Caloric Expenditure of Normal and Lower Body Positive Pressure Treadmill Running

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Lower body positive pressure (LBPP) treadmill walking and running are being used more frequently in clinical and athletic settings. Accurate intensity is a requirement for proper exercise prescription, especially for obese patients that may benefit from LBPP exercise. It is unclear if ACSM metabolic equations are suitable for LBPP running. There are currently no accepted calculations to estimate caloric cost or exercise intensity for LBPP running. **PURPOSE:** To measure the oxygen consumption ($\dot{V}O_2$) and caloric expenditure of treadmill running at normal body weight and LBPP. **METHODS:** Thirteen moderately trained, non-obese participants (Age: 25.8±7.2 years; BMI: 25.52±3.29 $kg \cdot m^{-2}$) completed two bouts of running exercise in a counterbalanced manner: (a) running on a normal treadmill (TM) and (b) running on a LBPP treadmill at 60% (40% of body weight supported) for 4 min. at 2.24, 2.68, and 3.13 $m \cdot s^{-1}$. Oxygen consumption was measured using open flow indirect calorimetry and last minute averages were defined as steady state. **RESULTS:** Volunteers' average (±SD) absolute $\dot{V}O_2$ at rest was 328.05±85.59 $ml \cdot min^{-1}$ and 365.80±119.82 $ml \cdot min^{-1}$ for TM and LBPP trials. Average TM $\dot{V}O_2$ for three treadmill speeds was for 2281.5±376.6, 2609.5±427.4, and 2730.2±541.7 $ml \cdot min^{-1}$. Average LBPP $\dot{V}O_2$ for three treadmill speeds was 1714.1±374.6, 1913.2±478.8, and 2064.4±470.2 $ml \cdot min^{-1}$. Caloric expenditure for three TM speeds was 11.4±1.9, 13.0±2.1, 13.7±2.7 $kcal \cdot min^{-1}$. Caloric expenditure during three LBPP treadmill speeds was 8.6±1.9, 9.6±2.4, and 10.3±2.3 $kcal \cdot min^{-1}$. Repeated measures ANOVA indicated a significant main effect of treadmill condition and $\dot{V}O_2$ $F(1, 12) = 35.635$, $p < .05$, partial $\eta^2 = .748$, and running speed and $\dot{V}O_2$ $F(2,24) = 29.062$, $p < .05$, partial $\eta^2 = .708$. There was no significant interaction between treadmill condition and speed on $\dot{V}O_2$, $F(2, 24) = 2.502$, $p > .05$, partial $\eta^2 = .173$. **CONCLUSION:** As expected, treadmill running in LBPP resulted in significantly lower oxygen consumption at all three running speeds. Interestingly, the percent difference in $\dot{V}O_2$ from TM and LBPP conditions was ~33% not the expected 40%. We conclude that metabolic cost of LBPP running is significantly less than normal treadmill running, yet the decrease is not as great as predicted by the change in body mass.