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Original article

Correlation between Transient Ischemic Dilation Index and Endothelin-1 Level in Patients with Type 2 Diabetes Mellitus

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Abstract

Transient ischemic dilation (TID) is a sensitive and specific marker for detecting the severity and extent of coronary artery disease (CAD), which is closely associated with endothelial dysfunction. TID can be observed on stress-rest myocardial perfusion scan (MPS) due to subendocardial hypoperfusion. Hyperglycemia in type 2 diabetes mellitus (T2DM) could lead to micro- and macrovascular complications and begins with endothelial dysfunction. Endothelin-1 (ET-1), a potent vasocontrictor, increases in endothelial dysfunction. The aim of this study was to examine the correlation between TID index and ET-1 levels in T2DM patients without any sign or symptom of cardiovascular complication. An analytic-correlational cross-sectional study was done on T2DM patients who met the inclusion criteria and agreed to participate by signing an informed consent form. The TID index was calculated automatically using standard software provided by the gamma camera GE-Infinia. Stress-rest MPS was done using technetium-99m (^{99m}Tc)-tetrofosmin and a pharmacological stress test using adenosine. The ET-1 level was determined by radioimmunoassay. Data distribution was analyzed using the Shapiro-Wilk normality test. The Mann-Whitney test was used to compare the average difference of the variables and Spearman's rank for correlation analysis. A total of 47 subjects consisting of 24 (51%) males and 23 (49%) females were included in this study. The age range was 37-74 years (54.3 ± 8.4). The TID index range was 0.86-1.26 (median = 1.12) and abnormal TID index was found in 23/47 (49%) subjects. ET-1 levels range 8.02-17.91 pg/mL (median = 11.08). The results showed no significant differences in age, ET-1 levels, and TID index based on age and sex ($P > 0.05$). There was a significant positive correlation between TID index and ET-1 level with $r = 0.7$ and $P < 0.001$. There was a positive correlation between TID index and ET-1 plasma level in patients with T2DM.

Keywords: Endothelial dysfunction, endothelin-1, transient ischemic dilation index, type 2 diabetes mellitus

Introduction

Transient ischemic dilation (TID) with perfusion defect observed on myocardial perfusion scan (MPS) is a highly sensitive and specific marker for the severity and extent of cardiovascular disease and an independent and powerful predictor for cardiac event.[1-5] TID could be found due to decrease of blood supply to the subendocardium as a response to cardiac stress and normal at rest. Some studies have shown that there was no difference in left ventricular wall thickness anatomically during the cardiac stress test and during rest in patients with positive TID.[6-9]

TID is often found in type 2 diabetes mellitus (T2DM) patients with asymptomatic cardiovascular complications.[3,5,10,11]

Cardiac macro and microvascular involved in long-term complications in a T2DM patient begin with endothelial dysfunction triggered by hyperglycemia.

Endothelial dysfunction can be found to be both macro- and microvascular, which leads to an imbalance between vasodilation and vasoconstriction capability

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