

FEASIBILITY OF ARTERIAL WAVEFORM-DERIVED ULTRA-SHORT HEART RATE VARIABILITY IN HEART FAILURE WITH A PRESERVED EJECTION FRACTION: INSIGHTS FROM A BLACK SOUTH AFRICAN POPULATION

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BACKGROUND AND OBJECTIVES: Heart failure with preserved ejection fraction (HFpEF) accounts for almost 50% of all HF cases and poses a growing global health burden. Traditionally associated with advanced age (>70 years), obesity, female sex and age-related arterial stiffness, emerging evidence from South Africa indicates a higher prevalence of HFpEF among young to middle-aged Black individuals with hypertension (HTN) and arterial stiffness. Given the role of autonomic dysfunction in HFpEF, heart rate variability (HRV) is a valuable assessment tool. Limited access to standard electrocardiography (ECG) based HRV in low-resource settings however necessitates alternative approaches. Ultra-short term HRV offers a practical, low-cost method for assessing autonomic dysfunction in this population. The study therefore aims to explore autonomic dysfunction and sex differences in ultra short-term HRV using carotid and femoral waveforms in Black patients with HFpEF.

METHODOLOGY: This retrospective study included 60 Black, age and sex matched participants (30 females and 30 males). Previously collected demographic, anthropometric, clinical, and PWV data were obtained from the ongoing umbrella study, Aortic Function in HFpEF. Sex differences in ultra-short-term HRV were assessed using the root mean square of successive differences (RMSSD). Statistical analyses were performed in SAS using appropriate parametric and non-parametric tests, with significance set at $p < 0.05$.

RESULTS: Males had higher diabetes prevalence (36% vs 10%), while females had higher treatment rates ($p = 0.029$). Obesity was more prevalent in females (57% vs 30%) who demonstrated greater hip circumference ($p = 0.015$). No significant differences were observed in HTN prevalence. However, males had a higher mean arterial pressure ($p = 0.045$). No significant differences were observed in carotid or femoral derived RMSSD values.

CONCLUSION: This study demonstrates the feasibility of deriving ultra-short-term HRV from arterial waveforms in a South African HFpEF cohort. Despite differing cardiometabolic profiles, no sex differences in HRV were observed, highlighting the need for further research into context-specific autonomic markers in HFpEF.