25 - ANALYSIS OF THE CAFFEINE'S ERGOGENIC EFFECT IN ATHLETES OF AMATEUR FOOTBALL (SUB-18) FROM KRAC TEAM FOOTBALL CLUB (PI), SUBMITTED TO AEROBIC TEST.

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INTRODUCTION

With the goal to achieve a sporting success of high level, coaches, nutritionist, doctors and scientists have adopted a lot of ergogenics resources, aiming to potentiate the performance or to attenuate the mechanisms which generate fatigue in their athletes. (MAUGHAN, 1999).

Ergogenic resources can be defined as substances used to increase physical potential, mental strength and mechanic efficiency. These resources can be in different types, mechanics (or biomechanics), psychological or nutritionals (GARRET; WILLIAM; KIRKENDALL, 2003).

For many people, caffeine makes parts of daily routine, today, probably it is the most used stimulant drogue in the entire world. Caffeine acts in different tissues of our body, causing many physiologic changes, among them can be emphasized the stimulation of Central Nervous System (CNS), the Skeletal Muscle System, cardiac and also the excretion of different hormones. (MAUGHAN; BURKE, 2004).

Caffeine also can participate of the fatigue's decrease in exercises and can present diuretics effects. The reduction of stimulus of insulin's liberation caused by caffeine, inhibits the activity of the synteasis glycogen, generating a lesser consume of glucose by the skeletal muscle in activity. As a result, occur the economy of glycogen, cause there is an increase of fat's oxidation and reduction of carbohydrates' oxidation, prolonging the tolerance to effort, while the increase of the plasmatic cateolamines concentration, reduces the hydration and increases the urinary volume during and after the prolonged exercise. (ALTIMARI et al., 2006).

In 2004, caffeine was put out from the not allowed substances, by the Anti-doping World Agency (WADA), what influenced the significant increase on the use of this substance by professional and amateur athletes. However is necessary to take some cares due to the use of this ergogenic substance, because the wrong ingestion can contribute to the appearance of collateral effects that would be able to influence negatively the athlete performance. (ALTIMARI et al., 2005).

In sporting disputes, mainly among amateur athletes, caffeine's use occur in a in discriminated way. Since an express coffee, to an energetic (generally added to another caffeine drink), in competitions not assisted by WADA, athletes and coaches without any information about dosage, defend caffeine ingestion as a stimulant.

The caffeine's effect as a stimulant is too controversial. Despite that lot of studies prove the drogue's effect; the anti-doping agencies do not see caffeine as significant in the final results of competitions. So, the consume of caffeine in sports, if does not obtain success as physiological improver, obtains as psychological stimulant.

In the northeast football context, is not possible to observe clearly the right use of caffeine. In many cases of caffeinated drinks such as: energetic, tea and own coffee, are used to obtain the stimulant effect caused by caffeine. Generally when they make ingestion of these drinks, the athletes do not consider dose, absorption time and diet. The use with conscious of caffeine (considering that it is a measure that hardly cause collateral effects and has low cost) could benefit, in punctual situations, the athletes from northeast and from other places which do not have financial resources enough to obtain a possible improvement on the teams income.

The discussion about caffeine, in science camp, contributes positively for sport, or giving support, or discouraging its use in these competitive environments. With the wish of the best performance, athletes and technical commissions are always disposed to achieve alternatives that could improve the income. In the specific case of caffeine, in a professional context, is applied to scientists, the task of contributing with tests and researchers, turning clear caffeine's action mechanisms (a tolerated substance) and its effects to base the decision of the actors cited above and like this to contribute with sport evolution.

In the present study, we analyzed statistically if there are differences of income in individuals that practice endurance activities (amateur football) submitted to aerobic tests (2400 meters) with and without caffeine. The sub-18 athletes were submitted to three steps of tests: anthropometric, with supplementation and without supplementation.

MATERIALS AND METHODS

Sample

The sample was constituted by fifteen athletes of male sex, of amteur football (sub-18) (KRAC-PI). They were selected voluntarily to participate of the study. The individuals had frequency of training of two to three times per week. Initially all they were submitted to a soon lecture about the present methodology. The subjects, already clarified about the purposes of this study and the procedures that would be submitted, they signed a term of free consent and clarified.

