Fitness Tracker Comparison of Energy Expenditure in a Healthy Population vs. Type 2 Diabetics

JOSHUA PFOST, KAITLYN BOWERMASTER, DEREK MOCZYGEMBA, AND SHELLY D. WEISE

Clinical Exercise Physiology, Prevention & Wellness Lab; Department of Physical Therapy; Angelo State University; San Angelo, TX

Category: Doctoral

Advisor / Mentor: Weise, Shelly (shelly.weise@angelo.edu)

ABSTRACT

Many are using wearable fitness trackers to assess energy expenditure (EE). Fitness trackers have been demonstrated to overestimate EE. Few studies have investigated EE tracking in the diabetic population. PURPOSE: To compare energy expenditure estimation for two fitness trackers and a gold-standard in a type 2 diabetic (T2DM) versus a healthy (H) population. METHODS: 24 participants (10 T2DM; 14 H) were recruited and met inclusion criteria. At initial visit, subjects completed treadmill walking while connected to a metabolic cart (gold-standard) with continuous monitoring via face mask and 2 activity trackers standardized in place one on each wrist. Participants walked on a treadmill for two phases: Phase A consisted of a warm-up followed by 10 minutes data collection at a self-selected walking pace (SSWP). Phase B included 10 minutes walking at 40-60% heart rate reserve. Total energy expenditure (EE) was collected from each device during the 10-minute data collection periods. Baseline descriptive data and Pearson correlation were determined. Mann-Whitney U test was performed to compare EE from the gold-standard in both groups for phase A and B. Friedman’s followed by Wilcoxon post hoc tests along with Bland-Altman analyses were utilized to explore EE measurements in all devices for groups in phase A and B. RESULTS: Results from the gold standard indicated no difference in EE between T2DM and H in phase A or B. (Phase A: T2DM=50.2+/−10.5 Kcal, H=47.0+/−11.8 Kcal; Phase B: T2DM=74.0+/−20.5 Kcal vs. H=79.9+/−22.6 Kcal). In exploratory comparisons, T2DM and H both demonstrated no significant difference in EE between tracker 1 and 2 (76.21+/−27.3 Kcal vs. 79.4+/−20.5 Kcal) while both trackers showed a significant difference compared to the gold-standard (48.3+/−11.1 Kcal) in phase A. For phase B, all devices were significantly different (Tracker 1: 113.25+/−32.1 Kcal; Tracker 2: 95.1+/−22.12 Kcal; Gold-standard: 77.45+/−21.5 Kcal). CONCLUSION: T2DM demonstrated no difference in EE versus healthy individuals during a SSWP or walking at a moderate intensity. Based on exploratory analyses, more variance between groups was noted utilizing activity trackers. Additionally, the trackers demonstrate a tendency to overestimate EE in both groups despite standardization of placement and intensity of walking. Health care professionals should use this knowledge in recommendations during exercise prescription.