The Effectiveness of HRV as a Predictor of Renal Health and Function in the Absence of Cardiometabolic Diseases. A Pilot Study

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ABSTRACT

Heart rate variability (HRV) is a non-invasive way to assess the autonomic nervous system (ANS) influence on the myocardium. The myocardium and cardiovascular system undergo changes throughout the aging process, specifically, renal vascular function. However, in the absence of cardiometabolic diseases, the ANS does not experience the same deleterious changes observed in at-risk populations. What is unknown is if HRV can predict renal health and function (RH/F) in the absence of cardiometabolic diseases. **PURPOSE:** To determine if HRV is correlated to RH/F in the absence of cardiometabolic diseases. **METHODS:** Thirteen healthy individuals (n = 7 male; n = 6 female, Age 37 ± 12.7 years, %BF 19.7 ± 6.6, VO_{2max} 42.3 ± 6.7 ml/ /kg/min) completed a single health assessment to quantify HRV to RH/F. HRV was measured for 5 mins in the supine position using an elastic belt and Bluetooth monitor (Polar H7). CardioMood software was used to process HRV variables high frequency (HF), low frequency (LF), total power (TP) were assessed for frequency domain, and standard deviation of all NN intervals (SDNN) and the square root of the mean of the squares of successive R-R interval differences (RMSSD) for the time domain. Blood and urine samples were collected by the same technician under standardized conditions. Serum creatinine (sCR), urine creatinine (uCr), cystatin C (CyC), and urine epidermal growth factor (uEGF) were used to calculate estimates of renal health and function via uEGF/uCr ratio (uEGFR), estimated glomerular filtration rate (eGFR) - modification of diet in renal disease (MDRD), CKD-EPI, and SCr/CyC eGFR. Data were analyzed using a Pearson Correlation between HRV and RH/F markers. All analyses were performed using SAS (v.9.3). **RESULTS:** HRV frequency domain variables LF, HF, LF/HF, and TP, and time domain, SDNN, and RMSSD were all significantly ($p < 0.05$) correlated to renal function markers sCR, MDRD, SCr-EPI, and SCr/CyC eGFR. There were no significant correlations observed between HRV and renal health variables ($p > 0.05$). **CONCLUSION:** There is a direct correlation between ANS and renal function when using HRV in individuals with the absence of cardiometabolic diseases. However, markers of renal health are not correlated to ANS.