Validation of physical activity monitors in individuals with diabetes: energy expenditure estimation by the multisensor SenseWear Armband Pro3 and the step counter Omron HJ-720 against indirect calorimetry during walking.

Abstract

BACKGROUND: The purpose of this study is to test the agreement between energy expenditure estimate of the SenseWear® Armband Pro3 (SWA) (BodyMedia, Pittsburgh, PA) and the Omron HJ-720 (Omron Healthcare, Kyoto, Japan) step counter with indirect calorimetry (IC) as a gold standard in older individuals with type 1 and type 2 diabetes mellitus while walking on a treadmill.

SUBJECTS AND METHODS: In total, six men (60.3±3.1 years old) and 13 women (51.1±11.0 years old) with type 1 or type 2 diabetes mellitus were included in the study. Each subject performed three 15-min walking sessions with different combinations of speed and incline (3 km/h, 0%; 4 km/h, 0%; 5 km/h, 5%) on a treadmill. Energy expenditure (EE) was simultaneously measured by the SWA, Omron, and IC. Mean over-/underestimation and Pearson's correlation coefficients were used for statistical evaluation of the agreement between tested methods and IC.

RESULTS: At the speed of 3 km/h with 0% incline, mean overestimation of +81.19±23.81% was found for SWA (r=0.79, P<0.001) and +70.51±20.91% for Omron (r=0.77, P<0.001). At the speed of 4 km/h and 0% incline, mean overestimation found for SWA was +78.18±33.96% (r=0.63, P<0.01) and +75.77±33.36% for Omron (r=0.52, P<0.05). At the level of high-intensity exercise at the speed of 5 km/h and 5% incline, mean underestimation was –7.88±16.86% for SWA (r=0.74, P<0.001) and –7.37±16.07% for Omron (r=0.75, P<0.001).

CONCLUSIONS: Both methods led to considerable overestimation of calculated EE in level walking and a relatively minor underestimation during fast uphill walking.