Abstract

Cardiovascular complications are the main cause of death in people with diabetes, which if identified can lead to improved health. A non-invasive, clinical system for low-cost screening of diabetes mellitus (DM) is introduced and tested on patients with some known conditions. Data recorded on 20 Normal Control (NC) and 20 Diabetic mellitus. Lead II electrocardiogram (ECG)
was recorded in three modes, supine, sitting to standing and deep breath. The heart rate variability (HRV) signal is extracted from ECG recording. The HRV signal is then characterized using time domain and frequency domain analysis method which is subsequently used as a basis for detection of percentage functional ability of sympathetic, parasympathetic and autonomic nervous system of diabetes mellitus. Almost 20 time domain and frequency domain parameters have significance p-value less than 0.05. Poor heart rate variability is seen in diabetes patients in all three modes. In patients with type 2 DM significant reduction of spectral power in HF band of the heart rate variability was found for orthostatic stress and respiratory stress. Decreased values of Dynamic Orthostatic Stress (DOS) index, Dynamic Respiratory Stress (DRS) index and Ortho-Respiratory Stress (ROR) Index for DM compared to NC indicates damage to sympathetic, parasympathetic and autonomic nervous system of DM as an effect of diabetes.

Reference

Heart Rate Variability Analysis a Non-invasive Clinical Screening Tool to Detect Functional Ability of Diabetic Cardiac Autonomic Neuropathy

Chengyu Liu, Changchun Liu, Liping Li, Qingguang Zhang, Bin Li. “Systolic and Diastolic Time Interval Variability Analysis and Their Relations with Heart Rate Variability”. IEEE, 2009; 978-1-4244-2902-8:1-4.


Index Terms

Computer Science

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Key words

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Frequency Domain Analysis