2458 Board #66 June 4 9:00 AM - 10:30 AM

Effects of Acute Aerobic Exercise on Arterial Stiffness in Young Adults

Shannon L. Krell[1], Daniel M. Croymans[1], Ryan A. Harris[2], Christian K. Roberts, FACSM[1]. [1]*University of California Los Angeles (UCLA), Los Angeles, CA.* [2]*Medical College of Georgia, Augusta, GA.*
Email: skrell@ucla.edu
(No disclosure reported)

PURPOSE: Arterial stiffness is an independent predictor of cardiovascular disease (CVD) and aerobic exercise has been recommended as a means to improve cardiovascular function and reduce CVD risk. The present study was designed to examine the acute effects of aerobic exercise on arterial stiffness and other related indices of cardiovascular function.

METHODS: Arterial tonometry measurements were performed on 54 non-smoking young adults (21 males, 33 females, mean age 21.3±0.8 yrs) before and after 30 minutes of aerobic exercise on a treadmill at 80% of their age-predicted HR_{max}. Using applanation tonometry (Sphygmocor), carotid-femoral pulse wave velocity (cfPWV) was measured and radial artery pulse wave analysis was performed for determination of augmentation index (AIx), aortic pressure (AP) and sub-endocardial viability ratio (SEVR). Measurements were taken in duplicate before and after exercise, with post-exercise measurements taken after subjects returned to resting heart rate (RHR).

RESULTS: Significant decreases in aortic pressure, systolic and diastolic blood pressure and SEVR (all $p<0.05$) were observed following acute exercise, although no significant changes in PWV or AIx were noted ($p>0.05$). Upon stratifying the subjects by sex, at baseline a significantly lower RHR (males: 65±9, females: 59±8 BPM) and PWV (males: 6.3±0.8, females: 5.7±0.8 m/s) and higher AIx (males: -6.2±8.2, females: 1.6±10.9) were observed in women compared to men (all $p<0.05$). In response to acute exercise, men exhibited a significant increase in AIx (-6.2±8.2 pre vs. -2.3±8.3 post, $p<0.04$) whereas women exhibited a significant decrease in AIx (1.6±10.9 vs. -2.0±8.9, $p<0.03$). The differences in the AIx responses (males: 3.9±8.5, females: -3.6±7.6, $p<0.01$) were not explained by baseline physical activity levels, body weight, BMI or waist circumference.

CONCLUSION: These data indicate that women and men may exhibit a different arterial response to an acute aerobic exercise bout. Since a significantly lower RHR and PWV was observed in the women, future studies are needed to determine whether the opposing arterial responses between sexes are due to gender differences or other physiological mechanisms.

2459 Board #67 June 4 9:00 AM - 10:30 AM

Aerobic Capacity Correlates with Prostacyclin Release in Hypertensive African Americans

Sheara Williamson, Deepti Varma, Michael Brown, FACSM, Susan Jansen. *Temple University, Philadelphia, PA.*
Email: sheara@temple.edu
(No disclosure reported)

Hypertension is a multifactorial disease that has a high prevalence in African Americans (AA). Research has implicated endothelial dysfunction as a factor involved in the development of hypertension. Thromboxane (TX), a vasoconstrictor and platelet aggregator; and prostacyclin (PGI_2), a vasodilator and anti-aggregator, are the primary eicosanoids formed influencing vascular tone. Submaximal aerobic exercise increases PGI_2 production in healthy individuals without upregulating TX synthesis. There is little known about the correlation of aerobic fitness and prostaglandin formation after a bout of moderate aerobic exercise in AA hypertensives.

PURPOSE: The purpose was to determine the relationship between aerobic capacity and prostanoid (TX and PGI_2) formation after a bout of moderate exercise in AA hypertensives.

METHODS: Ten sedentary hypertensive AA adults (mean BP 143±7/87±7, 58±2.3 yrs) underwent 50 min of aerobic exercise at 65% VO_{2max}. VO_{2max} was determined on a separate day prior to the exercise session using a modified Bruce treadmill protocol with gas analysis. Baseline urine was collected for 24 hrs on a separate day (control). Urine was collected again for 24 hours beginning immediately after the bout of exercise. All urine was frozen at -20oC until analysis. PGI_2 and TX were measured in urine at two time periods: 08:00-16:00 (day) and 16:00-00:00 (night) by gas chromatography/mass spectrometry and normalized to urinary creatinine concentration.

RESULTS: VO_{2max} ranged from 17.4ml/kg/min - 29.3ml/kg/min. PGI_2 levels increased from 50.7±11ng/ug to 76.1±22ng/ug ($p<.05$) during the day collection after the bout of exercise when compared to the control day. There was no significant change in TX during either time period. There was a significant relationship ($r=.49$, $p<.05$) between PGI_2 levels during the exercise day and $VO_{2\,max}$.

CONCLUSION: Moderate intensity aerobic exercise increases PGI_2 levels during the exercise day, but night time levels were not different than the control day at either time period. There appears to be a relationship between aerobic capacity and exercise induced PGI_2 production in hypertensive AA's. AA's with lower VO_{2max} had decreased PGI_2 formation after the exercise bout. Impaired PGI_2 production in response to exercise may be suggestive of endothelial dysfunction.

2460 Board #68 June 4 9:00 AM - 10:30 AM

Cardiac Demands of Acute Vibration Training in Apparently Healthy Adults

Lucille E. Sternburgh, Thomas J. Spring, Barry A. Franklin, FACSM. *William Beaumont Hospital, Royal Oak, MI.*
Email: Lucille.Sternburgh@beaumonthospitals.com
(No disclosure reported)

PURPOSE: Total body vibration training serves as a supplemental modality for resistance training in apparently healthy adults, with reported improvements in muscular strength and cardiovascular fitness. However, few data are available regarding the acute cardiac demands imposed by this exercise modality. This preliminary study was conducted to assess acute hemodynamic responses and associated cardiac demands during total body vibration training in apparently healthy adults.

METHODS: Fifteen healthy subjects (80% female), mean age 32.5 ± 11.4 years were tested on a Powerplate® vibration training platform, completing three non-consecutive sessions, which included four predetermined static exercises (squat, pushup, lunge, and row). Participants were oriented to the equipment and exercises prior to the first testing session, including measured outcomes with no vibration stimulus. Vibration exercises were performed statically for 45 seconds each at identical settings, at low-to-moderate intensity workloads. Subjects with known cardiovascular disease, arrhythmias, uncontrolled hypertension, and/or orthopedic limitations were excluded. Heart rate (HR), systolic blood pressure (SBP), and ECG were monitored during each session. The rate pressure products (RPP; HR x SBP/100) were compared during each exercise bout with and without vibration training.

RESULTS: Peak RPP was significantly higher during vibration training than during isometric exercise only (212.2 ± 42.0 and 169.8 ± 41.1 mmHg x bpm x 10-2 respectively; $p=0.02$), primarily due to an exaggerated SBP response. No significant symptoms, arrhythmias, or ECG abnormalities were noted.

CONCLUSION: Total body vibration training modestly increased cardiac demands when compared with identical isometric exercise without the superimposed vibration stimulus. The augmented cardiac demands should be considered when prescribing vibration training as resistance exercise in populations with suspected or known cardiovascular disease. Future investigations of hemodynamic responses should be undertaken in stable coronary artery disease patients prior to using vibration training in this population.