129 - EFFECTS OF LOW DOSE, SHORT-TERM CREATINE AND MALTODEXTRINE SUPPLEMENTATION DURING WINGATE TEST WITH VOLLEYBALL ATHLETES

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INTRODUCTION

Creatine is a compound naturally found in red meat, fish, and others aliments, besides being endogenously produced in small quantities by the organism. Creatine is composed by glycine, arginine and methionine, being that total creatine disposition in human body consist in free creatine and phosphocreatine (PCr) (WILLIANS AND BRANCH, 1998).

The creatine supplementation has the objective to augment the availability of both free creatine and phosphocreatine. The later is responsible, according to Willians and Branch (1998), by the energy release for ATP resynthesis, this system can be sustained about 5 to 10 seconds of maximum effort. The manner by which creatine supplementation act on the performance is not completely understood, being able to be explained by two reasons: 1) Increase of pre-exercise PCr availability, 2) increased rate of PCr resynthesis immediately after exercise (GREENHAFF, 1997). Related to this later factor, the same would be responsible for the improved performance in intermittent exercise (ROSSOW et al., 2000). On the other hand, the pre-exercise PCr availability doesn't seem to be related to a better performance in this same kind of exercise (MCKENNA et al., 1999).

One factor of extremely discussion is the strength gain through creatine supplementation with resistance training, and about how could be this action. Many explanations could justify the increase in strength after supplementation. One of them would be the acute effect of creatine, showing a less importance of training on the strength gains in the early phase (VOLEK et al., 1997). Other factor could be the increase in volume training, which can leading to an increase in fat free mass, and consequentially strength, if it would be maintained for several weeks (BURKE et al., 2003; VOLEK et al., 1997). The third explanation would be that creatine could act directly on muscle fiber hypertrophy (BURKE et al., 2003; VOLEK et al., 1997). According to Willoughby and Rosene (2001) such hypertrophy could be explained by the augmented synthesis of the heavy-chain myosin, in consequence of high-intensity training and supplementation.

Many studies have been carried out verifying the effects of traditional doses and short-term creatine supplementation on physical performance (DEUTEKOM et al., 2000; MENDES et al., 2004; KINUGASA et al., 2003; SNOW et al., 1998), however, there are few trials analyzing the short-term supplementation with lower doses (HOFFMAN et al., 2005; ROSSOUW et al., 2000; TARNOPOLSKY et al., 2001).

The aim of the present study is verify if a low-dose (5g/day) and short-term (7 days) creatine supplementation in conjunct with maltodextrine (30g/day), with volleyball athletes, has any effect on anaerobic performance during Wingate test of them.

METHODS AND PROCEDURES

Subjects

Seven male college athletes was recruited of Federal University of Parana Volleyball team, all of them reported championship participation, with sport experience. The same were divided in two groups, 4 subjects in the supplemented group (SG) and 3 subjects in the control group (CG) (TABLE 1). All subjects were physically healthy, without any musculoskeletal lesion or disease, during the tests periods. Any athletes reported been utilizing any kind of ergogenics or drugs during the current year. Both groups were instructed to maintain the training and feeding habits.

TABLE 1. Sample charactheristics

	SG (n=4)	CG (n=3)
Age (years)	20 ± 2	18.33 ± 1.15
Height (cm)	186. 48 ± 7.07	178.27 ± 6.31
Weight (Kg)	79.73 ± 9.75	70.13 ± 8.91

Experimental Design

The subjects reported to the performance laboratory on 2 occasions. In the first visit, an anamnese was applied to detect that the athletes did not utilize any ergogenics, and did not have any kind of lesion, beyond having sport experience, having participated of regional and local championships. After this procedure, anthropometrics measures were collected and the wingate test was applied, which was repeated 7 days later. Two groups were created in the first occasion: 1) One group that received the supplementation (SG), formed by 4 subjects; 2) and a control group (CG), formed by 3 subjects, which was advised to maintain the habitual food intake. Both groups were either instructed to maintain the daily habitual physical activity, did not realize any effort in the test day, and to didn't miss the trainings, which were three in the test-retest period. The tests were realized in the same time of the day.

Evaluations

Body mass and height were measured, utilizing a Plenna scale and a metric ribbon positioned in a vertical plain surface. The body mass was evaluated for each 0.1 Kg, and height was registered considering each centimeter.

For analyze the individual's body fat percentage, we used a scientific Cescorf skinfold caliper, with a precision of 0.01 mm. The 7 skinfold protocol of Jackson and Pollock (1978) was utilized to determination of body density, being the body fat percentage obtained by Siri equation. Three measures of each fold were collected and the median value was registered.

