Regression Equations to Predict VO$_2$ Max in Untrained Boys and Junior Sprinters of Kolkata

Chatterjee[1], P., Banerjee[2], A. K., Das[3], P., Debnath[3], P. and Chatterjee[4], P.
[1]Department of Physiology, University of Kalyani, Kalyani, West Bengal, INDIA.
[2]Department of Physical Education, University of Kalyani, Kalyani, West Bengal, INDIA,
[3]Department of Physical Education, Jadavpur University, Kolkata, INDIA
[4]Department of Physiology, University of Calcutta, Kolkata, INDIA

Abstract

The purpose of the study was to validate the applicability of the 20-m multi stage shuttle run test (20-m MST) in untrained boys and junior sprinters of Kolkata, India. 35 sedentary boys from different schools and 25 sprinters from different sports academies (age range 13 ~ 16 yr.) were recruited for the study. Direct estimation of VO$_2$ max comprised treadmill exercise followed by expired gas analysis by scholander micro-gas analyzer whereas VO$_2$ max was indirectly predicted by 20-m MST. In case of sedentary boys, the difference between the mean (+/- SD) VO$_2$ max values of direct measurement (VO$_2$ max = 42.99 +/- 5.16 ml/kg/min) and 20-m multi stage shuttle run test (SPVO$_2$ max =   42.69 +/- 5.06   ml/kg/min) was statistically significant (p<0.01). In case of sprinters, the difference between the mean (+/-SD) VO$_2$ max values of direct measurement (VO$_2$ max =52.31 +/- 3.04 ml/kg/min) and 20-m multi stage shuttle run test (SPVO$_2$ max = 51.97 +/- 2.92 ml/kg/min) was also statistically significant (p<0.01). Although, for both the cases of sedentary boys and junior sprinters, limits of agreement analysis suggest that 20-m MST may be applied in the studied populations for estimation of maximum oxygen uptake. For better prediction of VO$_2$ max in the studied populations, new equations have been computed based on present data.

Key Words: VO$_2$max, Aerobic capacity, Cardiorespratory fitness, Beep test, Sprinters, Sedentary

Introduction

Maximum oxygen uptake (VO$_2$ max), when directly determined after exercise involving a sufficient number of muscle group, is considered as a good index of physical fitness of an individual (*Astrand and Rodahl, 1970*). But the test of direct measurement of VO$_2$ max is difficult, exhausting and often hazardous to perform regardless the type of ergometer used (*Fox, 1973*). This is why scientists often perform this test in indirect protocols to predict VO$_2$ max (*Das & Bhattacharya, 1995*). But before applying any indirect protocol for the prediction of VO$_2$ max, the validity of the test should be established in particular population to be assessed. The 20-meter multistage shuttle run test (*Leger et al, 1988, Leger & Gadoury, 1989*), popularly known as Beep test, is often used world wide for measurement of aerobic capacity (*Wong et al, 2001; Mota et al, 2002; Guerra et al, 2002; Vicente-Rodriguez et al, 2003, Vicente-Rodriguez et al, 2004*). *Cooper et al (2005)* studied the repeatability and criterion related validity of the 20-m multistage fitness test as a predictor of maximal oxygen uptake in active young men. *Suminski et al, (2004)* established the validity of the 20-m MST for measuring aerobic fitness of Hispanic youth of 10 to 12 years of age. However, studies on the validity and suitability of this test are scanty in India (*Chatterjee et al, 2005*) and it has not been undertaken in an organized way for different Indian populations.

Recent study has indicated that there are sport-specific differences when predicting VO$_2$ max from the multistage