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Acute bouts of high versus moderate intensity exercise: Effects on microalbuminuria and insulin sensitivity

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Background: The prevalence of obesity has increased worldwide and represents a major public health concern. Obesity is often associated with an increase in urinary albumin excretion and impaired insulin sensitivity. Whilst it is clear that exercise is beneficial in terms of improving insulin sensitivity, the optimal exercise prescription in different cohorts is still unknown, hence the recent increase in studies investigating high versus moderate intensity interventions. It is also unclear what effect acute bouts of exercise may have on microalbuminuria, a marker which is more commonly being utilized for screening and prognosis of diabetes and cardiovascular disease.

Aim: The purpose of this study was to investigate the effects of an acute bout of moderate versus high intensity exercise on insulin sensitivity and microalbuminuria in obese and normal weight sedentary females.

Methods: Eighteen female participants (24.78±5.17 y; BMI 34.55±6.22 kg/m2) and ten normal weight participants (24±3.74 y; BMI 22.98±1.48 g/m2) leading sedentary lifestyles, participated in a single, 30 minute bout of moderate (65%- 5% Heart Rate Reserve [HRR]; 12-13 Rate of Perceived Exertion [RPE]) and high intensity exercise (75%-85% HRR; 14-15 RPE), over a two week period. Participants provided blood (glucose/insulin ratio, HOMA index, QUICKI index, plasma insulin, plasma glucose) and urine samples (albumin/creatinine ratio, U-creatinine, U-microalbumin) prior to each exercise bout and at 24h, 48h and 72h post-exercise.

Results: Fasting pre-exercise plasma glucose, HOMA Index and QUICKI Index were significantly (p<0.05) different between the obese and control groups. No change in urinary albumin excretion was observed following the two bouts of exercise. A significant (p=0.026) time effect was observed for albumin-creatinine ratio (ACR) with it being reduced at 48h and 72h post-exercise. No interaction effects were observed between groups or exercise intensities. U-creatinine was significantly (p<0.05) elevated in the normal weight group at 48h post-exercise. Both the obese and normal weight groups showed significant (p=0.001) reductions in the glucose/insulin ratio at 24h and 48h post-exercise with no differences observed between the groups or exercise intensities.

Conclusion: Acute bouts of exercise at moderate and high intensity failed to induce changes in microalbuminuria and insulin sensitivity in obese and normal weight females. Despite this, the percentage changes observed in a number of the dependent variables may suggest that there are clinical benefits associated with the acute bouts of physical exercise.

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