

HRV ANALYSIS FOR THE STUDY OF NEUROLOGICAL AND CARDIAC EFFECTS OF ALCOHOL ON YOUTH OF INDIA

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ABSTRACT

The time difference between two successive heart beats measured over a considerable time is termed as Heart Rate Variability (HRV). The HRV in a person vary with wide range of effects caused because of external and internal stimulations. HRV is widely used because it can provide the reliable information on the working of both cardiac and ANS (Autonomic Nervous System). It is a non-invasive, indirect method of measuring a physiological parameter. HRV is measured broadly using two types of parameter extractions; those are linear and nonlinear methods. Linear methods such as mean of R-R interval at various time intervals were analyzed which indicates increased sympathetic tone, and decreased parasympathetic tone, the percentage on NN50 is around 36percent in nonalcoholics and in alcoholics it is around 8 percent. In this work, two kinds of data were analyzed obtained from subjects in the age group of 18 to 22. The parameters of linear methods and four nonlinear methods, sample entropy (ApEn), Shannon entropy and Recurrence plot analysis, Detrended Fluctuation Analysis have been applied to analyze HRV among 158 subjects of which 79 are control study (non-alcoholics) and 79 are alcoholics. The analysis shows the effects of sympathetic and parasympathetic effects of Nervous system on the heart for alcoholic and non-alcoholic subjects, which are inferred by the linear and nonlinear parameters of HRV. Detrended Fluctuation analysis using MATLAB clearly differentiates between the alcoholic and non-alcoholic by studying the points along the line of the plot. In non-alcoholic subjects the points are aligned along the line of the plot, where as in alcoholic subjects very few points are aligned along the line of plot. The low frequency power lies around 624ms^2 nonalcoholics and around 1103ms^2 in alcoholic subjects. The Shannon Entropy values are around 2.5 in nonalcoholics and for alcoholic subjects it is around three. The above value clearly distinguishes the two data sets under study among alcoholics and non-alcoholics.

KEYWORDS: ECG, HRV, Sample Entropy, Shannon Entropy, Recurrence Plot