

Assessing Autonomic Balance in Peripheral Arterial Disease Patients: A Generalized Multiscale Entropy Analysis of Heart Rate Variability

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Background: Peripheral arterial disease (PAD) is a chronic disorder that affects blood flow to the lower limbs. Many patients can develop intermittent claudication (IC) due to decreased blood flow in the lower limbs. Heart rate variability (HRV) assesses the autonomic balance through the cardiovascular system, however, the ability to predict IC in PAD patients using HRV is still unclear.

Objective: We aim to assess if there are differences in resting HRV between patients with IC and healthy subjects using nonlinear analysis.

Methods: 14 healthy male subjects (60 ± 5 years) and 14 male IC patients (64 ± 6 years) underwent 10 minutes of ECG recording from which RR interval time series were obtained. We characterized the HRV using Generalized Multiscale Entropy (GMSE), after removing artifacts. GMSE allows us to characterize the complexity of the HRV at different time scales. We computed GMSE for each patient, and then estimated the mean and standard deviation for each scale and group (PAD and healthy) using bootstrap.

Results: GMSE was significantly different (p -value < 0.05) for each scale between the healthy and PAD groups. The mean and std for each scale and group are shown in the figure.

Conclusions: Our findings suggest that GMSE was able to distinguish between IC PAD patients and healthy subjects using HRV, so there is clearly an alteration in the autonomic balance due to PAD.

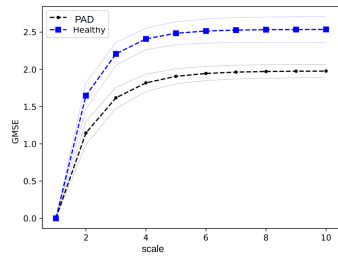


Fig: GMSE mean and std.