After the anthropometric evaluation, the athletes carried out the anaerobic Wingate test, with a 7.5% load of body weight. Before the test, each subject completed a warm-up period of 2 min. at a comfortable rate pedaling, determined by the own subject. To the ending of warm-up, the test was started and lasted 30 sec., where the subject pedaling in the maximum speed. The variables analyzed were Absolute Peak Power (APP), Relative Peak Power (RPP), and fatigue rate (FR). The subjects were instructed to continue pedaling for 3 min. more at a low rate after the test, just lowering heart rate. All subjects completed the tests.

Supplementation

The supplementation consisted of 5g creatine and 30g maltodextrine per day, during 7 days. The creatine monohydrate in capsule was utilized, being the last one of 1g each. For the correct ingestion of the supplements, the subjects received a kit separated by days, composed by 7 packages with 5 creatine capsules and other 7 packages with 30g of maltodextrine (measured at precision scale). The subjects were instructed to dissolve the maltodextrine in 200 ml of water, and also to consume both supplements 1 h before the beginning of trainings in the days that this later occurred, and when training

did not happen, the ingest would occur in the same time of the day. No information was given to the athletes during the evaluation period.

Statistical Analyses

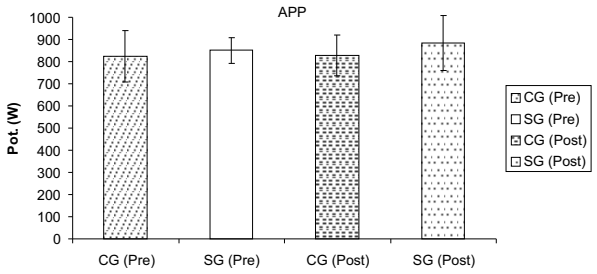
Descriptive analysis was employed to the sample characterization. For groups comparisons were utilized Mann Whitney analysis, and to compare pre and post values, a Wilcoxon test was used. The significance level was set at $p<0.05$.

RESULTS

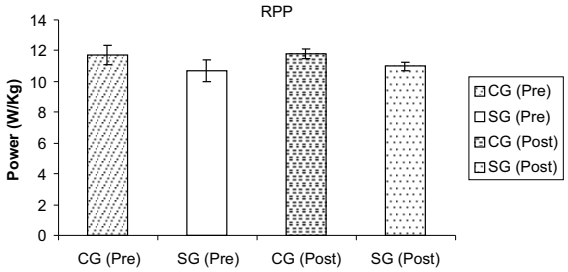
After 7 days of the study period, no significant differences were found in body weight, body fat percentage, and fatigue rate (TABLE 2). Also no significant differences were found in APP and RPP between groups and between pre and post conditions (GRAPHS 1 and 2). Although, there was a trend for a significant difference in RPP between groups in post-test condition, $p=0.057$. Any athlete reported adverse effects of creatine supplementation. All subjects were reevaluated on following day of the last supplementation day, and at the same time of the first test. Besides, all subjects completed all tests in both evaluations.

TABLE 2. Values of body mass, body fat (BF) percentage, and fatigue rate (FR) of both groups in pre and post-test conditions

	SG (Pre)	***SG (Post)***	***CG (Pre)***	CG (Post)
Body mass (Kg)	79.73 ± 9.75	80.40 ± 9.99	70.13 ± 8.91	70.40 ± 9.29
% BF.	9.28 ± 2.80	9.17 ± 2.45	8.64 ± 3.56	8.62±3.38
FR (%)	46.88 ± 3.83	46.46 ± 5.69	51.20 ± 1.80	49.63 ± 6.67



GRAPH 1. Absolute Peak Power at pre and post-test, in both groups. No significant differences were found.



GRAPH 2. Relative Peak Power at pre and post-test, in bouth groups. No significant differences were found.

DISCUSSION

The results showed no modifications on anthropometrics characteristics after supplementation, neither body mass or body fat percentage were significant altered in SG and CG. This findings are in agreements with others studies (HOFFMAN et al., 2005; ROSSOUW et al., 2000), which had verified no increase in body mass after low-dose, short-term creatine supplementation. However, another authors (TARNOPOLSKY et al., 2001; WILLOUGHBY AND ROSENE, 2001) found significant differences in body mass in consequence of creatine supplementation with similar doses, but a longer period.

