

Relationship between Blood Pressure and Heart Rate Circadian Rhythms in Normotensive and Hypertensive Subjects

Giulia Silveri*, Lorenzo Pascazio, Agostino Accardo

Department of Engineering and Architecture, University of Trieste, Trieste, Italy

Aim: Variability signals related to cardiovascular system contain relevant information about the behavior of the autonomic nervous system that acts as a controller of heart rate (HR) and blood pressure (BP). Even if several studies showed direct association between HR and BP and some authors found a linear relationship for particular HR range values, how the relationship could change during 24h, due to circadian rhythms, has never been studied. The aim of this paper is to fill this lack examining the 24h changes of BP and HR.

Methods: The BP and HR records of 423 normotensive (NO) and 205 hypertensive (HE) subjects, without clinical evidence of hypertension-related complications, were acquired using a Holter Blood Pressure Monitor and analysed.

Results: Systolic, Diastolic and Mean BP in both NO and HE subjects showed four different time intervals presenting well-defined trends. In particular, BP presented a decrease between 9:30 and 15:00 followed by a moderate increase between 15:00 and 19:30 and a deeper reduction during night (19:30 - 2:00). An about constant behaviour was present between 2:00 and 5:30 followed by a morning increase (5:30 - 9:30). Although with different slopes, HR presented similar trends in the intervals between 19:30 and 15:00, while during postprandial hours (15:00 - 19:30) HR and BP showed an inverse relationship with decreasing HR and increasing BP, not yet reported in the literature. Furthermore, the HR and BP values were significantly higher in HE than in NO subjects, with an about constant difference of 2.3 bpm and of 20 mmHg along the 24h, respectively.

Conclusion: Our results confirm previously outcomes concerning lower values of HR and BP during night than during day as well as a direct association between HR and BP while highlighted a new inverse relationship between HR and BP in the 15:30 - 19:30 period.