

AEROBIC FITNESS AND MAXIMAL HEART RATE TESTING IN 6-9 YR OLD CHILDREN – RELIABILITY, SENSITIVITY AND VALIDITY OF THE YO-YO IR1 TEST AND THE ANDERSEN-TEST

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Introduction

Low aerobic fitness and obesity is becoming one of the primary threats to public health (Bendixsen 2004). Recent intense training studies conducted as small sided football games demonstrated major fitness and health effects for adults (Krstrup et al, 2010). Children are active through physical education, however little information is available regarding the intensity of school sports. A series of fitness tests have been validated for HR_{max} determination and estimation of VO_{2max} (Bangsbo et al. 2008) for adolescence and adults, but few studies have been performed for children under the age of 9.

Methods

Heart rate was determined during 2x15 min sessions of four common school sport activities for 8-9 yr old children (grade2, n=33), i.e. 3vs3 football, floorball and basketball, and circuit training, (30s of exercise, 45-s breaks). HR_{peak} and VO_{2max} was determined for two groups aged 8-9 yrs (grade2, n=16) and 6-7 yrs (grade0, n=17) during an incremental treadmill running test (ITT). HR_{peak} and running distance was determined during a modified Yo-Yo IR1 test (IR1) (2x16 m) and the Andersen-test.

Results & Discussion

Mean HR was higher in sessions of football and basketball (76.3±1.7 and 77.1±1.3 % HR_{max}) in comparison to floorball and circuit training (72.9±1.5 and 64.1±1.2% HR_{max}, respectively, with similar differences in the time above 90% HR_{max} (13.0±3.6, and 13.8±3.3 % vs 7.7±2.7 and 0.2±0.2% of total time, respectively).

For grade2 pupils, IR1 performance (994±40 vs 536±218m), Andersen-test performance (1050±71 vs 955±56m) was 84 and 10% better (p<0.05), respectively, than for grade0 pupils. VO_{2max} was not significantly different. The IR1 test performance (r=0.68, p<0.02) and the Andersen-test (r=0.73, p<0.001) correlated with VO_{2max}. IR1, Andersen-test and ITT HR_{peak} was 98±2, 99±1 and 97±2% of the individual HR_{max}.

Conclusion

The IR1 and the Andersen-test are able to detect differences between subjects groups and are valid in determining maximal heart rate and estimating VO_{2max} for 6-9 yr old children. In the school sport setting, small-sided games of football and basketball elicit a high aerobic loading with periods of near-maximal values, whereas the aerobic loading is low-to-moderate during circuit training.

References

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