



Accuracy of piezoelectric pedometer step counts in different wearing locations

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Abstract

Background: Pedometers are simple and inexpensive devices used as a motivational tool or in rehabilitation interventions for chronic respiratory diseases. Piezoelectric pedometers may be worn at different body locations; however, their impact on pedometer accuracy has been scarcely explored. In addition, it is unknown which locations are preferred by patients, despite its importance to improve user's acceptance.

Aims: To assess the accuracy of a piezoelectric pedometer (Yamax EX-510) in counting steps, when worn at different body locations, and identify users' preferred location(s).

Methods: Sixty-three healthy adults (45.8 ± 20.6 yrs) wore 7 pedometers (neck, lateral/front right/left of the waist, pockets of the trousers), while walking 120m at slow, self-preferred (normal) and fast paces. Steps were manually counted (criterion measure) and pedometer steps were recorded. Tests were repeated twice. Participants indicated their preferred location(s) to wear a pedometer. Absolute percent error (APE) and the Bland and Altman method were used to examine device accuracy and consistency.

Results: APE was, on average, <3% at normal and fast paces despite wearing location, but higher at slow pace (4.5-9.1%). Accuracy was improved in pedometers located at the front of the waist and inside the pockets. Results were consistent ($p > 0.05$). Most patients preferred to wear the pedometer inside the right ($n=25$) and left ($n=20$) pockets.

Conclusions: Yamax EX-510 pedometers can be used to monitor walking activity, as they provide accurate results even at slower speeds (considering a 10% error¹). They should be worn at the front of the waist or inside the pockets.

¹Crouter SE, et al. *Med Sci Sports Exerc* 2003;35(8):1455-60.

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