3 - CARBOHYDRATE ACCUTE SUPPLEMENTATION IN WEIGHT TRAINING: A PILOT STUDY

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INTRODUCTION

Well balanced nutrition can contribute in the reduction of the fatigue, lesions, as well to optimize the deposits of energy and health from a subject [14]. However, not always it is possible the accomplishment of an appropriate diet making possible an abusive use of substances with objective of aprroving the athletic performance. Among those substances the nutritional supplements have been winning prominence along the last years, particularly among apprentices of physical activity that look for fast results, which many times the use is made without orientation or any control type.

Among the nutritional supplements more used in the academies or even for athletes of high income, the carbohydrate (CHO), mainly in the maltodextrina form, it has been assuming right highlights for the easy access and low cost. This way, CHO has been objective of countless researches, that it has pointing controversial results.

In long duration exercise with aerobic characteristics evidence are very clear, the ingestion of CHO after 2 hours of physical activity contributes to retaking of the glicemic levels close the initials values, which could contribute in the recovery and consequently improoving the subsequents physical activities[16].

In relation to intense activities and of short duration the discoveries are contradictory, while some studies showed positive effects [4,6,9] starting from the improvement of the acting in comparison with the group controls, other studies have been finding negative or no effects [10,13,15,21,21,23,24]. It is worth to stand out that the studies above mentioned were accomplished in different modalities, what hinders still one more understanding of the true effect of CHO in the different exercise intensities.

Exercises of high intensity and short duration use as source of energy the metabolism ATP-CP and the glucose originating from of the glycogen. The glycogen stored in the muscles works as the source predominant glucose during the first stages of the exercise as well as with increase of the intensity of the activity. The accentuated reduction of the hepatic and muscular glycogen during the exercise has been pointed as one of the factors that unchains the fatigue, when reducing the force that the muscle is capable to produce and its effectiveness in the accomplishment of the own movements of the activity physical done[16].

Athletes are not the only consumers of supplements, that habit is diffused more and more among the visitors of gyms that invest in substances that a lot of times are ignored the effect with the athletes' same objectives. It emphasized that most of the studies accomplished with ingestion of CHO has as sample individuals involved in several sporting modalities being few the studies that contemplate the muscular activity, it seems like this not to respect their particularities that it ends up excluding that modality that shelters many consumers of alimentary supplements.

This way, the purpose of this study was to analyze the effect of the acutte ingestion of CHO (60g.L-1 maltodrextrina) on the physical acting during a session of weight lifting training.

METHODS

Subjects

The subjects was composed by five individuals, male, with age of 25,6 ± 3,2 years, one of the criteria of selection of the subjects was previous experience in muscular activity of at least three times a week with more than 1 consecutive year and all were familiarized with the proposed exercises. After the participants being informed in full detail on the procedures to the which would be submitted the same signed the term of free and illustrious consent. This study was approved by the ethics commission in research of University of Medicine of UNICAMP.

Testing protocol

The maximum force was certain through the test of a maximum repetition (1 RM) in the exercises: elbow extension in the supine position (bench press), leg press 45° of inclination and flexing of elbows in the *Larry Scott* bank (arm curl), in this order. In the same day, before the training sessions the volunteers had their on weight checked.

The exercises were preceded by a warm up series (10 to 15 repetitions), with an approximate load of 50% of 1-RM. The training sessions were initiate soon after the warm up. The individuals were helped to take the position at the beginning in each exercises, since then having guided to execute two repetitions, when that fact happened to the load was increased for new attempt, if the volunteer didn't get to complete nor a repetition the load suffered a decrease before the next execution. The load registered like 1 RM was that which the individual got to just accomplish a single maximum voluntary contraction.

Experimental procedure

The experiments were accomplished in two sessions of weight lifting training, separate by three days. The sessions were always accomplished in the same schedule, and with control of the temperature (24°C). Both sessions consisted of the execution of four series in each exercise, with 80% of 1-RM to the voluntary exhaustion. The interval among the series was of two minutes and among the exercises of five minutes. After each series it was presented a table of subjective effort of Borg so that the volunteer determined the degree of difficulty after each stage.

