Utility of Two iPhone Device Apps in Assessing Heart Rate at Rest and During Activity

AMY M. WHITE, JAMES B. GEESLIN, NICOLE E. PRIEST, MATTHEW J. GARVER, LIBBY E. MCCURLEY, JOE D. BELL, and SHEILA A. JONES

Human Performance Laboratory; Department of Kinesiology and Nutrition; Abilene Christian University; Abilene, TX

Category: Undergraduate

ABSTRACT

Heart rate (HR) is a critical physiological variable used for prescribing exercise, assessing fitness level and tracking fitness improvements. Electrocardiography (ECG) stands as the criterion measure of HR. While recent development of HR-detecting mobile device applications (apps) has made evaluating HR more convenient; their degree of accuracy is unknown. Therefore, the purpose of this current study was to examine the accuracy and reliability of two-iPhone applications to detect HR at rest and during low-intensity exercise conditions. Eighteen female and 22 male subjects (26 + 9.5 yrs) were prepped for simultaneous detection of HR via three methods: ECG and two HR-detecting apps. App 1, a camera-based app called Azumio Instant Heart Rate (CAM), was used by placement of a finger over the camera lens of the mobile device. App 2, a microphone-based app called Heart Monitor by Bluespark, was employed via placement of an external microphone over the radial pulse. The participants underwent a series of 5-minute stages: seated rest followed by cycle then treadmill walking at low intensities. HR was recorded concurrently, at several time intervals from the three methods once a steady-state HR was reached. The means of the three devices were compared via ANOVA with the significance level set, *a priori*, at 0.05. Correlation analysis was employed to investigate relationships between the apps and ECG. No statistical difference was found between the CAM and ECG HR (p > 0.05) during the resting and cycle stages. However, during the treadmill phase, there was a significant difference (p = 0.018) between CAM and ECG. Nevertheless, there was a significant (p < 0.05), positive correlation between CAM and ECG under the resting, cycle and treadmill conditions (r = .966, r = .984, r = .877, respectively). Significant differences (p < 0.05) were found for each condition when comparing ECG and MIC HR. Data also revealed poor correlations (p > 0.05; r between -.004 and -.136) between MIC and ECG. The utility of CAM and MIC-based apps to detect HR remains in question as evidence appears to indicate exercise mode and app specificity. Caution should be shown when using these devices. The CAM-based app may accurately detect HR during resting and seated cycling but not during treadmill activity. The MIC-based app is not recommended for use in any condition. Of note, statistical significance may not mitigate usefulness when considering the accuracy of palpation. Additional research is necessary.