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Screening for Diabetic Cardiac Autonomic Neuropathy Using a New Handheld Device

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Abstract

Background:

Cardiac autonomic neuropathy (CAN) is a serious complication of longstanding diabetes and is associated with an increased morbidity and reduced quality of life in patients with diabetes. The present study evaluated the prevalence of CAN diagnosed by reduced heart rate variability (HRV) using a newly developed device in a large, unselected, hospital-based population of patients with diabetes.

Methods:

The study examined 323 patients consisting of 206 type 1 diabetes (T1DM) patients and 117 type 2 diabetes (T2DM) patients. The new handheld prototype Vagus™ was used to screen for CAN. Three different standardized cardiac reflex tests were performed to calculate HRV: 30:15 ratio, E:I ratio, and the Valsalva maneuver. An abnormal HRV in one test is indicative of early CAN, and if two or more tests show abnormal HRV, the diagnosis of CAN is established.

Results:

In total, 86% of examined patients completed all three tests. Each test was completed by more than 90% of the patients. The prevalence of established CAN was 23%, whereas 33% of the patients had early signs of CAN. The prevalence was higher in T2DM patients (27.8%) than in T1DM patients (20.6 %), $p = .02$. Patients with CAN were older and had a longer duration of diabetes, higher systolic blood pressure, more nephropathy and retinopathy, and a higher vibration threshold.

Conclusions:

Cardiac autonomic neuropathy is frequent in both T2DM and T1DM patients, especially in those with other late diabetes complications. Screening for CAN with the new device is feasible.

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Abbreviations: (ADA) American Diabetes Association, (BMI) body mass index, (CAN) cardiac autonomic neuropathy, (HbA1c) hemoglobin A1c, (HRV) heart rate variability, (T1DM) type 1 diabetes mellitus, (T2DM) type 2 diabetes mellitus

Keywords: cardiovascular autonomic neuropathy, cardiovascular reflex tests, diabetes mellitus, diagnostic tests, heart rate variability

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