THE EFFECTS OF SIX MONTH ENDURANCE EXERCISE ON AEROBIC POWER AND CARDIAC POWER OUTPUT IN OLDER MEN AND WOMEN
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Background: Aerobic power (relative VO_{2max}) and cardiac function decrease in both sexes with age (Lakatta, 2002). These functional changes have been attributed to age-related losses of cardiac myocytes and ventricular mass (Olivetti et al., 1995), these being more pronounced in men than women. Endurance exercise is known to affect cardiac structures and function, and could attenuate the effects of ageing. However, Spina et al. (1993) have suggested that older men respond better than women to endurance exercise. To investigate possible sex-specific differences in response to exercise, sedentary age-matched older men and women undertook the same incremental training programme over 6 months.

Method: Eleven health-screened sedentary men (age 60±3 years, body mass 82.5±11.9 kg) and 8 women (age 59±3 years, body mass 71.5±10.1 kg) completed the training programme after giving their informed consent to the ethically approved procedures. Before, at 6-week intervals, and at the end of 6 months training, relative VO_{2max} and CPO (CPO = Cardiac output x MAP) were measured at maximum exercise on a treadmill, with CPO also measured during rest. Cardiac output was measured non-invasively using a CO₂ rebreathing technique and mean brachial artery pressure (MAP) calculated after using manual auscultation (Cooke et al., 1998). The exercise training protocol incorporated five, 30 minute sessions a week, with each session consisting of 2 x 10 minutes treadmill walking/running, interspersed by 10 minutes of cycling. Exercise intensity started at 30% HRR (heart rate reserve) with step-wise increments to 45%, 60% and 75% HRR every 6 weeks.

Results: Aerobic power and cardiac function were essentially the same in both sexes when allometrically scaled to lean body mass. Aerobic power increased significantly (P<0.05) by 16±3 % in men and 18±2 % in women over the 6 months of training. Both men (16±2 %; P<0.05) and women (10±1 %; P<0.05) appeared to extract more oxygen (calculated a-vO₂ difference) from their blood streams. Despite these changes, no significant alterations were found in cardiac output, MAP or CPO in either sex when measured either at rest or during maximal exercise.

Conclusion: This 6-month training programme induced peripheral adaptations, with more oxygen extracted and consumed by the subjects’ skeletal muscles. However, there were no discernable changes in the heart’s maximum pumping or reserve capacities. We conclude that lower exercise intensities (<75% HRR) induce peripheral adaptations, but that higher intensities (>75% HRR) may be needed to induce central cardiac changes in older people. In contrast to the earlier report of Spina et al. (1993), we found no discernable sex-specific differences with endurance exercise training.


Keywords: Aerobic Power, Endurance Training, Cardiac