

## **The Effect of Sedentary Behavior on Arterial Stiffness in Healthy and Metabolic Syndrome Women**

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### **ABSTRACT**

Overweight and obese physical stature has been associated with increased endothelial dysfunction and the development of cardiovascular disease. This dysfunction may further be progressed as this population develops Metabolic Syndrome and Diabetes. To understand the mechanisms responsible for the vascular dysfunction in the Metabolic Syndrome participants in our research study, we aimed to identify if there is a difference in the Pulse Wave Velocity (PWV) as an effective measurement of peripheral arterial stiffness. Previous studies show that adults with higher superficial femoral artery stiffness experienced greater perceived fatigue and thus are less likely to continue daily physical activity. **PURPOSE:** To determine if daily ambulatory activity, as measured by peak cadence accelerometers, is associated with carotid arterial compliance and vascular response in young sedentary healthy and Metabolic Syndrome women. **METHODS:** 32 sedentary control women and 7 Metabolic Syndrome women (N=39) wore an accelerometer for 7 consecutive days to determine their daily activity and sedentary phases. Carotid and radial arterial compliance was measured using Tonometry technique to gather data on PWV (m/s) in both groups of women. Each participant performed a graded handgrip exercise procedure on a dynamic handgrip device while beat-to-beat blood pressure, brachial artery diameter, and blood flow with Doppler Ultrasound and B-mode imaging were measured simultaneously. Statistical analysis included correlations between daily step activity and peripheral arterial stiffness. Additional group comparisons were analyzed by a ANOVA using Sigmastat Analysis software. **RESULTS:** Metabolic Syndrome women, unlike the control group of women have a positive correlation (0.760,  $p=0.0476$ ) between PWV and total time of sedentary bouts. Metabolic Equivalents (METs) compared with total time in sedentary breaks displayed a stronger, positive correlation (0.637,  $p=0.000882$ ) in the group of control women than the group of Metabolic Syndrome women. Stronger, negative correlation ( $-0.517$ ,  $p=0.00242$ ) was also found between the average kilocalories burnt off per hour and the total time in sedentary bouts in the control group of women. The Metabolic Syndrome group have a significantly ( $p<0.05$ ) diminished arterial conductance in the brachial artery during handgrip conductance from rest to peak (1.5 watts). **CONCLUSION:** The results indicate that individuals who sustain longer sedentary periods in their daily activity, such as Metabolic Syndrome women, have higher peripheral stiffness. The increase in peripheral arterial stiffness would indicate a significant rationale for the mechanisms responsible for the vascular response deficit in Metabolic Syndrome participants during the small muscle exercise. Research reported in this publication was supported by an Institutional Development Award (IDeA) from the National Institute of General Medicine Sciences of the National Institutes of Health under grant number P20GM103451.