Experimental study

All the subjects executed three evaluations: the first one was anthropometric (height and weight) and the other ones were indirect tests of maxim aerobic resistance (max. VO2), supplemented and none supplemented. The protocol of the indirect max. VO2 was the Cooper 2400, extracted from Fernandes Filho (1999), where the evaluated person runs (preferably) and/or walking a distance of 2400 meters in the least time possible. The result is the time of the covered distance in minutes, transformed in seconds. From the time, was executed the indirect estimative of Oxygen consume, through the formula:

$$\text{Max VO2.} = \frac{(2400 \times 60 \times 0{,}2) + 3{,}5}{t(s)}$$

Where “t” represents the time in seconds and Max VO2 is given in $ml(KG.\ min)^{-1}$.

The interval adopted among tests was one week. Individuals received a list with caffeinated foods and they were advised to not make ingestion during the period of study evolution, and also to extenuation activities 24 hours before tests. Individuals were evaluated in the period between 16 and 17 hours (day) to minimize the effects of diurnal biologic variation.

Analysis Place

The study was subdivided into two steps: first one is composed by two phases and second one is composed by one phase. The tests were executed in an athletic track (400 meters), inside Piauí Federal University's dependences.

PROCEDURES

First step

The study's first phase was constituted of an anthropometric evaluation of height, weight and age, in accordance with the protocols described by Fernandes Filho (1999). The equipment used to measure height and weight, was a Soehnle 7755 professional balance, with 100 grams of precision, with weight measurer included Asimed, with minimum weight of 95 centimeters. The equipment has maxim capacity of 200 kilograms to height and 230 centimeter to weight.

For the second phase, was realized stretching of lower and higher members and a soon warm-up, and right after the indirect test of Maxim consume of Oxygen (Max VO2) without supplementation.

Second step

After this, in the third and last phase, athletes effected an stretching (lower and higher members) and a soon warm-up, then were submitted again to the test of Maxim consume of Oxygen (Max VO2), in accordance with the same protocol (Cooper of 2.400m) applied in the previous phase. However, for this phase, individuals received a caffeine supplementation, 60 minutes before the test, in double-blind with caffeine group (CG=09) and placebo starch (PG=0).

Caffeine's Administration

One hour before the test of third phase, were offered capsules with caffeine or placebo (starch). During this period the athletes executed stretching and a soon warm-up without distinction of groups. For each athlete from caffeine group was offered a capsule containing 5mg/kg of caffeine and each athlete from placebo group received a capsule containing starch (5mg/kg) only. They were instructed to ingest the capsules, if necessary, just with water.

Statistic treatment

The results were expressed on average and (±) standard deviation. The comparatives analysis were executed through the Test t of Student, when compared two variables and ANOVA one way, when compared more than two variables ($p<0,05$) for the pre and post supplementation tests and caffeine and placebo groups. Were executed comparisons between anthropometrics measures and the obtained values with caffeine and placebo group, what amplified study's discussion. Data were analyzed by the Graph PadPrism 5.0 statistic program.

RESULTS

The table 1 shows the participants' anthropometric characteristics, where we can observe the group with age average (standard deviation) of 15,8 years (± 0,9), 63,0 kg (± 7,5) of corporal mass, and 1,75m (± 0,07) of height.

TABLE 1. Average (± SD) of height, weight and age of the subjects.

	Height (m)	Weight (kg)	Age (years)
Average	1,75	63	15,8
Standard Deviation	± 0,07	± 7,5	± 0,9

The table two identifies anthropometric measures of subjects from caffeine and placebo groups. Was proved with theses data, that placebo group when in comparison is formed by people, on average, lower and lighter than caffeine group, while about age, both are similar.

TABLE 2. Average (± SD) of height, weight and age of the caffeine group and the placebo group.

	Caffeine Group (CG)			Placebo Group (PG)		
	Height (m)	*Weight (kg)*	*Age (years)*	*Height (m)*	*Weight (kg)*	*Age (years)*
Average	1,71	59,2	15,8	1,78	65,6	15,8
Standard Deviation	± 0,07	± 6,7	± 1,2	± 0,06	± 7,2	± 0,8

On the table 3 are showed the values, on average and standard deviation of maxim volume of oxygen, achieved by the subjects with the first test (none supplemented) and with the second test (supplemented) in ml $(kg.min)^{-1}$, without distinction of groups. On this table, was noticed a little improvement from the first to the second test of 2ml $(kg.min)^{-1}$. However, this difference was not statistically significant.

TABLE 3 VO2max.: first and second test (given in ml/kg/min^{-1}).

