The magnitude of improvement in flow-mediated dilatation following exercise training is similar in postmenopausal women with and without type 2 diabetes

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A decline in endothelial function as measured by flow mediated dilatation (FMD) is an early independent predictor of cardiovascular disease (CVD) and has been seen in diabetes (1) and following the menopause in women (2). Whether exercise training can improve endothelial function to the same magnitude in postmenopausal women with type 2 diabetes compared to those without diabetes is unclear and the purpose of the present study. 38 apparently healthy postmenopausal women (ND) and 15 postmenopausal women with type 2 diabetes (T2) volunteered for this study. All participants completed a maximal exercise test for the assessment of peak oxygen uptake (VO2peak), and were assessed for waist circumference and percentage body fat via skinfold analysis, FMD via reactive hyperaemia and ultrasound, blood pressure via sphygmomanometry and HOMA via fasting blood sampling. Participants were then randomised into body mass matched exercise training or control groups. The exercise training group trained under supervision twice per week (+one home session) at 55, rising to 75% VO2peak for six months. The control participants continued life as normal. Following the six month intervention all baseline assessments were repeated and the impact of exercise training upon FMD compared between ND and T2 groups via two way mixed mode ANOVA (time x group). The control data were assessed separately and confirmed no change in any variable over 6 months in either the ND or T2 women. At baseline there were no significant differences in VO2peak (ND: 24.4±3.6, T2: 21.2±5.6 ml.kg.min⁻¹), percentage body fat (ND: 37.9±5.2, T2: 40.6±5.6 %), blood pressure (ND MAP: 91±10, T2: 100±12 mmHg) or FMD (ND: 4.2±2.9, T2: 4.1±2.9%) between the ND and T2 women (P>0.05). HOMA was greater in the T2 women (ND: 1.7±0.1, T2: 4.7±2.0 P<0.05). Following training VO2peak improved more so in the ND than the T2 women (to 29.82±5.6 and 24.50±6.7 ml.kg.min⁻¹, respectively; interaction P=0.06), whilst waist circumference decreased by a greater magnitude in the T2 participants (ND: -0.5, T2: -3 cm; interaction P<0.05). Blood pressure and HOMA were not significantly affected by training (P>0.05). FMD improved to 7.0±2.9 and 7.1±2.0 % in the ND and T2 women respectively, but importantly there was no difference between groups in the magnitude of improvement (interaction P>0.05). The impact of exercise training upon endothelial function was biologically significant even in a milieu of low oestrogen concentration plus insulin resistance.


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Where applicable, the authors confirm that the experiments described here conform with The Physiological Society ethical requirements.