

Section: CLINICAL

Abstract: CLI-01

Impact of physical exercise on the accuracy of blood pressure and heart rate data measured by smartwatch

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INTRODUCTION: Heart rate (HR) and blood pressure (BP)—systolic (SBP) and diastolic (DBP)—are important for individuals who engage in physical activity. Smartwatches stand out because they are convenient and collect data noninvasively; however, the information they provide during physical exercise still requires validation. **OBJECTIVE:** To validate BP and HR data from the Samsung Galaxy Watch6. **METHOD:** This was a quantitative, descriptive, cross-sectional study. Eligible participants completed a questionnaire, underwent a smartwatch calibration protocol, and were assessed at three time points: before exercise, immediately after treadmill exertion, and after two minutes of rest following the activity. Values were compared with reference measurements: SBP and DBP obtained with an aneroid sphygmomanometer and stethoscope, and HR measured with a digital pulse oximeter. Analyses were performed in Stata 18.0 using descriptive statistics, the Shapiro–Wilk test for normality, Student's t-test for comparisons, and agreement analyses using Lin's concordance correlation coefficient and Bland–Altman methods. A 95% confidence level was adopted. The study was approved by the Research Ethics Committee. **RESULTS:** A total of 59 participants (31 male) were included, with a mean age of 22 years and a mean body mass index (BMI) of 23.46 kg/m²; none had a history of cardiorespiratory abnormalities. Mean SBP values did not differ only at rest ($p=0.114$) and after two minutes of recovery at rest ($p=0.068$), whereas measurements were inaccurate immediately after exertion ($p<0.01$). DBP measurements were accurate only before exercise ($p=0.20$) and immediately after exercise ($p=0.976$), losing the previously observed accuracy after recovery ($p<0.01$). HR showed good reliability at all study stages ($[p=0.411; 0.117; 0.501]$, respectively). **DISCUSSION:** The findings are consistent with the literature, which suggests that BP accuracy remains questionable: measurements tend to converge toward the calibration point, overestimate low values, and underestimate high values. It also remains uncertain whether intrinsic individual factors may alter these measurements. HR measurements, by contrast, are generally considered acceptable. **CONCLUSION:** Although wearable devices are promising and widely accepted by the population, their accuracy for BP remains uncertain, and further studies are needed before these measurements can inform clinical or sports-related decisions.

KEYWORDS: Wearable Electronic Devices; Physical Exercise; Validation Study.