	Max VO_2 (test 1)	Max VO_2 (test 2)
Average	42	44
Standard Deviation	± 3,1	± 3,9

The table 4 presents the averages and standard deviation of Max.VO2 of individuals with the two tests, first one without any supplement and second one with application of capsules (caffeine or placebo-starch) and CG (caffeine group), but one more time the differences that were found, were not statistically significant.

TABELA 4, Max VO_2. GP and GC, in both tests (given in ml/kg/min^{-1}).

	First test (not supplemented)		Second test (supplemented)	
	Placebo Group	*Caffeine Group*	*Placebo Group*	*Caffeine Group*
Average	42,7	41,6	44,7	43,6
Standard Deviation	± 3,4	± 3,0	± 4,6	± 3,5

These results evidence that placebo group, in the first test, achieved the maxim volume of oxygen, with a little advantage on the caffeine group, and remaining like this in the second test, about 0,9 ml $(kg.min)^{-1}$ more, however this difference

was not statistically significant.

DISCUSSION

The objective of the present work was to verify If caffeine can purpose some ergogenic effect on the aerobic capacity of amateur football athletes, sub-18, submitted to 2400m test. With this context, aerobic capacity is indispensable to have a good income, cause the development of the specific physical capacities is extremely important, because these capacities work as a support for a future technical individual development, putting the athlete in a right performance of his tactics functions of game (FONSECA, 2004). However, the analysis of this investigation, show that ingestions of caffeine capsule containing 5mg/kg has the same efficiency that placebo capsules with 5mg/kg of starch for this category. It can be explained due the fact that, on average, the little improvement obtained by integrants from caffeine group, is similar when compared to the improvement obtained by participants from placebo group, 2ml (kg.min)-1, as observed on table 4, as the improvement observed comparing the first with the second test, without distinction of groups, (table 3). Is important to remember that the improvement cited must be interpreted as a tendency, cause the income's increase was not statistically significant.

The research demonstrated that in these tests, the ergogenic factor was not caffeine, cause its improvement was equal to the improvement purposed by placebo, but possibly the psychological capsule's effect. When compared the supplemented and none supplemented test, the participants obtained an increment on their cardiorespiratory capacity in 2 ml (kg.min)-1 to both groups. Thus, the results of placebo and caffeine groups remain equals to improvement of income.

Although the fact that caffeine and placebo groups had similar incomes, the average of Max.VO2 of the placebo group was relatively upper to caffeine group in the first test until the second one (table 4). This phenomenon can be explained by the fact the majority of individuals from placebo group belongs to positions that need a more developed aerobic capacity, due to the functions that they practice on camp. The placebo group is formed by two laterals, two middle-camps, one defender and one attacker, while caffeine group was formed by four defenders, two goalkeepers, one middle-camp and one attacker. The difference of aerobic income varies in accordance with the specific physiological characteristics to football; the positions also presents physiological characteristics and demands differenced, that varies with the rate of work in each position (BARBANTI, 1996).

CONCLUSION

The evidences of caffeine's ergogenic effect on the performance in exercises of middle and long duration are too controversial. Thus, is necessary to take some cares about the use of this substance, cause although in this study 5mg/kg of caffeine dis not caused deleterious effects on this group, the wrong ingestion, mainly in high quantities, can contribute to the appearance of collateral effects, which can negatively influence the athletic perform.

In this study, placebo group achieved a better performance when compared with caffeine group, from the first until the second test. Then best performance of PG shows just a little inclination of this group to a better performance, cause was not detected difference between the groups, it means that in the statistic analysis, the groups had similar performances and improvements. In relation to the test of 2400m, with amateur athletes, the results suggest that caffeine's use purposes, as with placebo, a little improvement on the efficiency of the performance associated to psychological effect of the ingestion of a supposed supplement, but this efficiency is not statistically significant. The tolerance which the athletes have to caffeine, can have contributed for the less efficiency of caffeine as an ergogenic factor, cause the daily nutrition of the athletes was not controlled but just informed, thus these athletes can have, trhough daily consume, obtained the drug's saturation. With this, the supplementation with low dosage (5mg/kg) loses its acute effect, as with this studied case.

The improvement of performance, provided by caffeine, can be also influenced by the level of physical fitness. In the present research another factor which can have influenced the result was volume of physical activity practiced by the evaluated. The athletes are amateurs, so, the volume of physical activity considered, was what the athlete confirmed, however, although they had been instructed to avoid intensive efforts, mainly during the 24 hours before tests, some athletes can have executed intensive activities for other football academies, what certainly can have influenced on their performance.

