COMPARISON OF THE ACCURACY OF PREDICTING MAXIMAL OXYGEN UPTAKE FROM THE ÅSTRAND-RYHMING NOMOGRAM AND THE RATINGS OF PERCEIVED EXERTION.

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Introduction: Although direct measurement of maximal oxygen uptake (VO2max) is the most accurate indicator of cardiovascular fitness, serious practical and ethical concerns arise when adopting exhaustive exercise tests in non-athletic or patient populations. The Åstrand-Ryhming (Å-R) nomogram is traditionally used to estimate VO2max from submaximal exercise intensities, and is still advocated by the ACSM (2006) despite large inconsistencies in its predictive utility. Recent research has shown that sub-maximal graded exercise tests (GXT), perceptually-regulated by the Borg 6-20 Rating of Perceived Exertion (RPE) scale provide accurate estimates of VO2max in physically-active men and women (Eston et al. 2005). Similar findings have also been demonstrated using an RPE nomogram (Buckley et al., 1998) incorporated into an Å-R test. The purpose of the study was to assess the efficacy of predicting the VO2max of sedentary participants from differing RPE protocols and the Å-R test.

Methods: Thirty four, healthy sedentary men and women (mean ± SD; 30.5 ± 8.8 & 36.8 ± 13.3 years, respectively) performed a GXT to volitional exhaustion to determine VO2max (estimation), a sub-maximal GXT, perceptually-regulated at RPEs 9, 11 and 13 (production), and an Å-R exercise test, in a randomised order. All tests were separated by 48 h. Submaximal oxygen uptake (VO2) values elicited prior to and including RPE 13 were extrapolated to RPE 20 by linear regression analysis to provide predictions of VO2max from both the estimation and production test.

Results: ANOVA revealed a significant difference between predicted and measured VO2max (P < .05). The Å-R nomogram significantly overestimated measured VO2max (39.6 ± 11.1 & 34.4 ± 6.3 ml·kg⁻¹·min⁻¹, respectively). However, there were no significant differences between predictions of VO2max from the estimation, production or RPE nomogram (36.4 ± 9.3, 32.9 ± 6.4 and 32.9 ± 6.0 ml·kg⁻¹·min⁻¹, respectively).

Conclusions: Extrapolation of VO2 values from ratings of perceived exertion (RPE 13), which equate with moderate levels of exercise intensity, provides more accurate estimates of VO2max than the Å-R nomogram, within a sedentary population. Accordingly, utilisation of moderate RPEs with non-athletic populations may prove beneficial in promoting exercise adherence.

References:


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