

The Effects of Body Position On Heart Rate

Introduction:

The number of cardiac cycles that occurs in a minute is called the heart rate (HR). Several factors can affect HR including activity level, body position and environmental factors (1). Body position can influence heart rate due to gravity, which may have a greater effect in some positions (2). Therefore, the purpose of this study was to better understand how body position influences HR. It was hypothesized that a person in the standing position would have a lower HR when compared to a supine or sitting position.

Methods:

This study utilized a single male subject who was 35 years old, with a height of 190 cm and weight of 83.9 kg. The experimental protocol consisted of obtaining HRs after the following conditions 1) after 2 minutes in the supine position, 2) immediately after moving to a sitting position, 3) one minute after moving into sitting position, 4) immediately after moving to a standing position, 3) one minute after moving into standing position. Researchers obtained HR by palpating the subject's radial artery just below the base of the thumb and measuring the number of heartbeats felt during a 15-second interval. These values were converted to beats per minute (bpm).

Results:

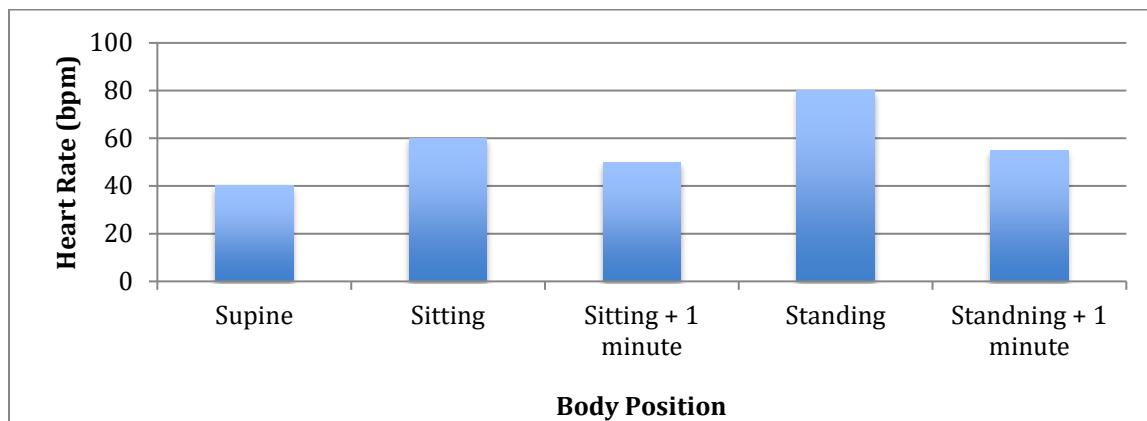


Figure 1 - The effect of body position on heart rate

Discussion:

The purpose of this was to examine the effects of body position on HR. It was hypothesized that HR would be highest while standing compared to supine and sitting. This study showed that immediately after changing body position that HR increased (supine 40, sitting 60, standing 80). However, after ~1 min, HR began to return towards supine values.

When going from a supine to sitting, or from sitting to standing, more venous pooling occurred in the lower extremities as gravity was able to play a larger role on blood flow, resulting in decreased venous return. Additionally, during this experiments the subject did not utilize any muscle activity to change body positions, which prevented the muscle pump from maintain venous return. This decreased venous return likely attenuated stroke volume. In an

effort to maintain cardiac output in face of a reduced stroke volume, HR would have to increase, and this was seen. However, over the course of a minute, blood pressure increased which would increase venous return towards baseline values. This would result in heart rate being reduced to maintain cardiac output, which was seen in the +1 min values for sitting and standing.

Limitations of this study include only waiting one minute for HR to stabilize. It may take longer than one-minute for HR to return to baseline. Additionally, measuring HR for 15 seconds, instead of a full minute may overestimate HR

References:

1. Watanabe, N., J. Reece, and B.I. Polus, *Effects of body position on autonomic regulation of cardiovascular function in young, healthy adults*. Chiropr Osteopat, 2007. **15**: p. 19.
2. Suzuki, Y., *Influences of gravitational stress and total muscle mass on human cardiovascular adjustments during prolonged dynamic exercise*. Ann Physiol Anthropol, 1990. **9**(2): p. 139-51.