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Elevated Temperature Inside a Lower Body Positive Pressure Treadmill During Exercise: A Possible Environmental Constraint

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Lower body positive pressure (LBPP) treadmills have become increasingly popular for rehabilitation and training. Running on a LBPP treadmill entails sealing the body from the hips down in a high air pressure chamber to simulate exercise at lower body weight. The effects of the sealed chamber on treadmill temperature during exercise have yet to be explored. **PURPOSE**: The purpose of the study was to measure treadmill and tympanic temperature while participants were running on a LBPP treadmill. **METHODS**: Fifteen trained endurance athletes, seven males and eight females (AGE 21.7 ± 2.9 yrs., WEIGHT 61.9 ± 8.5 kg) completed four running trials at different body weight (BW) percentage levels (60, 75, 85, and 100%). The 100% BW trial was run on a normal treadmill (non LBPP). During each trial, participants rested for two minutes then ran at three steady state speeds (2.9, 3.4, and 3.8 m/s) for four minutes each. Room air, tympanic, and LBPP chamber temperatures (°C) were recorded before the trial, at the end of each stage, and after the trial. **RESULTS**: The average treadmill temperature (± SD) at each increasing BW was 31.1 ± 2.5, 30.5 ± 1.76, 30.4 ± 2.3, and 22.9 ± 1.8°C, respectively. Sphericity was assumed for a repeated measures ANOVA. Treadmill temperature was statistically significantly different among the four BW conditions $F(3, 42) = 53.49$, $p < .0005$, partial $\eta^2 = .793$. Post hoc analyses with a Bonferroni adjustment indicated that temperature was statistically greater in the 60, 75, and 85% BW conditions than in the 100% condition (M = 8.174, 95% CI [5.572, 10.777], p < .0005) (M = 7.556, 95% CI [5.195, 9.917], p < .0005) (M = 7.495, 95% CI [6.137, 8.853], p < .0005). There was not a significant difference in room temperature among all conditions (overall average 21.6 ± 1.5 °C). Average pre-exercise tympanic temperature for each BW was 35.4 ± 0.7, 35.1 ± 0.8, 35.2 ± 0.7, 35.8 ± 0.5 °C and post exercise tympanic temperature was 35.3 ± 0.6, 35.3 ± 0.6, 35.0 ± 0.8, and 35.8 ± 0.6 °C.
CONCLUSION: Treadmill temperature was significantly higher in all LBPP weight conditions when compared to normal weighted running on a traditional treadmill. Runners may use LBPP treadmills for rehabilitation or low-impact training, but should be aware of the increase in LBPP chamber temperature. The current study is the first to report elevated temperature inside a LBPP treadmill.