Measured and predicted oxygen uptake in healthy adults


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Introduction

Measurement of maximal oxygen uptake (VO2max) is considered to be the gold standard (GS) to determine aerobic capacity in human (Evans et al., 2015). Determination of VO2max requires a costly equipment and a high intensity exercise that may not be performed easily in untrained individuals and/or with health concerns. Several tests have been designed to predict VO2max in human in order to reduce risk, costs and other drawbacks linked to the direct measurement of VO2max. Among them, the one-mile track walk test (1 mile-WT; Kline et al., 1987) is a simple test that does not require specialized equipment. In addition, a non–exercise based-equation model (NE-BEM; Jurca et al., 2005) has been proposed to estimate VO2max in healthy individuals. This study tests the validity of the 1 mile-WT and NE-BEM to estimate VO2max in a group of healthy adults.

Materials and Methods

Prior to testing, all 12 participants (men, 2; women, 10) completed a written informed consent form. They performed a maximal graded exercise test on a treadmill up to exhaustion with the expired air of the individual undergoing analysis for O2 content using the Cosmed K4b2 (COSMED, Rome, Italy; Fig. 1). The test began at a speed of at 7 km/h (no incline) for 5 minutes to be increased by 2 km/h every 3 minutes.

Results

Six statistical methods, with different assumptions, were used to estimate the level of agreement between measured and estimated VO2max values. Bland–Altman plots were also constructed.

The mean (±SD) VO2max was 41.2±4.1 with the GS vs. 44.6±5.4 and 34.7±5.1 mL.kg⁻¹.min⁻¹ as estimated by the 1-mile-WT and the NE-BEM, respectively. There was no agreement between the different tests (Fig. 4).

Conclusion

The estimation of VO2max in a group of non-homogenous individuals (variety of race, gender, age and BMI) was not valid using the prediction equations referenced in the literature highlighting the need to validate a model specific to the test modality.

Bibliography:

