

## Evaluation of Heart Rate Variability Parameters During Awake and Sleep in Refractory and Controlled Epileptic Patients

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### Background:

Alterations of heart rate variability (HRV) in epileptic patients were the field of interest of several studies for many reasons, particularly the contribution toward sudden unexpected death in epilepsy (SUDEP).

### Aim:

We aimed at evaluation of autonomic dysfunction in epileptic patients during awake and sleep in addition to studying the association between SUDEP risk with different Holter parameters.

### Patients and Methods:

The study included eighty epileptic patients (40 controlled epileptic patients and 40 refractory epileptic patients) compared to 30 volunteers as control group. They underwent detailed epileptic history, Chalfont seizure severity scale, sudden unexpected death in epilepsy (SUDEP)-7 risk score and 24 hour Holter monitoring to assess HRV parameters.

### Results:

Patients with refractory epilepsy had longer duration of epilepsy with increased number of used AEDs compared to controlled epileptic group. Both controlled and refractory epileptic patients had significantly higher average heart rate (AV.HR), sympatho-vagal ratio (low-frequency/high-frequency (LF/HF) ratio in 24 hours, daytime, and nighttime), and LF and HF values compared to controls. The rMSSD (the root mean square of difference between successive normal intervals), Tri.Index (triangular index), and pNN50 (percentage of the number of pairs of consecutive beat-to-beat intervals that varied by 50 ms) were

significantly reduced in both epileptic groups compared to controls. Among refractory epileptic patients, patients with generalized epilepsy had significantly higher severity epileptic scale, average heart rate, minimum heart rate, and LF/HF night, in addition to lower rMSSD and pNN50 compared to patients with focal epilepsy. We found positive correlation between the following Holter indices (LF/HF 24, LF/HF day, and LF/HF night) and the duration of the epilepsy, while negative correlations between Tri.Index, LF, and HF and the epileptic duration were detected. SUDEP-7 risk was negatively correlated with pNN50 and rMSSD; meanwhile, it was positively correlated with LF/HF 24. The severity of epilepsy among refractory epileptic patients was positively correlated with average heart rate but negatively correlated with pNN50 and rMSSD. Using linear regression analysis, we found that pNN50 and rMSSD could predict SUDEP-7 risk and severity of epilepsy in refractory epileptic patients.

### Conclusion:

Epileptic patients (particularly refractory patients with generalized EEG findings and long duration) had reduced heart rate variability and hence impairment of parasympathetic activity with increased susceptibility for adverse outcomes. Moreover, pNN50 and rMSSD could be used as predictors for SUDEP-7 risk as well as severity of epilepsy in refractory epileptic patients.