In this study, the research conditions were not favorable. The extra-tests factors, were too hard to be controlled, mainly in relation to the evaluated participants, cause during the study was not possible to observe all the nutritional case of the athletes, their week repose that preceded each test, the daily ingestion of caffeine, during the period. These situations were just advised by a collaborator nutritionist and by the researchers, but there was not an monitoring on the athlete's routine.

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ANALYSIS OF THE CAFFEINE'S ERGOGENIC EFFECT IN ATHLETES OF AMATEUR FOOTBALL (SUB-18) FROM KRAC TEAM FOOTBALL CLUB (PI), SUBMITTED TO AEROBIC TEST.

ABSTRACT

This study had as objective to analyze the caffeine's ergogenic effect in football amateur athletes (sub-18) from KRAC football club (PI) submitted to aerobic test of 2400 meters. Were evaluated fifteen athletes with ages between 15 and 18 years old, in two tests: the first one without supplementation and second one with caffeine supplementation. In the first test, all they executed the 2400m test without distinction among groups; and in the second test all they were distributed between caffeine (CG)

and placebo (PG) groups. Were evaluated the anthropometric measures of weight, height and position that each athlete uses to act, and finally the aerobic tests (without and with supplement, respectively) with intervals of one week among tests. Tests were executed in the athletics track from Piauí Federal University, which has 400 meters in length and six lanes of width. Among the searched athletes, placebo members (n=6) obtained better results than caffeine members (n=9), while in relation to the tests without supplementation, both of groups achieved the same evolution of maxim oxygen's volume, but this little difference was not statistically significant, cause aims just a tendency of athletic improvement with the use of caffeine supplement, as placebo (starch) use. The adopted supplementation was 5mg/kg, based on athletes' weight average obtained through anthropometric evaluation executed before aerobic tests. This study concluded that with all this aspects, caffeine did not influence significatively the athletes' income for the improvement of maxim oxygen volume (VO2max). Was observed just a little tendency of improvement to both groups (caffeine and placebo), from none supplemented to the supplemented test.

KEY-WORDS: Caffeine; Amateur athletes; Aerobic test.

ANALYSE DE L'EFFET ERGOGÉNIQUE DE LA CAFÉINE DANS LE FOOTBALL AMATEUR (MOINS DE 18 ANS) DE L'ÉQUIPE KRAC FOOTBALL CLUB (PIAUI) SOUMIS À UN TEST AÉROBIQUE

ABSTRAIT

Cette étude a tenu comme but d'analyser l'effet ergogénique de la caféine sur les athlètes de football amateur (ayant moins de 18 ans) du KRAC Football Club (Piauí) soumis au test aérobie de 2400 mètres. Nous avons évalué quinze joueurs âgés entre 15 et 18 ans dans deux essais : un avec une supplémentation de caféine et autre sans supplémentation. Au début, tous les participants ont fait le test de 2400 mètres sans distinction entre les groupes, dans le second test, les athlètes ont été répartis entre le groupe de caféine (GC) et le placebo (GP). A cette phase, nous avons pris des mesures anthropométriques de poids, la taille et l'âge et la position où chaque joueur occupe normalement et enfin les tests aérobie (avec et sans supplément, respectivement) avec une semaine d'intervalle entre les tests. Les tests ont été effectués sur la piste de course à l'Université fédérale de Piauí (UFPI), qui mesure 400 mètres de long et six voies de large. Parmi les athlètes recherchés, les membres du groupe placebo (n = 6) ont obtenu des résultats similaires au groupe caféine (n = 9). En ce qui concerne les tests sans supplémentation et avec supplémentation les deux groupes n'ont pas obtenu l'évolution de la consommation maximale d'oxygène statistiquement significative, c'est à dire, les résultats indiquent seulement une tendance à l'amélioration athlétique avec l'utilisation d'un complément présumés, indépendamment de sa composition (la caféine ou l'amidon). Le supplément utilisé a été 5 mg/kg, en fonction du poids moyen des athlètes obtenus par des tests anthropométriques, avant le test aérobie. L'étude a conclu que, en général, la caféine n'a pas affecté significativement la performance des athlètes dans l'amélioration de l'absorption maximale d'oxygène (VO2max.), nous avons observé une légère tendance à l'amélioration à ainsi que pour le groupe caféine comme pour le groupe placebo (l'amidon), de test non supplémenté pour le test supplémenté.

MOTS-CLÉS: caféine, athlètes amateurs, test aérobie.

