

ABSTRACT

Title: Heart rate concordance measured by Fitbit and Cortex during a graded aerobic running test of preschool children

Objectives: The aim of this study is to compare the outcomes obtained by the Fitbit product with the gold standard for determining both intensity and volume of exercise, a mobile gas analyzer that evaluates, along with heart rate, the energy expenditure of the desired physical activity in a graded running test. Or to determine the degree of difference in heart rate obtained by Fitbit and Cortex in a graded running test in preschool children. The main objective of this study is to verify the usefulness of the Fitbit wristband for monitoring physical activity of preschool children.

Methods: In order to achieve the set goal, the method of comparison and statistical analysis of data obtained from a mobile gas analyzer and a smart watch during a graded running test in preschool children was used. The graded running test consisted of six steps (lying before running, running at 3 km/h, 6 km/h, 8 km/h, 9 km/h and lying after running), each lasting 3 minutes. Data were then statistically processed and evaluated in terms of overall mean, mean for each step T-test and Pearson correlation coefficient.

Results: The results of the research show some differences between the two devices, with the Cortex device measuring higher heart rate readings compared to the smartwatch, with exceptions in the order of units. The Pearson correlation coefficient shows a strong correlation between the two variables. Cortex is thus more likely to provide higher values and, as the gold standard, more accurate results. Nevertheless, the Fitbit smartwatch can be considered as a sufficient and well usable tool in monitoring physical activity in preschool children, with the advantage of being mainly easier to use, which compensates for minor nuances compared to the Cortex. The Pearson correlation coefficient of $r=0.8883$ using a statistical significance level of $p<0.05$ indicated a strong linear relationship between the two heart rate measurements originating from the cortex and the fitbit. A one-tailed paired T-test with a t-value of $t=4.47558E-27$ indicated a statistically significant difference between the measured data, suggesting that the differences between the data are not due to chance and are not a measurement error.

Keywords: Cortex, Fitbit, physical activity, preschool age, heart rate