos University Teaching Hospital were used in subject recruitment. Data including bio-sociodemographic, anthropometric, blood pressure were collected using a Profoma. Blood glucose was assessed using the glucose oxidase method, C-peptide assayed using ELISA after an 75g oral glucose load, peripheral neuropathy determined using Biotesiometer and retinopathy determined using ophthalmoscope. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 24. Student t-test and chi-square were used to analyse continuous and categorical variables respectively.

RESULT

Seventy-one (53.8%) of the study subjects were females. The mean (SD) age of subjects was 57.27 (±10.85) years, duration of DM was 10.41 (±7.81) years, HbA1c was 7.64 (±2.97) %, the fasting plasma glucose (FPG) and random plasma glucose (RPG) mean were 7.43 (±4.27) mmol/L and 12.15 (±7.84) mmol/L respectively. The mean (SD) C-peptide levels of subjects was 0.71 (±0.44) nmol/L. The prevalence of normal, high and low C-peptide levels among study subjects were 80.0%, 14.0% and 6.0% respectively. The prevalence of peripheral neuropathy (PN) among type-2 DM was 25.0% and the prevalence of diabetic retinopathy (DR) among type-2 DM was 12.0%. Seventeen (68.0%) of the study subjects had mild PN and 7 (28.0%) had severe PN. Eleven (91.7%) of the study subjects with retinopathy had non-proliferative retinopathy and 1 (8.3%) had proliferative retinopathy. High C-peptide levels (>1.03 nmol/L) were associated with mild peripheral neuropathy while severe peripheral neuropathy was associated with low c-peptide levels (<0.26nmol/L), this was not statistically significant (p= 0.85). Similarly, high C-peptide levels was associated with mild non-proliferative retinopathy but low C-peptide levels was not associated with any category of retinopathy, this finding was however not statistically significant (p= 0.64).

CONCLUSION

High C-peptide levels (insulin resistance) in type 2 DM was associated with mild forms of peripheral neuropathy and retinopathy while low C-peptide levels (beta cell failure) was associated with severe peripheral neuropathy. Assessing C-peptide levels in type-2 diabetes mellitus patients may be useful in the evaluation of peripheral neuropathy and diabetic retinopathy.