

Effects of Beta Blocker Therapy on RR Interval Correlations During Exercise

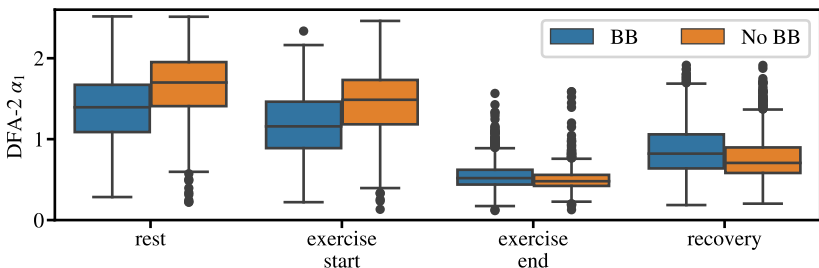
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Aims: The effects of beta blockers (BBs) to heart rate (HR) and HR variability (HRV) are well known in general, but RR interval (RRI) correlations during an exercise test have not been previously studied in detail. We explored how BBs affect the RRI correlations before, during and after exercise.

Methods: We analyzed RRIs extracted from Mason–Likar modified 12-lead ECG recordings during a clinical exercise test ($N = 2257$, of which 1227 with BBs) from FINCAVAS database. We used an accurate method to evaluate the short-term scaling exponent α_1 – an effective measure of RRI correlations – of detrended fluctuation analysis (DFA) in one-minute segments at different stages of exercise. The scaling exponent is affected by many confounding factors (age, sex, diseases, medication) taken into account with subgroup analysis.

Results: During rest, BBs showed significant reduction in the DFA scaling exponents (Welch’s t -test p -value $< 10^{-57}$, 0.3 absolute difference in medians). A similar difference remained at low exercise intensity. At the end of the exercise, the median α_1 was reduced to approximately 0.5 in both groups, and the inter-sample variance was also reduced by intense exercise. Finally, the effect inverted in the recovery phase, where the α_1 was elevated in the BB group (p -value $< 10^{-13}$ with 0.1 difference in medians). Similar qualitative behavior was observed across the different subgroups, suggesting that BBs are the dominant causal factor. In conclusion, BBs alter the RRI correlations and their response to exercise: the initial reduction in RRI correlations vanishes at intense exercise and their post-exercise resurgence is hastened with BBs.



Short-scale DFA-2 scaling exponents α_1 for different segments of the clinical exercise test with and without beta blocker treatment.