

The effects of aerobic and combined aerobic and resistance exercise training on physical fitness in young women

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Introduction

The purpose of this study was to evaluate the effects of aerobic training alone or combined with strength training on the physical fitness of young women.

Methods

Sixty-five women (18–28 years old), who were not engaged in any exercise program for at least one year, were randomly assigned to an aerobic training group, a combined training group, or a control group. The aerobic training consisted of indoor cycling sessions and the combined training consisted of indoor cycling and resistance exercise in the first and second half of each session, respectively. Both aerobic and combined exercise programs lasted 8 weeks with a periodicity of 3 sessions of 45 min per week. Assessments were conducted before and after the 8-week intervention period on muscular strength, body composition, bone mineral density and cardiorespiratory fitness. Total fat and bone mineral density (lumbar spine and femoral neck) were determined by dual-energy x-ray absorptiometry (Hologic QDR 1000). Knee and elbow extensor and flexor concentric strength were measured with an isokinetic dynamometer (Biodex System 3) using protocols with angular velocities of 60°/s (3 reps) and 180°/s (20 reps). The YMCA cycle ergometer test was used to estimate $\text{VO}_{2\text{max}}$. Data were analysed using repeated measures ANOVA with Bonferroni post-hoc analysis (level of significance was set at $p < 0.05$).

Results

Significant positive effects were found between groups at 8-week follow-up on knee strength measures. The *post-hoc* analysis showed that the combined training group improved significantly in comparison to the aerobic training group in knee flexion peak torque (PT) ($p = 0.024$) and knee flexion PT/body weight ($p = 0.046$) at an angular speed of 60°/s. Significant positive changes of the combined training group in comparison with the control group were also found in knee extension PT ($p = 0.013$), knee flexion PT ($p = 0.002$) and knee flexion PT/body weight ($p = 0.014$) at an angular speed of 180°/s. Finally, after the 8-week training period and also for the evaluation at 180°/s, the combined training group showed better scores than the indoor cycling group in knee flexion PT/body weight ($p = 0.014$). No significant changes were found for measures of cardiorespiratory fitness, body composition and bone mineral density.

Discussion

Our results show that 8 weeks of combined training can improve the knee muscular strength of young women. Nevertheless, no other differences were found between groups in measures of physical fitness. Future studies should examine if prolonged training periods would lead to more noticeable differences on the effects of combined and indoor cycling training programs.