A Comparison of Heart Rate Variability Between High Fit and Recreational Fit Cyclists

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ABSTRACT

Neural influences guide a coordinated response by the cardiovascular system altering heart rate during work. The shape of the heart's response to incremental exercise can be explained by assessments of two neural responses referred to as parasympathetic and sympathetic activity. The purpose of this study is to assess heart rate variability between groups of differing fitness status. Heart rate data was archived from tests done in the Cycling Performance Center on the campus of Midwestern State University. Male and female cyclists acted as subjects. The following information was assessed: age (years), height (cm), weight (kg), body fat (%) and heart rate (bpm) each 20 sec. Fit demographic, quartiles were established based on maximal oxygen consumption (Max VO_2) with quartile 1 being the least fit and quartile 4 being the most fit. Heart rate response within quartiles were compared to heart rate data from recreational subjects. Heart rate variation was determined through heart rate changes every twenty (20) seconds throughout the test. Variations were compared between groups. An independent samples t-Test with Tukey post hoc comparisons was used to determine differences between groups. Statistical significance was determined *a priori* at $p \leq 0.05$. Mean (SD) descriptive values were the following: age, 19.5 (1.9) y; height, 177.5 (4.1) cm; weight, 80.6 (5.6) kg; body fat 8.3 (1.1) %. . Mean heart rate variation (20 s) between groups was the following: quartile 1, 8.1; quartile 2, 9.6; quartile 3, 6.2; quartile 4, 5.2; recreational, 9.2. Quartile 4 (most fit) showed significant ($p < 0.04$) differences from quartiles 1and 2 and the recreational group. Quartile 3 showed differences ($p < 0.05$) from quartile 1, 2 and the recreational group. Quartile 1 showed differences ($p < 0.05$) from quartile 2 and the recreational group. Differences were seen primarily between the top two fit quartiles (3, 4) and the low quartile groups and the recreational group. Following parasympathetic withdrawal, variability was highest in the least fit group while quartile 4 showed the least amount of heart rate variability throughout the test. The highest fit group showed the greatest heart rate variation at the onset of exercise with diminished variability with an increase in work. The opposite was true with the recreational group that showed the greatest variation as workload increased. In summary, heart rate variation was altered with fitness status. This alteration indicates a favorable differences as fitness status is increased.