

Effects of smoking habit on repeated high-intensity sprint performance and heart rate variability in collegiate students

Chia-Lun Lee¹, Wen-Dien Chang², Ching-Feng Cheng³, and Chia-Jung Lee³

¹Department of Recreational Sports and Management, Yu Da University, Miaoli 361, Taiwan

²Department of Sports Medicine, China Medical University, Taichung 404, Taiwan

³Department of Athletic Performance, National Taiwan Normal University, Taipei 106, Taiwan

Abstract

Purpose: The purpose of this study was to investigate the effects of cigarette smoking habit on repeated sprint high-intensity performance, heart rate variability (HRV) and maximal oxygen uptake in collegiate male students. **Methods:** 31 habitual smokers (S, >13 cigarettes / day) and 99 non-smokers (NS) completed this randomized experimental design study. All participants performed a repeated sprint high-intensity test (RST) and a 20-m shuttle test (ST) during the familiarization trial. RST test consists of 6×10-s sprints with 60-s active recovery intervals on a cycle ergometer and ST is a 20-m shuttle run in accordance with audio CD until exhaustion to estimate maximal oxygen uptake. The beat-to-beat HRV was continuously recorded in supine position for 20-min prior to RST test and for 30-min immediately after the RST test. Time and frequency domain analyses of HRV were analyzed to determine the effects of cigarette smoking habit. The peak power, mean power, total work, heart rate and rate of perceived exertion (RPE) were taken during the RST. **Results:** No significant differences were observed on peak power, mean power, total work, heart rate and RPE between S and NS groups ($p > .05$); however, maximal oxygen uptake in the S group was significantly lower than that in the NS group (37.8 ± 5.5 vs. 42.1 ± 6.7 ml·kg⁻¹·min⁻¹, $p < .05$). Post-exercise systolic pressure (141.6 ± 17.6 vs. 132.2 ± 16.7 mmHg, $p < .05$) and diastolic pressure (87.4 ± 17.6 vs. 79.4 ± 13.0 mmHg, $p < .05$) in the S group were significantly higher than those in the NS group. The square root of the mean squared successive differences between adjacent RR intervals (RMSSD), proportion of RR intervals greater than 50 ms (pNN50), high-frequency powers (HF), and natural log of HF (lnHF) in the S group were significantly higher than those in the NS group during recovery phase ($p < .05$). **Conclusions:** Cigarette smoking habit does not affect anaerobic exercise capacity, but it impairs cardiorespiratory capacity and blood pressure profiles. Moreover, cigarette smoking habit may increase parasympathetic modulation during recovery phase after RST exercise.

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