ANÁLISIS DEL EFECTO ERGOGÉNICO DE LA CAFEÍNA EN EL FÚTBOL AMATEUR (MENORES DE 18 AÑOS) DEL EQUIPO KRAC FÚTBOL CLUB (PIAUÍ) SUJETADOS A UNA PRUEBA AERÓBICA

RESUMEN

Este estudio tuvo como objetivo analizar el efecto ergogénico de la cafeína en los deportistas de fútbol amateur (menores de 18 años) del KRAC Fútbol Club (Piauí), sujetados a la prueba aeróbica de 2400 metros. Hemos evaluado quince jugadores con edades comprendidas entre 15 y 18 años en dos pruebas: un sin suplementos y otro con suplementos de cafeína. Al principio, todos los participantes cumplieron una prueba de 2400 metros, sin distinguir entre los grupos, en la segunda prueba, los atletas se repartieron entre el grupo cafeína (GC) y el grupo placebo (GP). En esta etapa se tomó las medidas antropométricas de peso, talla y edad y la posición en la que cada jugador actúa normalmente y, finalmente, las pruebas aeróbicas (con y sin suplemento, respectivamente) con un intervalo de una semana entre las pruebas. Las pruebas se realizaron en la pista de atletismo de la Universidad Federal de Piauí (UFPI), que mide 400 metros de largo y seis carriles. De los deportistas encuestados, los miembros del grupo placebo (n = 6) obtuvieron resultados similares a del grupo cafeína (n = 9). Con respecto a las pruebas sin suplemento y con suplemento los dos grupos no presentaron evolución de consumo máximo de oxígeno estadísticamente significativa, es decir, los resultados indican sólo una tendencia hacia la mejoría atlética con el uso de un suplemento presunto, con independencia de su composición (cafeína o almidón). El suplemento utilizado fue de 5 mg/kg, basado en el peso promedio de los atletas obtenidos por mediciones antropométricas y exámenes antes de las evaluaciones aeróbicas. El estudio concluyó que, en general, la cafeína no afectó significativamente el rendimiento de los atletas para mejorar la captación máxima de oxígeno (VO2máx.), se observó una ligera tendencia de mejora, tanto para el grupo cafeína como para el grupo placebo (almidón), de las pruebas sin suplemento para lo con suplemento.

PALABRAS CLAVE: atletas, cafeína, amateur, prueba aeróbica.

A ANÁLISE DO EFEITO ERGOGÊNICO DA CAFEÍNA EM ATLETAS DE FUTEBOL AMADOR (SUB-18) DA EQUIPE DO KRAC FUTEBOL CLUBE (PI) SUBMETIDOS A UM TESTE AERÓBICO

RESUMO

Este estudo teve como objetivo analisar o efeito ergogênico da cafeína em atletas de futebol amador (sub-18) do KRAC Futebol Clube (PI) submetidos ao teste aeróbico de 2400 metros. Foram avaliados quinze atletas com idade entre 15 e 18 anos, em dois testes um sem suplementação e outro com suplementação de cafeína. A princípio, todos os participantes realizaram o teste de 2400 metros sem distinção entre grupos no segundo teste os atletas foram distribuídos entre os grupos cafeína (GC) e placebo (GP). Nesta etapa foram aferidas as medidas antropométricas de peso, altura e idade e a posição em que cada atleta costuma atuar e por fim os testes aeróbicos (sem e com suplemento, respectivamente) com intervalo de uma semana entre testes. Os testes foram realizados na pista de atletismo da Universidade Federal do Piauí (UFPI), a qual tem 400 metros de comprimento e seis raias de largura. Dos atletas pesquisados, os integrantes do grupo placebo (n=6) obtiveram resultados semelhantes aos integrantes do grupo cafeína (n=9). Com relação aos testes sem suplementação e com suplementação os dois grupos não obtiveram evolução do consumo máximo de oxigênio estatisticamente significativa, ou seja, os resultados apontam apenas uma tendência de melhora atlética com o uso de um suposto suplemento, independente da sua composição (cafeína ou amido). A suplementação adotada foi de 5 mg/kg, baseada na média de peso dos atletas obtida através da avaliação antropométrica antes dos testes aeróbicos. O estudo concluiu que de forma geral, a cafeína não influenciou significativamente o rendimento dos atletas para melhora do consumo máximo de oxigênio (VO2máx.), observou-se apenas uma leve tendência de melhora tanto para o grupo cafeína quanto para o grupo placebo (amido), do teste não suplementado para o teste suplementado.

PALAVRAS-CHAVE: Cafeína; atletas amadores; teste aeróbico.