

Low Intensity Exercise has Greater Acute Vascular Benefits for Reducing Arterial Stiffness in Hot Compared to Neutral Conditions

KYLEIGH ALLIE, JULIANNA KILPATRICK, PAOLO M. SALVADOR and ERIC RIVAS

¹ Exercise and Thermal Integrative Physiology Laboratory, Texas Tech University, Department of Kinesiology and Sport Management, Lubbock, TX, USA

Category: / Undergraduate

Advisor / Mentor: Eric Rivas, Ph.D.(eric.rivas@ttu.edu)

ABSTRACT

Both exercise and passive heating cause acute reductions in blood pressure. It is unknown if exercise-heat stress causes likewise reductions or greater when combined. **PURPOSE:** This project tested the hypothesis that the resting and exercise-heat stress cause hypotension and improvements in arterial stiffness.

METHODS: Seven healthy active (7 day activity: 9887±3564 steps/day; VO₂max: 52±10 mL/kg/min) subjects (5M/2F, 24±9y, 171±6cm, 68±7kg) completed a 30 min baseline rest followed by 60 min at an exercise intensity of their choice that represented their perceived exertion (RPE) of 12 (between light and somewhat hard) on a 20-point rating scale while being blinded to the ergometer (watts) in a hot dry to humid (42.3±0.3°C; initial 10.4±0.4% relative humidity [Rh] that increased to 62.2±5.3%Rh) and control neutral dry (22.9±1.0°C; 11.5±1.9%Rh) condition in random order separated by at least 7 days. Heart rate (HR), peripheral blood pressure (systolic [SYS], diastolic [DIA], mean arterial pressure [MAP]), arterial stiffness (augmentation index [AIX@75]; pulse wave velocity [PWV]) and total vascular resistance (TVR), and central blood pressures (cSYS, cDIA) were measured after the 30 min baseline rest and 60 min of exercise recovery. A 2-way repeated measures analysis of variance was used to examine interaction and main effects for condition x time. **RESULTS:** Exercise intensity was slightly greater (54±1 vs 48±3%VO₂max, $P<0.003$) in neutral than hot conditions at an RPE of 12. Pre- and post-exercise heat stress resulted in an increase in heart rate (pre-: $\Delta 14\pm 11$ BPM, post-: $\Delta 26\pm 12$ BPM) and AIX@75 (pre-: $\Delta 7\pm 7\%$, post-: $\Delta 14\pm 12\%$) and a decrease in post-exercise TVR ($\Delta 0.1\pm 0.2$ s²mmHg/ml) (Main effect: Condition; $P\leq 0.03$). Only post-exercise heat stress reduced SYS ($\Delta 12\pm 14$ mmHg), cSYS ($\Delta 9\pm 12$ mmHg), and PWV($\Delta 0.4\pm 0.4$ m/s) (Condition x Time; $P\leq 0.03$). **CONCLUSION:** Low intensity exercise heat stress has greater acute cardiovascular benefits for reducing arterial stiffness and peripheral and central systolic pressures compared to exercise in neutral conditions.