

Dynamic Graded Muscle Exercise in Sedentary Metabolic Syndrome Women; Effects on Cardiac Workload

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ABSTRACT

Metabolic syndrome (MetSyn) individuals presented declining sensitivity to insulin ($p=.0201$) as calculated by insulin sensitivity index (ISI-60) measurement. The young women categorized as MetSyn were previously found to have significantly lower (ISI-60) from healthy controls (Gomez, 2018), and had higher percent body fat ($p<.05$), diminished HDL ($p<.05$), and higher expenditure of Kcals ($p=.04$) compared to controls as measured by 7 day accelerometer. Cardiovascular modification is hypothesized to involve progressive dysfunction of the insulin mediated AKT/PKB eNOS pathway. **PURPOSE:** The purpose of this study is to identify if daily sedentary activity is associated with myocardial workload in the development of the metabolic disorder. We hypothesized metabolic syndrome individuals Rate Pressure Product (RPP) would be at elevated at rest and through various workloads of small muscle exercise. **METHODS:** We compared daily activity to heart function in order to identify possible myocardial workload, using Rate Pressure Product (RPP) between controls and MetSyn in women ($RPP=HR \times SBP$). Dynamic graded handgrip and single leg kick exercises were used to measure any cardiovascular deficiency between MetSyn and controls. By taking SBP and HR for every workload, we identified differences in cardiac work. **RESULTS:** RPP values greater than 10,000 bpm/mmHg indicated an increased risk for heart disease, where metabolic syndrome group was found to have higher RPP ($p=.02$) indicating that their hearts work harder. We also identified that individuals with higher RPP have had more sedentary breaks as measured by accelerometer $R=.396$, $p=.0227$, $n=33$. For Handgrip workloads there was a significant increase of RPP between Unloaded, 1Kg, 2Kg ($p<.05$). Throughout the Leg kick workloads RPP differences were significant from unloaded, 5 watts, 10 watts ($p<.05$). Additionally, RPP was found to be negative correlate to ISI60 $R=-.373$, $p=.0722$, $n=24$, which would indicate that individuals with lower insulin sensitivity have higher myocardial workload. **CONCLUSION:** MetSyn individuals are experiencing higher myocardial workloads. We predict that sedentary lifestyles along with developing metabolic deficiency are responsible for the observed increased myocardial workload in MetSyn women.

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