*O*riginal *R*esearch

Assessment of heart rate variability on Electrocardiograph in young adults with diabetes

[1]Dr. Bharat Somahi, [2](Brig) Dr. Dinesh Chandra Gupta, [3]Dr. Swapnil C Ganeshpure, [4]Dr.Mahesh Padsalge

[1]Junior Resident, Department of General Medicine, D Y Patil University School of Medicine, Navi Mumbai;
[2](Ex AMC), Professor, Department of General Medicine, D Y Patil University School of Medicine, Navi Mumbai;
[3]Associate professor, Department of General Medicine, D Y Patil University School of Medicine, Navi Mumbai;
[4]Associate professor, Department of General Medicine, D Y Patil University School of Medicine, Navi Mumbai;

ABSTRACT
Background: Cardiovascular autonomic neuropathy (CAN), a complication of DM, affects the autonomic nerves innervating the heart and can adversely affect cardiac performance. Reduction in HRV is an early manifestation of CAN with parasympathetic loss preceding sympathetic dysfunction. Whether HRV is influenced by prior diabetes treatment or glycemic control in young adults with youth-onset DM is not known. The present study thus aimed at assessing HRV on electrocardiography in young adults with diabetes. **Materials & methods:** A hospital based observational study was conducted at Department of Medicine of Dr. D.Y. Patil Hospital & Research Centre. 100 diagnosed cases of diabetes for more than 5 years in age less than 45 years were enrolled.. All the patients were subjected to a detailed history taking and physical examination. Patients were then tested for HRV with the use of an ECG generator – Baseline resting ecg for Sinus arrhythmia followed by ECG taken while deep breathing. **Results:** E:I ratio was abnormal in 29 percent of the patients while HRV was lost in 3 percent of the patients on resting baseline ECG . **Conclusion:** Early detection of loss of HRV in asymptomatic patients is also important for cardiovascular risk stratification in the diabetic young adults
Key words: Diabetes, ECG, Heart Rate Variability.

Corresponding author: Dr. Bharat Somahi, Junior Resident, Department of General Medicine, D Y Patil University School of Medicine, Navi Mumbai, Maharashtra, India

INTRODUCTION
Heart rate variability depicts functional status of autonomic nervous system on sinus node
Reduced heart rate variability (HRV) with respiration is the earliest subclinical marker of CAN and has been shown to increase the risk of arrhythmia, sudden death, and silent myocardial ischemia in adults (1).Parasympathetic activity is affected first in longstanding diabetes due to long course of vagus nerve.

However, data regarding the presence and correlates of subclinical CAN among contemporary youth and young adults with type 1 diabetes are sparse (3). On one hand, these individuals with diabetes have a younger age at onset and thus a longer duration of hyperglycemia ; on the other hand, they are benefiting from more sophisticated insulin regimens and improved glucose monitoring than persons with type 1 diabetes diagnosed in earlier years (4)

The present study thus aimed at assessing Heart Rate Variability on electrocardiography (baseline resting ECG and with deep respitration) in young adults with diabetes.

MATERIALS & METHODS
CAN testing with parasympathetic function done- HRV assessed with resting baseline ECG and then with deep Expiration and Inspiration .

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Initially With the patient at rest and supine,baseline resting ECG obtained, to evaluate sinus arrhythmia. Subsequentaly ,heart rate is monitored by ECG while the patient breathes in and out at 6 breaths per minute (deep breathing). Qualitative data was represented in the form of frequency and percentage. Association between qualitative variables was assessed by Chi-Square test with Continuity Correction for all 2 X 2 tables and Fisher's exact test for all 2 X 2 tables.

Table 1: E:I ratio distribution

E/I Ratio	Test Result	Counts	Percentage
=<1	Abnormal	29	29.0%
>1	Normal	71	71.0%

RESULTS
E:I ratio was abnormal in 29 percent of the patients while HRV was lost in 3 percent of the patients on Resting baseline ECG

DISCUSSION
Diabetes is a problem of major concern and has been characterised as the primary health care challenge of the twenty-first century. The distribution of type 1 diabetes mellitus (T1DM) shows a rapid increase as well as the rise of type 2 diabetes mellitus (T2DM) in younger patients.(6)
NORMALLY, Maximum - Minimum heart rate is >=15 beats per minute on deep breathing.
E:I RATIO- IS RR INTERVAL OF EXPIRATION: INSPIRATION on deep breathing (Normal>1)

E:I ratio was abnormal in 29 percent of the patients while HRV was lost in 3 percent of the patients on resting baseline ECG.
CAN, together with diabetes duration, has been demonstrated as the main predictor of reduced aortic distensibility in type 2 diabetes, and, therefore, it is associated with a significant reduction in the elastic properties of the aorta. Reduced aortic distensibility predicts cardiovascular mortality in patients with type 2 diabetes and impaired glucose tolerance.[11]
From the heart rate variability parameters, low heart rate variability during spontaneous breathing tended to be associated with excess mortality in the people with diabetes, but not in those without diabetes.

CONCLUSION
Early detection of loss of HRV on ECG in asymptomatic patients is also important for cardiovascular risk stratification in young adults with diabetes.
Loss of heart rate variability on ECG is further picked by deep inspiration and expiration to measure E:I

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