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REVIEW ARTICLE

Diabetic Autonomic Imbalance and Glycemic Variability

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Abstract

Diabetic autonomic neural imbalance is a severe complication of long-term diabetes patients and may progress to diabetic autonomic neuropathy (DAN). The prevalence of DAN is reported to be between 20 and 70%, depending on the studies. The pathogenesis of DAN remains unresolved. However, emerging evidence suggests that glycemic variability (GV) may be associated with autonomic imbalance in patients with both type 1 and type 2 diabetes. As symptoms are initially weak and uncharacteristic, the condition often remains undiagnosed until late manifestations present themselves. Predominant symptoms may include nausea, vomiting, gastroparesis, involuntary diarrhea, postural hypotension, voiding difficulties, and sexual dysfunction.

Analyzing the patterns of heart rate variability carries the potential for detection of autonomic imbalance in the subclinical and asymptomatic stages. In this context, GV may affect the sympathovagal balance by increasing oxidative stress and proinflammatory cytokines. Establishing a GV risk profile could therefore be important in determining risk factors in diabetes patients. This review addresses the issues above and in particular the possible association between diabetic autonomic imbalance and GV.

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Abbreviations: (ACE) angiotensin-converting-enzyme, (CAN) cardiac autonomic neuropathy, (CGM) continuous glucose monitoring, (DAN) diabetic autonomic neuropathy, (ECG) electrocardiograph, (GV) glycemic variability, (HbA1c) glycated hemoglobin, (HPA) hypothalamic-pituitary-adrenal, (HRV) heart rate variability, (MAGE) mean amplitude of glycemic excursions, (T1DM) type 1 diabetes mellitus, (T2DM) type 2 diabetes mellitus

Keywords: autonomic imbalance, complications, correlation between estimates of blood glucose variability, diabetes, glycemic variability, heart rate variability, hypothalamic-pituitary-adrenal axis, neuropathy

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