In relation of performance, Mendes et al. (2004) verified no influence of creatine (20g/day 6 days) on swimmers, either in high-intensity and short-duration exercise, high-intensity and long-duration exercise, or intermittent exercise. Deutekom et al. (2000) also found no positive effects of creatine (20g/day 6 day) in rowers performance submitted to cycloergometer exercise. In the same way, many studies (KINUGASA et al., 2003; SNOW et al., 1998) using double-blinding methods showed no effect of short-term supplementation on athletes performance.

In spite of few studies verifying short-term supplementation (5 - 7 days) with low-doses creatine, our study are in accordance with what had been reported in the literature, where no positive effects on physical performance had been found. Being this later related to intermittent exercise (ROSSOUW et al., 2000), anaerobic power or resistance exercise (HOFFMAN et al., 2005), or, to strength gains (TARNOPOLSKY et al., 2001).

However, when the period of supplementation is short, but the doses are greater (20 30 g/day, 0.35/Kg/day), the results seems to be contradictory. Some studies showed positive effects of creatine on performance (MUJIKA et al., 2000; SKARE et al., 2001; ZIEGENFUSS et al., 2002), though others did not verify the same results, reporting no effect of supplementation on physical performance (DEUTEKOM et al., 2000; FINN et al., 2001; MENDES et al., 2004; KINUGASA et al., 2004; SNOW et al., 1998).

CONCLUSION

In conclusion, low-dose, short-term creatine and maltodextrine supplementation did not influence the Absolute and Relative Peak Power of the volleyball athletes during Wingate Anaerobic Test.

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EFFECTS OF LOW DOSE, SHORT-TERM CREATINE AND MALTODEXTRINE SUPPLEMENTATION DURING WINGATE TEST WITH VOLLEYBALL ATHLETES

Abstract: Low limb power is one of the most important requirements for a great performance in volleyball. Therefore, the importance of ergogenics use to increase anaerobic power is observed. **Objective:** Verify if creatine and maltodextrine supplementation, with low doses (5g and 30g respectively) and short-duration (7days), has positive effects on anaerobic performance. **Method:** Seven college athletes were recruited from the volleyball team of Federal University of Parana. Anthropometrics measures (body mass, height and body fat percentage), Absolute Peak Power (APP) and Relative Peak Power (RPP) during Wingate test were evaluated. After this, two groups were created, a supplementation group (SG) composed by 4 subjects and a control group (CG) with 3 subjects. The subjects were instructed to maintain the same habitual training and food intake. After the last day supplementation, all tests were repeated. The values were analyzed by the Mann Whitney test (comparisons between groups) and Wilcoxon test (comparisons between pre and post-test conditions). The significance level was set at $p<0.05$. **Results:** No significant differences were found in any of the study variables, neither in comparisons between groups nor in pre and post-test conditions. **Conclusion:** We conclude that the low-dose, short-term creatine and maltodextrine supplementation did not influence the Absolute and Relative Peak Power of the volleyball athletes during the Wingate test.

Key Words: Creatine supplementation, Wingate test, Absolute Peak Power, Relative Peak Power.

EFFETS DE LA SUPPLÉMENTATION DE CRÉATINE ET MALTO-DEXTRINE EN LE TEST WINGATE EN ATHLETES DE VOLLEY-BALL SUR UNE BRÈVE PÉRIODE DE TEMPS

Resumé: La puissance de les membres inférieurs c'est une de les plus importants conditions pour la bonne performance à le volley-ball. Alors, il y a vérifié la importance de la utilisation de les ressources ergogéniques pour augmenter la pouissance anaérobie. **Objectif:** Vérifier si la supplémentation de créatine et malto-dextrine, à la baisse dosage (respectivement 5g et 30g) et sur une durée de 7 jours, a effets positifs dans la pouissance anaérobie. **Méthode:** L'amostra se forme de 7 athlètes qui sont de l'equipe de volley-ball de la Universidade Federal do Paraná. Il y a été mesuré la masse corporelle, l'estatura et pourcentage de gras à l'équation de 7 DC de Jackson e Pollock (1978), bien aussi le maximum de puissance absolu (MPA) et relatif (MPR) dans le test Wingate. Après cette procédé, il y a sélectionné 4 sujets pour le groupe supplémenté (GS) et 3 sujets pour le groupe de contrôle (GC). Les groupes ont reçu des instructions pour maintenir la routine normal de entraînement et nourriture. Après le dernier jour de supplémentation les tests ont été répété. Les variables ont été analysé par les tests Mann-Whitney (comparaison entre les groupes GS et GC) et Wilcoxon (comparaison entre pré et pós supplémentation). Le niveau significatif a été $p < 0,05$. **Résultats:** Il n'y a pas difference significatif dans les variables analysées, soit la comparaison entre les groupes, soit la comparaison pré et pós supplémentation. **Conclusion:** La conclusion est que, dans cet échantillon, la supplémentation de créatine et malto-dextrine, à la baisse dosage et pendant une courte durée, il n'y a pas effet sur la pouissance absolue et relative vers le test Wingate.

