

Comparison of 6-Minute-Walk-Test (6MWT) to 2-Minute-Step-Test (2MST) of Children in the Lowland and Mountain

Ferdy K Cayami, Adhie NR Sastrowardhoyo, MS Anam, Galuh Hardaningsih, Anindita Soetadji
Pediatric Department, Diponegoro University, Semarang Indonesia

Abstract

Background

Physical fitness is one of health indicators as it is closely related with physical and mental health mainly in children. Six-minute-walk test (6MWT) is the most common method developed to measure the physical fitness in children but it requires large place and more tiresome for the examiner. Modified Harvard Step Test (HST) has been developed with difference height of bench to accommodate the children height and leg length. This study aimed to examine the correlation and agreement of 2-minute-step test (2MST) in comparison to 6MWT in both lowland and mountain.

Method

A total 178 students (83 students in the lowland and 95 students in the mountain) aged 10–12-year-old completed both 2MST and 6MWT examination on different day. Antropometric measurement was performed before the examination. The student walk on a 20 m course for 6 minutes for 6MWT and step on 20 cm bench for 2 minutes with tempo 60x/min for 2MST examination. The HR before, HR right after the examination and one minute after resting were measured with pulse oximetry. Suitable comparison test, Pearson correlation test and Bland-Altman Plot analysis were performed on the VO₂Max calculated from 6MWT and 2MST test.

Result

There were no significant different of VO₂Max obtained from 6MWT 24.3 ± 3.9 ml/kg/min and 2MST (24.9 ± 1.66 ml/kg/min), ($p=0.053$), significant moderate positive correlation ($r=0.409$ (95% CI, 0.278-0.524), $p<0.001$) and good agreement based on Bland-Altman Plot Analysis. Separate analysis for lowland and mountain revealed similar results but the starting HR before the examination was significant different for students on the mountain. There were also significant different of VO₂Max between normal nutritional status and malnutrition students.

Conclusion

The 2MST has good correlation and agreement with 6MWT in measuring the physical fitness in students aged 10–12-year-old in lowland but further analysis in necessary to evaluate the difference in the mountain.

Keywords: 6MWT, step test, 2MST, physical fitness in children