The subjects were guided so that they tried to execute the maximum of possible repetitions in each one of the series to configured a functional incapacity to overcome the offered resistance. As happened when checking the maximum load, the individuals were helped so that they took the right position at the beginning in each exercise.

Supplementation protocol

The subjects involved in the study received a solution of carbohydrate (CHO) (60g.L-1-maltodrextrina, Probiótica®) or placebo (PL) (aspartame, Succamp®), both diluted in juice fruits of flavor orange. The solution of CHO or PL were ingested in the proportion of 5 ml.kg-1 15 minutes before the beginning of the tests. The ingestion was conduct as a double-blind model, randomized.

Statistical analysis

For the statistical analysis of the data the test of Wilcoxon was used for samples non parametric (Statistica® 5.1). The significant level adopted was $p<0,05$.

RESULTS

The number of repetitions accomplished in each series and the total sum of repetitions in the bench press, leg press 45° and arm curl in the supplemented condition with carbohydrate (CHO) or placebo (PL) they are presented in the table 1, 2 and 3, respectively.

Significant differences were not verified when compared the numbers of repetitions accomplished in each exercise series (1, 2, 3 and 4th series) in the condition supplemented with carbohydrate (CHO) and placebo (PL) in none of the exercises ($p>0,05$).

Table 1 - Number of repetitions accomplished in each series and the total sum of repetitions in the bench press, in the supplemented condition with carbohydrate (CHO) or placebo (PL). Values expressed in medium ± semi-width interquartile. (N=5)

Sujeitos	1º Série		2º Série		3º Série		4º Série		Ó SR	
	CHO	PL	CHO	PL	CHO	PL	CHO	PL	CHO	PL
1	12	8	9	8	6	6	5	5	32	27
2	19	19	8	11	6	8	5	6	38	44
3	11	10	7	6	5	4	4	4	27	24
4	11	12	7	7	6	6	4	5	28	30
5	12	14	8	8	6	6	5	4	31	32
Md	12	12	8	8	6	6	5	5	31	30
SAI	± 1	± 2	± 1	± 1	± 1	± 1	± 1	± 1	± 2	± 2

ÓSR = sum of the series; Md = medium; SAI = semi-width interquartile.

Significant difference was not verified when compared the total number of repetitions in the bench press, in the supplemented condition with carbohydrate (CHO) and placebo (PL) ($p>0,05$).

In the same way, no significant difference was observed in the total number of repetitions in the exercise leg press 45°, in the supplemented condition with carbohydrate (CHO) and placebo (PL) ($p>0,05$). It is worth to stand out that, the leg press 45° exercise was what presented the largest number of repetitions for all the subjects, even with the use of equal relative load (80% of 1 RM).

Table 2 - Number of repetitions accomplished in each series and the total sum of repetitions in the exercise leg press 45°, in the supplemented condition with carbohydrate (CHO) or placebo (PL). Values expressed in medium ± semi-width interquartile. (N=5)

Sujeitos	1º Série		2º Série		3º Série		4º Série		Ó SR	
	CHO	PL	CHO	PL	CHO	PL	CHO	PL	CHO	PL
1	14	14	13	15	12	11	11	11	50	51
2	16	14	10	9	8	6	7	6	41	35
3	15	15	7	9	5	8	5	4	32	36
4	20	26	17	22	15	18	13	14	65	80
5	17	12	14	12	12	12	12	11	55	47
Md	16	14	13	12	12	11	11	11	50	47
SAI	± 1	± 1	± 2	± 3	± 2	± 2	± 2	± 2	± 7	± 7

ÓSR = sum of the series; Md = medium; SAI = semi-width interquartile.

