

Automated Blood Pressure Device for Incremental Exercise Stress Testing

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ABSTRACT

Blood pressure (BP) measurement plays a critical role in cardiac stress testing and is most commonly assessed manually. The emphasis of social distancing during the COVID-19 pandemic has renewed the interest in and the need for an automated BP device that is specifically designed for incremental exercise stress testing. **PURPOSE:** To assess the accuracy of a new automated blood pressure device specifically manufactured for cardiac stress testing in comparison to traditional manual BP readings serving as the reference standard. **METHODS:** Thirty-five apparently healthy adults aged 35 ± 16 years were studied during an incremental stress test on the cycle ergometer. The workload began at 25W and increased by 25W every two minutes until a rating of perceived exertion of 16 or 80% maximal heart rate was achieved. Two observers measured BP simultaneously, one listening to Korotkoff sounds using a stethoscope and one using headphones to listen to sounds generated by an automated BP device (Fukuda Denshi). A new wearable BP monitor in the form of a wristwatch (Omron) was also included in comparisons. **RESULTS:** With increasing workload, systolic BP increased progressively without significant differences in BP readings between both observers compared with the automated monitor at any stage. Systolic BP obtained with the BP machine was highly correlated with those obtained by the stethoscope observer ($r=0.96$) and the observer with headphones ($r=0.95$). Diastolic BP was not significantly different between the readings at any stage during exercise. Diastolic BP obtained with the BP machine was associated with those obtained by the stethoscope observer ($r=0.73$) and the observer with headphones ($r=0.74$). DBP measured immediately post-exercise was significantly higher in the BP machine than in the observers during the recovery. The wearable wristwatch device was not able to reliably measure BP during exercise due to error readings from excessive movement. However, the resting and recovery BP values were significantly correlated with the stethoscope observer ($r=0.69$ for systolic, $r=0.55$ for diastolic BP). **CONCLUSION:** The automated BP monitor specifically made for cardiac stress testing accurately measured both systolic and diastolic blood pressure during exercise.