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ORIGINAL ARTICLE

Correlation between body fat and post-exercise heart rate in healthy men and women

Corrélation entre la graisse corporelle et la fréquence cardiaque post-exercice chez les hommes et les femmes en bonne santé

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KEYWORDS

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Summary

Aims. – A slower first minute reduction of post-exercise heart rate (HR) represents an unfavorable indicator of autonomic control, with post-exercise HR influenced by several physiological and pathophysiological attributes. However, the association between post-exercise HR and body composition indices is poorly described so far. The purpose of this study was to describe the correlation between body fat and post-exercise HR in apparently healthy men and women.

Methods and results. – We evaluated body composition of 203 participants (age 29.1 ± 11.9 years, 165 men and 38 women), who completed maximal graded exercise test on a treadmill, with heart rate monitored during and immediately after exercise. The average body fat was $13.7 \pm 7.3\%$ (men) and $25.6 \pm 9.2\%$ (women), with 7.9% men and 23.7% women classified as obese. A negative trend has been reported for correlation between body fat and post-exercise HR ($r = -0.12$; $P = 0.09$). When adjusted for age, gender and cardiorespiratory endurance, body fat accounted for only 10.4% of variability in post-exercise HR ($P = 0.39$). Nevertheless, the model as a whole was a statistically significant predictor of post-exercise heart rate ($P = 0.02$), with cardiorespiratory endurance accounted for 35.4% of variance to this model ($P = 0.005$).

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MOTS CLÉS

Récupération ;
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Conclusion. – It seems that autonomic control, as evaluated by post-exercise HR, was not associated with body fat in our cohort of apparently healthy normal-weight and obese men and women. When monitoring and interpreting post-exercise HR in real-life circumstances among healthy men and women, one should not focus attention on their body composition.

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Résumé

Objectifs. – Une diminution plus lente de la fréquence cardiaque post-exercice (HR) est un indicateur défavorable du contrôle autonome, avec une HR post-exercice influencée par plusieurs attributs physiologiques et physiopathologiques. Cependant, l'association entre les indices de HR et de composition corporelle post-exercice est mal décrite jusqu'à présent. Le but de cette étude était de décrire la corrélation entre la graisse corporelle et la FC post-exercice chez des hommes et des femmes apparemment en bonne santé.

Méthodes et résultats. – Nous avons évalué la composition corporelle de 203 participants (âge $29,1 \pm 11,9$ ans, 165 hommes et 38 femmes), qui ont terminé le test d'exercice maximal sur un tapis roulant, avec la fréquence cardiaque surveillée pendant et immédiatement après l'exercice. La graisse corporelle moyenne était de $13,7 \pm 7,3$ % (hommes) et $25,6 \pm 9,2$ % (femmes), avec 7,9 % d'hommes et 23,7 % de femmes classées comme obèses. Une corrélation entre la graisse corporelle et la FC post-exercice ($r = -0,12$; $p = 0,09$) a été signalée. Lorsqu'on a ajusté l'âge, le sexe et l'endurance cardiorespiratoire, le pourcentage de graisse ne représentait que 10,4 % de la variabilité de la FC post-exercice ($p = 0,39$). Néanmoins, le modèle dans son ensemble était un prédicteur statistiquement significatif de la fréquence cardiaque post-exercice ($p = 0,02$), l'endurance cardiorespiratoire représentant 35,4 % de la variance de ce modèle ($p = 0,005$).

Conclusion. – Il semble que le contrôle autonome, tel qu'évalué par la FC post-exercice, n'était pas associé à la graisse corporelle dans notre cohorte d'hommes et de femmes en bonne santé. Lors du suivi et de l'interprétation des FC en post-exercice dans des circonstances réelles chez les hommes et les femmes en bonne santé, on ne devrait pas concentrer l'attention sur leur composition corporelle.

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1. Introduction

Heart rate (HR) dynamics after maximal or submaximal exercise has been recognized as a useful marker of autonomic function, and cardiometabolic health and performance in both clinical and experimental physiology [1–3]. A slower first minute reduction of post-exercise HR represents an unfavorable indicator of autonomic control, with post-exercise HR response influenced by several physiological and pathophysiological attributes [4,5]. It appears that a more sluggish decrease in HR during recovery period was associated with an impaired ability to increase not only vagal but also sympathetic activity to appropriate levels, mainly due to reduced baroreflex sensitivity [4]. Among other factors, obesity might be associated with altered function of the autonomic nervous system [6] and abnormal post-exercise HR responses. For example, overweight adolescents seem to exhibit adverse modifications in autonomic control characterized by a reduction in parasympathetic activity [7], while overweight patients from cardiovascular clinic presented impaired HR recovery after exercise as compared to their counterparts with normal weight [8]. Many obesity-related factors were identified to affect markers of autonomic function in health and disease [9–11]. In particular, hyperinsulinemia, hyperleptinemia and increased fatty acid frameworks arising from fat accumulation drive

elevated sympathetic activity in many tissues and organs, including the heart, peripheral vessels, kidney and skeletal muscle [11]. However, the association between body composition and post-exercise HR in healthy adults seems to be poorly described so far. Therefore, the main purpose of this cross-sectional study was to describe the correlation between body fat and post-exercise HR in healthy men and women.

2. Materials and methods

Two hundred and three ($n = 203$) apparently healthy adults (165 men and 38 women) volunteered to take part in this study, with participants were recruited through local media advertising. They completed a health history questionnaire and general medical screening, and gave their informed consent regarding their voluntary participation in the study. All participants were free from heart disease, musculoskeletal dysfunction or known metabolic disorder, and refrained from using any performance-enhancing agents within 14 days before study commenced. They were informed verbally and in writing about the nature and demands of the study, with ethical approval received from the local institutional review board. Experimental procedures were conducted in accordance with the Declaration of Helsinki. All measurements

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