Mots Clés : Supplémentation de créatine, test Wingate, maximum de puissance absolu, maximum de puissance relatif.

EFECTOS DE LA SUPLEMENTACIÓN DE CURTA DURACIÓN CON CREATINA Y MALTO DEXTRINA EN EL TEST DE WINGATE EN ATLETAS DE BALONVOLEA

Resumen: La potencia de miembros inferiores es uno de los principales requisitos motores para una buena performance en el balonvolea. Sabiendo eso, verifica-se la importancia de la utilización de recursos ergogênicos visando el aumento de la potencia anaerobia. **Objectivo:** Verificar si la suplementación con creatina y maltodextrina, con bajas dosis (5g y 30g respectivamente) y curta duración (7 días), posue efectos positivos sobre la potencia anaerobia. **Método:** La amuestra fue compuesta por 7 atletas masculinos de la equipo de balonvolea de la Universidad Federal del Paraná. Fueron aferidas medidas antropométricas (masa corporal, talla y % de grasa por la ecuación de 7 DC de Jackson y Pollock (1978)) y pico de potencia absoluta (PPA) y relativa (PPR) en el test de Wingate. Después eso procedimiento, fueron seleccionados 4 sujetos para el grupo suplementado (G1) y 3 sujetos para el grupo controle (G2). Los grupos recibieran instrucción para mantener la rutina normal de entrenamiento y alimentación. Después del último día de suplementación todos los testes fueron repetidos. Las variables fueron analizadas por los testes de Mann-Whitney (comparación entre los grupos G1 y G2) y Wilcoxon (comparación entre pré y pos suplementación). El nivel de significación utilizado fue de $p < 0,05$. **Resultados:** No fueron encuentradas diferencias significativas en ninguna de las variables del estudio tanto en la comparación entre los grupos cuanto en la comparación pré y pos suplementación. **Conclusión:** Puede-se concluir que, en esa amuestra, la suplementación de creatina y maltodextrina, con bajas dosis y curta duración no hubo influencia sobre la potencia absoluta y relativa en el teste de Wingate.

Palabras Claves: Suplementación de creatina, teste de wingate, pico de potencia absoluta, pico de potencia relativa.

EFEITOS DA SUPLEMENTAÇÃO DE CURTA DURAÇÃO COM CREATINA E MALTODEXTRINA NO TESTE DE WINGATE EM ATLETAS DE VOLEIBOL

Resumo: A potência de membros inferiores é um dos principais requisitos motores para uma boa performance no voleibol. Sabendo disso, verifica-se a importância da utilização de recursos ergogênicos visando o aumento da potência anaeróbica. **Objetivo:** Verificar se a suplementação de creatina e maltodextrina, com baixas dosagens (5g e 30g respectivamente) e curta duração (7 dias), possui efeitos positivos sobre a potência anaeróbica. **Método:** A amostra foi composta por 7 atletas masculinos da equipe de voleibol da Universidade Federal do Paraná. Foram aferidas medidas antropométricas (massa corporal, estatura e % de gordura pela equação de 7 DC de Jackson e Pollock (1978)) e pico de potência absoluta (PPA) e relativa (PPR) no teste de Wingate. Após esse procedimento, foram selecionados 4 sujeitos para o grupo suplementado (GS) e 3 sujeitos para o grupo controle (GC). Os grupos receberam instrução para manter a rotina normal de treinamento e alimentação. Após o último dia de suplementação todos os testes foram repetidos. As variáveis foram analisadas pelos testes de Mann-Whitney (comparação entre os grupos G1 e G2) e Wilcoxon (comparação entre pré e pós suplementação). O nível de significância utilizado foi de $p < 0,05$. **Resultados:** Não foram encontradas diferença significativas em nenhuma das variáveis do estudo tanto na comparação entre os grupos quanto na comparação pré e pós suplementação. **Conclusão:** Pode-se concluir que, nesta amostra, a suplementação de creatina e maltodextrina, com baixas dosagens e curta duração não teve influência sobre a potência absoluta e relativa no teste de Wingate.

Palavras Chaves: Suplementação com creatina, teste de wingate, pico de potência absoluta, pico de potência relativa.