

Effects of Exercise Modes to Improve Insulin Sensitivity and Fat Oxidation in Obese and Patients with Type 2 Diabetes - a Meta-Analysis.

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ABSTRACT

Exercise is effective in improving insulin sensitivity (IS) and resting fat oxidation in an obese and population with type 2 diabetic (T2D). However, most Americans do not adhere to the ACSM recommended exercise guidelines. The effectiveness of different exercise modes to improve IS and resting fat oxidation in obese and T2D individuals is unknown. **PURPOSE:** The purpose of this study was to compare the 1) effects of aerobic, resistance, and combination exercise training and 2) to determine the role of volume and intensity (aerobic) and repetitions and sets (resistance) on exercise induced improvements in IS and resting lipid oxidation in an obese and T2D population. **METHODS:** PubMed electronic database was searched for studies that included obese or T2D individuals, studies that included aerobic, resistance, or combination exercise training that reported IS and/or lipid oxidation measured by respiratory quotient (RQ). 73 studies met the criteria for IS and 9 studies (only aerobic exercise) met the criteria for resting fat oxidation analyses. Meta-analysis methods were used to evaluate the role of moderators, such as volume, intensity, number of sets, and repetitions, in the effectiveness of exercise training to improve IS and fat oxidation. **RESULTS:** Aerobic, resistance and combination exercise training were effective modes in improving IS in obese and T2D ($Z=5.43$, $p<.0001$). However, aerobic exercise had no effect on improving resting fat oxidation in this population ($Z=-0.96$, $p=0.3374$). Volume and intensity during aerobic exercise did not have an effect on degree of improvement in IS and fat oxidation (IS: $Q=1323.6$, $p<.000$; Fat Ox: $Q=221.97$, $p < .0001$). During resistance exercise, greater number of sets resulted in a greater improvement in IS ($Z=3.14$, $p=0.0017$), whereas number of repetitions did not have an effect ($Z=0.71$, $p=0.4793$). **CONCLUSION:** Although traditional aerobic exercise is an effective training method in improving IS in obese and individuals with T2D, resistance and/or combination exercise provide beneficial alternative training methods to improve IS. While prescribing resistance exercise, focusing on number of sets (3 or more), rather than number of repetitions, should be emphasized to improve IS. Exercise training was not effective in improving resting fat oxidation in obese and T2D. however, this could be due to a small sample size available in literature. Further research needs to be done on the effects of exercise on resting fat oxidation in obese and T2D.