Table 3 - Number of repetitions accomplished in each series and the total sum of repetitions in the arm curl exercise, in the supplemented condition with carbohydrate (CHO) or placebo (PL). Values expressed in medium ± semi-width interquartile. (N=5)

Sujeitos	1º Série		2º Série		3º Série		4º Série		Ó SR	
	CHO	PL	CHO	PL	CHO	***PL***	CHO	PL	CHO	PL
1	10	11	10	8	8	6	8	5	36	30
2	12	12	8	9	4	5	5	5	29	31
3	11	8	6	7	5	5	4	4	26	24
4	18	22	14	14	11	12	11	10	54	58
5	15	15	11	11	5	7	5	5	36	36
Md	12	12	10	9	5	6	5	5	36	31
SAI	± 2	± 2	± 1	± 1	± 1	± 1	± 1	± 1	± 3	± 3

ÓSR = sum of the series; Md = medium; SAI = semi-width interquartile.

When compared the total number of repetitions in the arm curl exercise, in the supplemented condition with carbohydrate (CHO) and placebo (PL) ($p>0,05$) any significant difference was not verified ($p>0,05$).

DISCUSSION

The objective of the present study was to verify the influence of the sharp ingestion of CHO (60g.L-1 maltodrextrina) on the physical acting during a session of weight lifting training, in order to explain possible controversies as the efficiency of this supplement in this activity type that is very used in gyms.

Starting from the findings of the present study any significant change was not verified among the results obtained in the different experimental conditions (CHO vs PL). What could be explained at least partly for the exhaustion protocol that maybe has not been enough to exhaust the stocks of intramuscular glycogen, turning the dispensable ingestion of CHO, that is also evidenced by the number of exercises and for its duration, that was smaller than 40 minutes. To sustain that statement another study accomplished in similar time and that it showed the inefficiency of the ingestion of CHO, on the other hand, studies that used activities with superior time presented positive results when suplementados with CHO[12,18,20]. Important to emphasize that the time of execution cannot be the only factor being considered since the intensity of the exercises is also important, as this it was already known as maximum the only measurable variable was the time of duration of the sessions. Differences in the diet might also have influenced the found results as well as its understanding5, once the ingestion of CHO was not controlled before the tests.

CONCLUSION

The results of the present study demonstrated that the acutte ingestion of CHO (60g.L-1 maltodrextrina) was not capable to improve the performance in weight lifting exercises. Two factors might have influenced the results, the exhaustion protocol used might have been insufficient to decrease the glycongen stores, so much for the reduced number of exercises as for the short time of duration; and the lack of control of the ingestion of CHO before the muscular activity sessions. Finally, it is necessary a larger number of studies that investigates the effect of the ingestion of CHO during the weight lifting training, with intention of still explain some doubts existent in relation to a quite common habit in gyms.

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ACUTE CARBOHYDRATE SUPPLEMENTATION IN WEIGHT TRAINING: A PILOT STUDY
ABSTRACT

The purpose of this study was to analyze the effect of the acute ingestion of CHO on the physical acting during a session of weight lifting training. The subjects of this study were five individuals with 25,6 ± 3,2 years, that were submitted to two sessions of training with three exercises separated by three days. Both sessions consisted of the execution of four series in the intensity corresponding to 80% of 1-RM in the exercises, bench press, leg press 45° and arm curl, until the voluntary exhaustion. The interval among the series was of two minutes and five minutes among the exercises. The supplementation was conducted as double-blind model and randomized, where the ingestion of CHO (60g.L^{-1} maltodrextrina) or placebo (PL) (aspartame) accomplished in the proportion of 5ml.kg^{-1} occurring 15 minutes before the start of each session of weight lifting training. For the statistical analysis the test of Wilcoxon was used for non parametric samples, with level of significant of p=0,05. With our findings it can be observed that the ingestion of CHO didn't improve the performance in weight lifting training.

Keywords: supplementation; carbohydrate; weight training.

