

Analysis of Heart Rate variability:

Heart rate variability (HRV) is a conventionally accepted term to describe variations of both instantaneous heart rate and R-R intervals standardized by a Task force organized by European Society of Cardiology and The North American Society of Pacing and Electrophysiology.

There are two methods for analyzing HRV:

• Time domain method:

Time domain method determines the heart rate at any point in time or the intervals between successive normal QRS complex in a continuous ECG record. Common simple time domain variables include mean normal to normal QRS complex (NN) interval and the mean heart rate, the difference between longest and shortest NN interval and maximum and minimum NN ratio, the difference between night and day heart rate, and so forth.

Statistical time domain variables include the standard deviation of the NN interval (SDNN), root of the mean squared differences of successive NN intervals (RMSSD), the number of interval differences of successive NN intervals greater than 50 ms (NN50), and pNN50, the proportion derived by dividing NN50 by the total number of NN intervals.

• Frequency domain method:

Power spectral density analyzes the information of total power distribution as a function of frequency. Very low frequency (VLF, frequency range ≤ 0.04 Hz), low frequency (LF, frequency range 0.04-0.15 Hz) and high frequency (HF, frequency range 0.15-0.4 Hz) are the components of total power (frequency range 0.00-0.4 Hz) in a spectrum of 2-5 minutes record.

Measurements of power components is usually made in absolute values of power (ms²), but LF and HF also expressed in normalized units (n.u.) representing the relative value of each power component proportionate the total power minus the VLF component. This represents the controlled and balanced behavior of the two branches of autonomic nervous system. The vagal activity is a major

contributor to the HF component. The LF component is a marker of sympathetic modulation. But others suggest, as a parameter that include both sympathetic and vagal influences. LF/HF ratio is considered as a mirror of sympatho-vagal balance.

Heart rate variability (HRV) parameters as cardiac autonomic markers:

- Analysis of HRV is one of the most promising newer techniques to quantify cardiac autonomic nervous activity.
- Analysis of HRV has become popular because it is independent, non-invasive and to some extent informative.
- There are three HRV analyzing methods to assess cardiac autonomic nerve functions-
 - (a) Simple bedside R-R interval method: less sensitive older methods [eg. Valsalva maneuver, orthostatic test, deep breathing].

Remaining two methods are modern and micro-computer based:

- (b) Long term time domain measures: more sensitive and reproducible than the short term tests.
- (c) Short term frequency domain measures: useful in separating sympathetic from parasympathetic activity.

BSMMU has started HRV analysis in the year of 2008 both for research purpose and patients' service in the department of Physiology, BSMMU, Dhaka.

Reference:

European Society of Cardiology and the North American Society of pacing and electro physiology. (1996) Heart Rate Variability. standards of measurement, physiological interpretation and clinical use. *Circulation*. 93: 1043- 65.

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