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電子菸與菸草菸對急性運動後心肺反應與運動表現之比較
The Comparison of Exercise-Induced Cardiorespiratory Responses Following
E-cigarette and Tobacco Smoking

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ABSTRACT

Purposes: The purpose of this study is to investigate the acute exercise-induced cardiorespiratory responses and exercises performance following e-cigarette (EC) and tobacco cigarette (TC) smoking. **Methods:** A randomized crossover design was used. Thirty young male adult smokers were recruited with an average age of 23 years old, and have been smoking for 3.5 years and smoke nine cigarettes a day. The acute smoking interventions were measured at two-day intervals under three conditions: control, free nicotine use EC (EC₀), 3 mg nicotine of EC (EC₃) and 3 mg nicotine of TC (TC₃). A maximal multistage shuttle 20 m run test (MMST) was used for the acute exercise. The measured respiratory and cardiovascular responses were: heart rate (HR), blood pressure (BP), oxygen saturation (SPO₂), forced vital capacity (FVC), forced expiratory volume within 1 second (FEV₁) and peak expiratory flow (PEF). A thrice replication of measurements was taken: baseline, post-smoking, and post-exercise. The prediction of $\dot{V}O_{2max}$ and time to exhaustion (TTE) were taken during exercise. A two-way repeated measure and one-way ANOVA were used for the data analysis. **Results:** The result demonstrated that TC₃ smoking increased HR and DBP post smoking more than EC₀ (HR_{TC₃}: 93.3 ± 3.1 and HR_{EC₀}: 81.7 ± 2.7 (bpm), $p < .05$) and (DBP_{TC₃}: 83.2 ± 1.2 and DBP_{EC₀}: 76 ± 1.8 (mmHg), $p < .05$) respectively. HR, SBP, and DBP induced by exercise remained unchanged following EC and TC smoking ($p > .05$). SPO₂ and PEF after TC₃ smoking were significantly higher than EC₀. The predicted $\dot{V}O_{2max}$ and TTE on TC₃ were significantly lower than EC₀ (TTE_{TC₃}: 365.3 ± 27.3 and TTE_{EC₀}: 393.4 ± 27.8 , $p < .05$) and EC₃ predicts $\dot{V}O_{2max}$ ($\dot{V}O_{2max}$ TC₃: 35.6 ± 1.4 and $\dot{V}O_{2max}$ EC₃: 37.4 ± 1.6 (ml/kg/min), $p < .05$; TTE_{TC₃}: 365.3 ± 27.3 and TTE_{EC₃}: 394.1 ± 29.6 (s), $p < .05$). **Conclusion:** This study concluded that smoking EC had a lower impact on cardiorespiratory responses and exercise performance than TC for smokers.

Keywords: heart rate, blood pressure, forced vital capacity, peak expiratory flow, exercise performance.

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