Cortisol, Heart Rate, and Perceived Exertion Responses to Different Resistance Training Protocols with and Without Blood Flow Restriction

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ABSTRACT

PURPOSE: The purpose of this study was to examine the effects of different resistance exercise protocols on cortisol, heart rate, and perceived exertion. **METHODS:** Eight males and eight females (age = 21.8 ± 2.6) performed three randomly assigned exercise protocols on three separate occasions: low-intensity resistance training (RT) exercises with blood flow restriction (BFR) at 20% of one repetition maximum (1-RM) (BFR20), moderate-intensity RT exercises with BFR at 40% of 1-RM (BFR40), and traditional high-intensity RT exercises at 80% of 1-RM (HI80). Participants completed 2-3 circuits of four sets in the leg press and leg extension machines. Total volume of resistance training (RT) exercises performed was about 25% for the BFR20 session and 50% for the BFR40 session compared to the volume of RT exercises for the HI80 session. Heart rate (HR) and rating of perceived exertion (RPE) were monitored throughout each session. Saliva samples were collected before and immediately after each exercise session. Samples were stored at -80 ℃ and later analyzed with ELISA for salivary cortisol concentrations. **RESULTS:** No significant differences in cortisol concentrations were noted between conditions, but significant increases in cortisol concentrations were seen from pre- to post-exercise ($p<0.039$). The HI80 condition resulted in significantly higher HR values in the leg press when compared to BFR40 ($p<0.01$). HI80 also resulted in higher RPE values in the leg press when compared to BFR40 ($p<0.002$) and BFR20 ($p<0.021$). Lastly, BFR20 ($p<0.03$) and HI80 ($p<0.01$) resulted in significantly higher RPE values in leg extension compared to BFR40. **CONCLUSION:** The cortisol findings may indicate that all three exercise protocols resulted in similar levels of stimuli to the hypothalamic-pituitary-adrenal axis. It should be highlighted that the BFR20 session with lowest training volume and intensity resulted in similar objective (i.e., HR) but significantly lower subjective level of exertion (i.e., RPE) compared to the HI80 session with highest training volume and intensity. The cortisol, HR, and RPE responses to various RT sessions indicate that the findings of the present study may have some clinical and/or practical applications.