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BRIEF NOTE

Effects of short term creatine supplementation and resistance exercises on resting hormonal and cardiovascular responses



Effets d'une supplémentation de courte durée en créatine, et d'exercices de musculation, sur différentes hormones circulantes et le profil tensionnel

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KEYWORDS

Blood pressure;
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Summary

Introduction. – The purpose of this study was to examine the effects of 3, 5 and 7 days of creatine loading coupled with resistance exercise on resting testosterone and cortisol concentrations, systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), heart rate and rate pressure product (RPP). These measures were compared to those in placebo group.

Summary of facts. – Twenty active males were randomly assigned to either a creatine group (Cr) or placebo group (Pl). Participants performed resistance exercises at day 3, 5, and 7; and also tested at day 4, 6, and 8. Subjects of the Cr group showed significant increases in testosterone concentrations and decreases in cortisol concentrations, in comparison with Pl and baseline, after 5 and 7 days of Cr loading ($P < 0.05$). There were no significant changes in heart rate, SBP, DBP, MAP, and RPP for both groups at all times ($P > 0.05$).

Conclusion. – Results of the present study suggest that more than 5 days of creatine supplementation, associated with resistance exercises is sufficient for increasing testosterone concentrations and decrement in cortisol concentrations.

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MOTS CLÉS

Pression artérielle ;
Cortisol ;
Testostérone ;
Supplémentation en
créatine ;
Fréquence cardiaque

Résumé

Introduction. – Le but de cette étude était d'évaluer les effets de 3, 5 et 7 jours de prise de monohydrate de créatine, associée à la réalisation d'exercices de musculation, sur les concentrations plasmatiques de testostérone, cortisol, les pressions artérielles systolique, diastolique, et moyenne, et le « double produit » (produit de la pression artérielle systolique par la fréquence cardiaque).

Résultats. – Vingt sujets régulièrement actifs ont participé à cette expérimentation, répartis en un groupe supplémentation en créatine (Cr), et un autre consommant un placebo (Pl). Les sujets ont suivi des séances de musculation à j3, j5 et j7, et ils ont été testés à j4, j6 et j8. Les sujets du groupe Cr ont présenté une augmentation significative de la concentration plasmatique de testostérone et une baisse significative de la concentration de cortisol, comparativement aux valeurs retrouvées chez les sujets du groupe, après 5 et 7 jours de supplémentation ($P < 0,05$). Aucune variation sensible et significative des valeurs tensionnelles n'a été détectée dans les 2 groupes expérimentaux ($P > 0,05$).

Conclusion. – Les résultats obtenus suggèrent que 5 jours de supplémentation, associés à la pratique de séances de musculation, permettent d'augmenter des concentrations plasmatiques de testostérone et de baisser celles de cortisol.

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1. Introduction

Resistance exercise is known to be strong stimulus to change in the hormone secretion, blood pressure and heart rate. Resistance exercise stimulates the release of various anabolic and catabolic hormones, especially the testosterone and cortisol. The hormonal response to resistance exercise potentiates gains in muscle strength following training [1].

Previously reported that creatine (Cr) supplementation can be nutritional supplement for increasing strength, lean body mass and alters body composition [2]. The coordination between Cr supplementation and resistance exercise can be pivotal in enhancing hormonal response. It has been hypothesized that Cr induces hypertrophy through the endocrine mechanisms. To our knowledge, few studies investigated the effects of short term (e.g., 5 and 7 days) Cr supplementation on anabolic and catabolic hormones. For example, Volek et al. [3] compared testosterone and cortisol concentrations between Cr and placebo groups and found no Cr effect on endocrine status at immediately after-resistance exercise.

Exercise training has beneficial effects on cardiovascular system. Recently, attention has been given not only to the cardiovascular system benefits of regular physical training, but also to the effects resulting from acute exercise session. There were several data about the positive effects of resistance exercise in decreasing resting blood pressure [4]. Therefore, the purpose of this investigation was to examine the effects of 3, 5, and 7 days of Cr supplementation on resting testosterone and cortisol concentrations, systolic and diastolic blood pressure, heart rate, mean arterial pressure and rate pressure product in healthy human subjects.

Supplementation with Cr monohydrate can increase intramuscular phosphocreatine stores by about 25%, thus optimizing the resynthesis of adenosine triphosphate by the anaerobic alactic system. In addition, Cr supplementation leads to weight gain within the first few days, likely due to water retention related to Cr uptake in the muscle.

Moreover, during specific exercise conditions, the Cr supplementation exhibit significant increases in physiological and performance changes [2]. To our knowledge, the influence of resistance exercise with Cr loading on resting blood pressure and heart rate are unclear and no study directly compared resting testosterone and cortisol concentrations following 3, 5 and 7 days of creatine loading.

2. Methods**2.1. Subjects**

Twenty physical active males volunteered with informed consent to participate in this study, which had been approved by the ethic committee of the Center of Sport and Health Sciences at the University. Volunteers were free from musculoskeletal injury and had not taken any dietary supplement within the past 12 months. Volunteers were randomly assigned in a double-blind manner to a control or placebo group (Pl, $n = 10$; age 20 ± 1.1 y; weight 74.2 ± 4.8 kg; height 1.81 ± 0.07 m) and creatine investigation group (Cr, $n = 10$; age 21.5 ± 1.1 y; weight 74.6 ± 4.2 kg; height 1.78 ± 0.08 m). Volunteers were on their ordinary diet, not permitted to use nutritional supplementation, and did not consume anabolic steroids or any other anabolic agents known to increase performance.

2.2. Experimental design

One week prior to initiation of study, each participant was familiarized with the testing and resistance exercise procedures. Researchers clearly explained the purpose and procedures of the study to the participants who volunteered for the study. During this session, age (yr), height (m) and weight (kg) were determined. One week later, each participant was required to attend the laboratory on eight separate occasions, with the first visit for measurement of blood pressure and heart rate, testosterone and cortisol concentrations, respectively, and then six visits for completion

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