

Heart Rate Variations in Statistical Quartiles from VO₂max Values in Competitive Cyclists

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ABSTRACT

Cycling can be considered an elite level sport, and with this accompanies varying levels of fitness. Fitness levels are established from maximal oxygen uptake tests. In addition, heart rate may be utilized to examine the varying levels of athletic capability to determine if there is a difference among subjects pertaining to heart rate responses, and their corresponding oxygen uptake (VO₂) in a graded exercise test. **PURPOSE:** The purpose of this study was to examine heart rate response based on varying fitness levels in competitive cyclists during a graded exercise test. **METHODS:** Subjects were 61 (n=61) competitive cyclists statistically placed into quartiles through maximal oxygen consumption (MVO₂) values (ml*kg⁻¹*min.⁻¹). Prior to testing, all subjects signed an informed consent approved by the Institutional Review Board for humans as subjects at Midwestern State University. Each subject was tested on a cycle ergometer using the Australian Institute of Sport (AIS) protocol, in which a beginning workload of 150 watts (w) was completed for 5 minutes, followed by 25 watt increase every minute until volitional fatigue. Heart rate (b*min.⁻¹) data was selectively chosen from each group based on the data collected in beat-by-beat 20 second averages. For heart rate analysis, the following quartile sample sizes were utilized: 1st quartile (n=4), 2nd quartile (n=4), 3rd quartile (n=4), 4th quartile (n=5). Thresholds (trend deviation) for heart rate were determined by a log-linear regression line cross-over method. Established cross-over points (2) indicated three phases of heart rate response. Analysis of Variance (ANOVA) was performed to determine group quartile differences for MVO₂ and heart rate responses. Statistical significance was set at p ≤ 0.05. **RESULTS:** Mean (SD) and range for MVO₂ at each quartile (Q) were the following: 1st Q=51.65 (6.7), range=30.4-56.6; 2nd Q=60.57 (2.77), range=57.2-65.3; 3rd Q=68.05 (1.44), range=66-70.6; 4th Q=75.12 (3.78), range=70.97-85.2. Threshold occurrences between Q were not different at the point of trend-line cross-over. However, HR at thresholds while not statistically different were not similar. Quartile cross-over HR (b*min.⁻¹) were the following at the two cross-over points: 1st Q=152.9 & 171.1; 2nd Q=128.75 & 158.6; 3rd Q=138.9 & 156.75; 4th Q=128.7 & 155.2. **CONCLUSION:** This research indicates a non-significant difference in heart rate response between quartiles. Additionally, fitness levels of competitive cyclists based on MVO₂ levels were shown to be statistically different. In summary, this research indicates varying heart rate response in competitive cyclists of different fitness status.

