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# A systematic review and meta-analysis of the effect of aerobic vs. resistance exercise training on visceral fat

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## Abstract

It is increasingly recognized that the location of excess adiposity, particularly increased deposition of visceral adipose tissue (VAT), is important when determining the adverse health effects of overweight and obesity. Exercise therapy is an integral component of obesity management, but the most potent exercise prescription for VAT benefit is unclear. We aimed to evaluate the independent and synergistic effects of aerobic exercise (AEx) and progressive resistance training (PRT) and to directly compare the efficacy of AEx and PRT for beneficial VAT modulation. A systematic review and meta-analysis was performed to assess the efficacy of exercise interventions on VAT content/volume in overweight and obese adults. Relevant databases were searched to November 2010. Included studies were randomized controlled designs in which AEx or PRT in isolation or combination were employed for 4 weeks or more in adult humans, where computed tomography (CT) or magnetic resonance imaging (MRI) was used for quantification of VAT pre- and post-intervention. Of the 12196 studies from the initial search, 35 were included. After removal of outliers, there was a significant pooled effect size (ES) for the comparison between AEx therapy and control (-0.33, 95% CI: -0.52 to -0.14;  $P < 0.01$ ) but not for the comparison between PRT therapy and control (0.09, 95% CI: -0.17 to -0.36;  $P = 0.49$ ). Of the available nine studies which directly compared AEx with PRT, the pooled ES did not reach statistical significance (ES = 0.23, 95% CI: -0.02 to 0.50;  $P = 0.07$  favouring AEx). The pooled ES did not reach statistical significance for interventions that combined AEx and PRT therapy vs. control (-0.28, 95% CI: -0.69 to 0.14;  $P = 0.19$ ), for which only seven studies were available. These data suggest that aerobic exercise is central for exercise programmes aimed at reducing VAT, and that aerobic exercise below current recommendations for overweight/obesity management may be sufficient for beneficial VAT modification. Further investigation is needed regarding the efficacy and feasibility of multi-modal training as a means of reducing VAT.

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