Impact of the exercise mode on exercise capacity: bicycle testing revisited

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STUDY OBJECTIVE: To test the performance of a tool designed to estimate functional capacity in order to select a bicycle ramp protocol yielding a test duration from 8 to 12 min in healthy individuals, and to assess differences in exercise responses between bicycle and treadmill tests. PARTICIPANTS AND MEASURES: Forty-one healthy and physically active volunteers (10 women; median age, 37 years; interquartile range [IQR], 29.5 to 41 years) performed an individualized ramp exercise protocol on a bicycle ergometer and a treadmill in random order. Prior to testing, the Veterans Specific Activity Questionnaire (VSAQ) combined with a modified variant of the VSAQ nomogram (metabolic equivalents [METs] derived from VSAQ and age with the modified nomogram, resulting in METs nomogram) was used to estimate exercise capacity and to select the treadmill protocol. The corresponding bicycle work capacity nomogram (in watts) was derived by the following equation: (METs nomogram - 1) x body weight/3.486. RESULTS: Using treadmill tests, all 41 participants (100%) achieved maximal exercise from 8 to 12 min, as compared to 33 participants (80%) for the bicycle tests (p = 0.003). Peak oxygen uptake (V̇O₂) [bicycle: median, 49.7 mL/kg/min (IQR, 45.4 to 56.6 mL/kg/min); vs treadmill: median, 53.1 mL/kg/min (IQR, 47.3 to 57.7 mL/kg/min; p < 0.0001)] was lower using the bicycle compared to the treadmill. However, the difference in peak V̇O₂ values between the two exercise modes was lower (2.6 mL/kg/min; IQR, 1.1 to 4.3 mL/kg/min), corresponding to 4.6% (IQR, 2.4 to 8.5%) of the lower of both values than reported in previous studies, and seven participants (17%) even achieved a higher peak V̇O₂ using the bicycle. CONCLUSIONS: A modified version of the VSAQ can be effectively used to select appropriate ramp rates for exercise testing using a bicycle ergometer in healthy individuals. Differences in maximal responses are less than those previously reported, suggesting that the bicycle ergometer is an appropriate alternative to the treadmill test in healthy volunteers.

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