

AGEING EFFECT ON THE INTERCHANGEABILITY BETWEEN HEART RATE VARIABILITY AND PULSE RATE VARIABILITY

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1. Introduction

Pulse rate variability (PRV) derived from photoplethysmography (PPG) is a widely used surrogate of HRV especially for cardiovascular health monitoring in daily life. While PRV is generally regarded as a valid proxy of HRV for young healthy adults, their agreement can be influenced by various physiological reasons such as pulse wave propagation [1]. Previous studies have found that older adults exhibit increased pulse wave velocity and arterial stiffness level which could make the PRV and HRV non-interchangeable. Along with an aging society, it is essential to investigate the influence of aging effect on the HRV-PRV interchangeability for reliable and precise health monitoring on older adults.

2. Objectives

We aimed to investigate whether the HRV and PRV are interchangeable in elderly and young adults in the aspects of the signal features that are commonly used in daily health monitoring.

3. Methods

We analyzed a dataset containing synchronized ECG and PPG data measured from 31 old adults and 34 young adults doing orthostatic tests [2]. Twenty features from time, frequency and nonlinear domain were analyzed. Linear mixed models and Bland-Altman analysis were utilized for statistically analysis.

4. Results

Results showed that the older adults have a significant lower HRV-PRV interchangeability than young adults.

5. Conclusion

The results highlight the non-interchangeability of using PRV as a substitute for HRV in health monitoring, particularly in older populations because of autonomic aging. We anticipate that these findings could also inform further precautions for other patient populations with autonomic neuropathy, such as those with heart failure or diabetes mellitus.

6. References

- [1] Gil, Eduardo, et al. "Photoplethysmography pulse rate variability as a surrogate measurement of heart rate variability during non-stationary conditions." *Physiological measurement* 31.9 (2010): 1271.
- [2] Mol, Arjen, et al. "Pulse transit time as a proxy for vasoconstriction in younger and older adults." *Experimental Gerontology* 135 (2020): 110938.