

Eight Weeks of Combined Exercise Training Induced Improvement in Insulin Sensitivity is Associated with Improvement in Aerobic Capacity, but not with Improvement in Strength.

MANUEL AMADOR, CESAR MEZA, CYNTHIA MONTENEGRO, JEFFREY D. COVINGTON, GEORGE KING, ANDREW MCAINCH, SUDIP BAJPEYI.

Metabolism, Nutrition, and Exercise Research (MiNER) laboratory;
Department of Kinesiology; University of Texas at El Paso; El Paso, TX

Category: Masters

Advisor / Mentor: Bajpeyi, Sudip (sbajpeyi@utep.edu)

ABSTRACT

A lifestyle compromised of predominantly sedentary behavior is a risk factor that promotes the development of metabolic syndrome. It has been demonstrated that individuals with blunted insulin sensitivity (IS) and metabolic flexibility (MF) tend to be more prone to develop the disease. An increase in physical activity is recommended in order to prevent cardiovascular disease and type 2 diabetes mellitus. The aim of this study was to determine whether healthy, sedentary, normoglycemic, Mexican American men without a family history of type 2 diabetes are able to improve IS and MF after participating in a combined (aerobic/resistance) exercise intervention. Subjects ($n=6$; 21.83 ± 0.8 years; $BMI 28.92 \pm 1.6$ kg/m^2), participated in 8 weeks of combined exercise training three times per week (35 minutes of aerobic training & 45 minutes of resistance training/session). Upper body 1 repetition maximum (1RM) was measured using the flat barbell bench press and lower body 1RM was measured using a back leg strength dynamometer. IS was assessed using the hyperinsulinemic euglycemic clamp (clamp). Insulin dose administered to each subject was set $80mU/m^2/min$. MF was assessed by determining change in RQ (ΔRQ) at the steady state of the clamp compared to RQ measured at baseline/resting. Participants were provided with standard diet 5 days before pre and post intervention testing in order to control for the effects of diet on insulin sensitivity. Body composition was measured using dual x-ray absorptiometry. IS improved significantly after the 8 weeks of combined exercise training (3.18 ± 0.35 to 3.75 ± 0.34 mg/kg $EMBS/min$, $p=0.05$). There was no significant improvement in MF (0.06 ± 0.02 to 0.08 ± 0.02 ΔRER , $p=0.19$). Body weight significantly increased (3.76% ; 81.06 ± 5.38 to 84.11 ± 5.67 kg , $p=0.01$) with no change in fat mass and a trend to increase in fat free mass (2.8% ; 55.92 ± 2.77 to 57.5 ± 2.38 kg , $p=0.1$). Upper body strength significantly increased (168.3 ± 26.57 to 195 ± 26.04 $lb.$, $p=0.001$). Lower body strength increased (356.7 ± 46.52 to 428.3 ± 34.51 $lb.$, $p=0.02$). VO_2 max improved significantly (3.90 ± 0.14 to 4.19 ± 0.16 L/min , $p=0.037$). Improvement in IS was associated with an increase in VO_2 max ($r=0.92$, $p=0.008$) but not with the improvement in strength. Improvement in MF was significantly correlated with fasting glucose ($r=-0.83$, $p=0.04$), and an increase in lean mass ($r=0.82$, $p=0.04$). In conclusion, 8 weeks of combined exercise improves insulin sensitivity in healthy, sedentary, normoglycemic Hispanic men. Improvement in insulin sensitivity is associated with improvement in aerobic fitness but not gain in upper and lower body strength.