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ORIGINAL ARTICLES

No Relevant Relationship between Glucose Variability and Oxidative Stress in Well-Regulated Type 2 Diabetes Patients

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Abstract

Background:

A strong relationship between glycemic variability and oxidative stress in poorly regulated type 2 diabetes (T2DM) on oral medication has been reported. However, this relationship was not seen in type 1 diabetes. The purpose of this study is to reexamine the relation between glycemic variability and oxidative stress in a cohort of T2DM patients on oral medication.

Methods:

Twenty-four patients with T2DM on oral glucose lowering treatment underwent 48 hours of continuous glucose monitoring (CGMS® System Gold™, Medtronic MiniMed) and simultaneous collection of two consecutive 24-hour urine samples for determination of 15(*S*)-8-iso-prostaglandin $F_{2\alpha}$ ($PGF_{2\alpha}$) using high-performance liquid chromatography tandem mass spectrometry. Standard deviation (SD) and mean amplitude of glycemic excursions (MAGE) were calculated as markers of glycemic variability.

Results:

Included in the study were 66.7% males with a mean age (range) of 59 (36–76) years and a mean (SD) HbA1c of 6.9% (0.7). Median [interquartile range (IQR)] urinary 15(*S*)-8-iso-$PGF_{2\alpha}$ excretion was 176.1 (113.6–235.8) pg/mg creatinine. Median (IQR) SD was 31 (23–40) mg/dl and MAGE 85 (56–106) mg/dl. Spearman correlation did not show a significant relation for SD ($\rho = 0.15$, $p = .49$) or MAGE ($\rho = 0.23$, $p = .29$) with 15(*S*)-8-iso-$PGF_{2\alpha}$ excretion. Multivariate regression analysis adjusted for age, sex, HbA1c, and exercise did not alter this observation.

Conclusions:

We did not find a relevant relationship between glucose variability and 15(*S*)-8-iso-$PGF_{2\alpha}$ excretions in T2DM patients well-regulated with oral medication that would support an interaction between hyperglycemia and glucose variability with respect to the formation of reactive oxygen species.

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Abbreviations: (AUCpp) postprandial incremental area under the curve, (BMI) body mass index, (CGM) continuous glucose monitoring, (EIA) enzyme immunoassay, (FPG) fasting plasma glucose, (GFR) glomerular filtration rate, (HbA1c) hemoglobin A1c, (HDL) high-density lipoprotein, (HPLC) high-performance liquid chromatography, (IQR) interquartile range, (LDL) low-density lipoprotein, (MAGE) mean amplitude of glycemic excursions, (MS) mass spectrometry, ($PGF_{2\alpha}$) prostaglandin $F_{2\alpha}$, (ROS) reactive oxygen species, (SD) standard deviation, (T1DM) type 1 diabetes mellitus, (T2DM) type 2 diabetes mellitus

Keywords: 8-isoprostanes, glucose variability, MAGE, oxidative stress, type 2 diabetes

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