HYDRATE DE CARBONE AIGU SUPPLÉMENT EN FORMATION DU POIDS: UNE ÉTUDE PILOTE
RÉSUMÉ

Le but de cette étude était analyser l'effet de l'ingestion aiguë de CHO sur le suppléant physique pendant une session de formation de l'haltérophilie. Les sujets de cette étude étaient cinq individus avec 25,6 ± que 3,2 années qui ont été soumises à deux sessions de former avec trois exercices sont séparées d'ici trois jours. Les deux sessions ont consisté en l'exécution de quatre séries dans l'intensité qui correspond à 80% de 1-RM dans les exercices, presse de banc, jambe presse 45° et boucle du bras, jusqu'au épuisement volontaire. L'intervalle parmi la série était de deux minutes et cinq minutes parmi les exercices. Le supplément a été mené comme modèle d'aveugle double et a randomisé, où l'ingestion de CHO (60g.L-1 maltodrextrina) ou placebo (PL) (aspartame) accompli dans la proportion de 5ml.kg-1 qui a lieu 15 minutes avant le début de chaque session de formation de l'haltérophilie. Pour l'analyse statistique l'épreuve de Wilcoxon a été utilisée pour non échantillons paramétriques, avec niveau de considérable de p=0,05. Avec nos conclusions il peut être observé que l'ingestion de CHO n'a pas amélioré la performance dans formation de l'haltérophilie.

Mots-clé: supplément; hydrate de carbone; formation du poids.

SUPPLEMENTACION AGUDA EL HIDRATO DE CARBONO EN EL ENTRENAMIENTO DE PESO: UN ESTUDIO MODELO
RESUMEN

El propósito de este estudio era analizar el efecto de la ingestión aguda de CHO en la acción física durante una sesión de entrenamiento del levantamiento de pesas. Los sujetos de este estudio eran cinco individuos con 25,6 ± que 3,2 años que se sometieron a dos sesiones de entrenar con tres ejercicios separaron por tres días. Ambas sesiones consistieron en la ejecución de cuatro serie en la intensidad que corresponde a 80% de 1-RM en los ejercicios, la prensa del banco, la pierna prensa 45° y rizo del brazo, hasta el agotamiento voluntario. El intervalo entre la serie era de dos minutos y cinco minutos entre los ejercicios. El supplementacion se dirigió como doble-deslumbre a modelo y aleatorizó, dónde la ingestión de CHO (60g.L-1 maltodrextrina) o placebo (PL) (el aspartame) cumplido en la proporción de 5ml.kg-1 que ocurre 15 minutos antes de la salida de cada sesión de entrenamiento del levantamiento de pesas. Para el análisis estadístico la prueba de Wilcoxon se usó para el las muestras non paramétricas, con el nivel de significante de p=0,05. Con nuestros resultados puede observarse que la ingestión de CHO no mejoró la actuación en el entrenamiento del levantamiento de pesas.

Las palabras claves: el supplementacion; el hidrato de carbono; el entrenamiento de peso.

SUPLEMENTAÇÃO AGUDA DE CARBOIDRATO NO TREINAMENTO DE MUSCULAÇÃO: UM ESTUDO PILOTO
RESUMO

O propósito deste estudo foi analisar o efeito da ingestão aguda de CHO sobre o desempenho físico durante uma sessão de treinamento de musculação. Fizeram parte do estudo 5 indivíduos, do sexo masculino, com idade média de 25,6 ± 3,2 anos, que foram submetidos a duas sessões de treinamento de musculação distintas, separados por três dias. Ambas as sessões consistiram na execução de 4 séries na intensidade correspondente a 80% de 1-RM nos exercícios, supino regular, *leg press* 45° e rosca *Scott,* até a exaustão voluntária. O intervalo entre as séries foi de 2 minutos e entre os exercícios de 5 minutos. A suplementação foi conduzida a partir de modelo duplo-cego, randomizado onde e ingestão de CHO (60g.L^{-1} maltodrextrina) ou placebo (PL) (aspartame, Succamp®), foi realizada na proporção de 5 ml.kg^{-1} 15 minutos antes do início de cada sessão de treinamento de musculação. Para a análise estatística foi utilizado o teste de Wilcoxon para amostras não paramétricas, com nível de significância de p=0,05. A partir dos resultados encontrados pode-se observar que a utilização de CHO não melhorou significativamente o desempenho dos sujeitos na execução das séries de exercícios de musculação.

Palavras-chaves: suplementação; carboidrato; treinamento de musculação.