ABSTRACT

TITLE: A study of Heart Rate Variability and Electrocardiographic changes in hypothyroid patients correlated with T_3, T_4 and TSH levels.

AUTHORS: Shyamala Gowri K[1], Uma Maheshwari T[1]

AFFILIATION: [1]Department of physiology, PSG Institute of Medical Sciences and Research, Coimbatore. Dr.MGR university, Tamilnadu.

INTRODUCTION:

Hypothyroidism is the second most common metabolic disorder in the Indian population. Hypothyroidism can lead to significant morbidity due to its effects on the cardiovascular system.

AIMS AND OBJECTIVES:

To evaluate short term heart rate variability and electrocardiographic changes in hypothyroid subjects and controls and correlate it with serum T_3, T_4 and TSH levels.

MATERIALS AND METHODS:

Thirty females aged between 25 to 45 years presenting with newly diagnosed clinical and subclinical hypothyroidism to the outpatient clinic were included in the study group and thirty age matched apparently healthy females were included in the control group. Demographic characteristics were noted and thyroid function tests, ECG and HRV were done in all the subjects in both the groups.

RESULTS:

Statistical analysis was done using SPSS software version 19. Continuous variables were presented as Mean ± Standard deviation (SD) and categorical variables were presented as absolute numbers or percentage. The comparison of normally distributed continuous variables between the hypothyroid group and the euthyroid group was performed using unpaired Student's 't' test. Nominal categorical data between the two groups were compared using Chi-Square test. Demographic profile of the two groups was not significantly different. The mean TSH level was significantly higher in the hypothyroid group compared to the euthyroid group (P value 0.001). The mean FT_3 and FT_4 levels were not significantly different between the two groups. Time domain indices of Heart Rate Variability such as SDNN, RMSSD and pNN50 were significantly decreased in the hypothyroid group (P value 0.000) compared to euthyroid group indicating a decrease in long term vagal control of the heart. Among the frequency domain parameters, LF (nu) was significantly increased (P value 0.001), HF (nu) was significantly reduced (P value 0.001) and LF/HF ratio was significantly increased in the hypothyroid group compared to euthyroid group indicating relative increase in sympathetic activity in hypothyroid group. There was a weak positive correlation between serum TSH levels and LF/HF ratio which was not statistically significant and a negative correlation was found between serum FT_3 levels, serum FT_4 levels and LF/HF ratio in hypothyroid subjects. Multiple linear regression analysis between thyroid function test parameters and LF/HF ratio did not show independent contribution of thyroid function test parameters to LF/HF ratio. There was no significant difference in

ECG parameters between the two groups. Mean regression analysis of ECG parameters and thyroid function test parameters showed that serum FT_3 level alone was found to be a good predictor of heart rate in hypothyroid subjects.

CONCLUSION:

In this study, comparison of spectral components of Heart Rate Variability between hypothyroid and euthyroid subjects showed significant autonomic imbalance with predominant sympathetic tone and decreased parasympathetic tone in hypothyroid subjects. Heart Rate Variability appears to be superior to ECG in detecting early cardiac changes in hypothyroid subjects. ECG is a commonly used clinical investigation for detecting cardiac abnormalities while HRV is a research tool which is rarely used in clinical practice. Hence further studies are needed to establish the clinical utility of Heart Rate Variability in diagnosing the cardiac morbidities which occur in hypothyroidism.

KEYWORDS: HRV, ECG, T_3, T_4, TSH, LF/HF ratio.