TACSM Abstract

Hand Cooling during Recovery from Exercise in the Heat: Cold Water Immersion *vs.* Dry Cold Negative Pressure

MEAGAN V. CANTU, CHRISTOPHER M. HEARON, FACSM, MATTHEW V. BLISS, and TYLER M. FARNEY

Human Performance Laboratory; Department of Health and Kinesiology; Texas A&M University-Kingsville; Kingsville, TX

Category: Undergraduate

Advisor/Mentor: Hearon, C.M. (christopher.hearon@tamuk.edu)

ABSTRACT

Areas of the body that are devoid of hair, such as the palms of our hands, efficiently dissipate heat through specialized blood vessels. Immersing the hands in cold water is said to benefit the process of heat exchange, but has been criticized for its ability induce cutaneous vasoconstriction. The use of dry cold negative pressure is proposed to bypass this reflex in order to increase constant heat dissipation. **PURPOSE**: To compare the effect of two different hand cooling modalities on core temperature when recovering from exercise in a hot environment. **METHODS:** Males (*N*=12, 21±2 yr, 64±15 kg, 174±6 cm) of average cardiorespiratory fitness (VO_{2Peak}=37±3 ml·kg^{-1}·min^{-1}) participated in three heat trials (35.1±0.2°C, 42±1%RH,) where they exercised on a cycle ergometer at 65% VO_{2Peak} until a desired core temperature (38.3°C), 95% of heart rate max, or until volitional maximum. During recovery from the heat trials, subjects underwent one of three hand cooling treatments for 10 min [cold water immersion (WTR), dry cold negative pressure (NEG), and a control with no hand cooling (CON)] in a balanced crossover design. In WTR trials subjects submerged one hand in cold (10°C) water, and in NEG the hand was placed in sealed cold (10°C) container (AVAcore CoreControl Pro) that provided negative pressure (-47 mm Hg). Heart rate (HR) and core temperature (rectal, T_{re}) were measured pre-/post-recovery cooling. Two way (cooling method x time) repeated measures ANOVA was used to analyze recovery HR and T_{re} (α=0.05). **RESULTS:** The main effect for cooling method was not significant for both HR (WTR=117±12 bpm, NEG=113±9 bpm, CON=118±13 bpm)(*p*=0.1650) and T_{re} (WTR=37.7±0.3°C, NEG=37.8±0.2°C, CON=37.8±0.3°C)(*p*=0.3560) during recovery. As expected, the main effect for time was significant for both T_{re} (Pre=37.8±0.2°C, Post=37.6±0.2°C)(*p*=0.0040) and HR (Pre=135±13 bpm, Post=97±9 bpm)(*p*=0.0001) as both declined during recovery. The cooling method x time interaction (*p*=0.4280) did not demonstrate that T_{re} decreased differently between the three cooling modalities, but the cooling method x time interaction for HR was significant (*p*=0.0320) where the change in HR during recovery periods did differ significantly between the cooling modalities. The significant interaction was driven by the WTR treatment HR declining at a slightly quicker rate than NEG and CON**. CONCLUSION:** The use of WTR or NEG didn't decrease T_{re} any more efficiently than CON, but recovery HR did decline at slightly greater rate in WTR compared to both NEG and CON. This could suggest that while WTR provided a similar T_{re} reduction as NEG and CON, it did so with a quicker reduction in heart work.