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NUTRICIONAL EVALUATION IN PROFESSIONAL MMA ATHLETES

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ABSTRACT

Therefore, nutrition is an extremely important variable that must be controlled in the daily lives of fighters. MMA competitions have been gaining an enormous repercussion in the media and have become increasingly more competitive. Several nutritional strategies are capable of interfering in the performance of the athletes, particularly the inadequacies of diet can harm athletic performance. Because MMA will be an interesting sport for the evaluation of the effects of an inadequate diet, the goal of this study is to perform a nutritional evaluation with 6 professional male athletes (age 31.5 +/- 10.0, height 177cm +/- 8.6, weight 78.6kg +/- 7.9, BMI of 23.5 +/- 0.7, fat free mass of 62.0kg +/- 7.0 and fat mass 9.0kg +/- 2.0) regarding the caloric value of diet and macronutrient consumption. The results were obtained from professional athletes with a daily caloric intake for 2.271kcal and 29.9kcal/kg/day. The carbohydrate intake was 221.6g per day and 2.8g/kg. The protein intake was 180g and 2.3g/kg. The fat intake was 55g and 0.71g/kg. An elevated protein consumption was noted, which could be reduced to generate an increased consumption of carbohydrates and fats, because the results show a low consumption of both carbohydrates and fats. The inadequate profile of macronutrient intake could be due to the lack of knowledge of the athletes about the subject and the lack of professional advice or consultation. Thus, it seems to us that the introduction of surveys about the basic knowledge of nutrition for these athletes is needed for the success of the implementation of changes in their diets, as well as, it was also clear that the athletes of our sample could increase their percentage intake of carbohydrates and fats by reducing proteins.

Key words: Nutrition. MMA. Athletes.

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RESUMO

Avaliação nutricional em atletas MMA profissionais

Como outros esportes de combate, os lutadores de MMA devem lutar dentro de uma classe de peso especificada. Portanto, a nutrição é uma variável extremamente importante que deve ser controlada no cotidiano dos lutadores. As competições de MMA vêm ganhando uma enorme repercussão na mídia e se tornaram cada vez mais competitivas. Várias estratégias nutricionais são capazes de interferir no desempenho dos atletas, particularmente as inadequações da dieta podem prejudicar o desempenho atlético. Portanto como o MMA é um esporte interessante para a avaliação dos efeitos de uma dieta inadequada, o objetivo deste estudo é realizar uma avaliação nutricional com 6 atletas profissionais do sexo masculino (idade 31,5 +/- 10,0, altura de 177 centímetros +/- 8,6, peso 78,6 kg +/- 7,9, IMC de 23,5 +/- 0,7, massa livre de gordura de 62,0 kg +/- 7,0 e 9,0 kg de massa gorda +/- 2,0) em relação ao valor calórico da dieta e o consumo de macronutrientes. Os resultados foram obtidos de atletas profissionais com ingestão calórica diária de 2.271kcal e 29.9kcal / kg / dia. A ingestão de carboidratos foi de 221,6 g por dia e 2,8 g / kg. A ingestão de proteína foi de 180g e 2,3g / kg. A ingestão de gordura foi de 55g e 0,71g / kg. Foi observado um elevado consumo de proteína, que poderia ser reduzido para gerar um aumento no consumo de carboidratos e gorduras, pois os resultados mostram um baixo consumo de carboidratos e gorduras. O perfil inadequado de ingestão de macronutrientes pode ser devido à falta de conhecimento dos atletas sobre o assunto e a falta de aconselhamento ou consulta profissional. Assim, parece-nos que a introdução de pesquisas sobre os conhecimentos básicos de nutrição para esses atletas é necessária para o sucesso da implementação de mudanças em suas dietas, assim como também ficou claro que os atletas da nossa amostra poderiam aumentar sua ingestão percentual de carboidratos e gorduras pela redução de proteínas.

Palavras-chave: Nutrição. MMA. Atletas.

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INTRODUCTION

Formerly called “Anything Goes”, the current sport of Mixed Martial Arts (MMA) brings together many fighting modalities into one single rule. The sport of MMA is a body contact sport. The blows can be traumatic, unstabilizing, immobilizing, and considered to be finishers.

The fight is dynamic, and it enables plenty of actions such as punching, kicking, kneeling, to project the opponent, fight on the ground, immobilize, and to finalize.

The rules of combat have evolved to protect the athletes and to decrease the number of injuries. The decision of what will be the rules is let for the event for the Sports Commission to decide (Zago and Navarro, 2012).

The majority of official competitions follow the rules of the biggest MMA event in the world, the Ultimate Fighting Championship (UFC).

According to Zago and Navarro (2010), a regular match is typically 3 rounds that last 5 minutes each. If a match is considered a title fight for a championship belt, the match is slightly different and goes 5 rounds and still 5 minutes per round. Each bout is also categorized by the specific body weight of the fighter, and they must “make weight” to be able to contest the match.

The Science of Nutrition stated that health is define as “the study of the nutritional processes, as well as the components of foods, their actions, interaction, and balance in the relation to health and disease.” Similarly, “nutritional processes” refers to processes and properties of living organism by which they assimilate and balance the use of nutritious materials for energy, production of heat, or building material for growth, maintenance, or repair of tissues, and the nutritional properties of foods.

The increase in performance through the modifications in diet have been a target of interest in athletes since the most remote times (Bassit and Malverdi, 1998).

With the recent popularization of MMA and higher salaries, there has been an increase in the attention towards the role of nutrition as a way to increase performance.

The nutrition towards high performance sports have been highly valued for sports professionals, since the athletes are submitted to constant training and high volumes of intense exercise there are different nutritional requirements when compared to non-athletes individuals (Navarro and Shandler, 2007).

Just like differences in other sports and how they are performed, the same holds true for performance nutrition of fighters versus those in sports such as baseball, basketball, football, hockey, and track and field.

Having to continuously move for 5 minutes rounds means that training has to be intense, and that also means that nutritional needs have to match the energy usage to help with rebuilding and recovery of the complete athlete system.

Despite serving as a fundamental way to the restitution of energetic storage substrates burned during activity, such as carbohydrates, proteins and lipids, is through the diet that other aspects such as central fatigue, cognition, and immune response can also be altered (Newsholme and Leech, 1983).

Because of the high demands placed on fighters for training and competition, modifications to fighter diets are necessary and will provide crucial nutrients for making all systems function at optimal levels.

Considering that many fighters compete in classes where the weight limit is a lot lower than their off-season weight, the majority of athletes are not able to maintain their bodyweight within the limits of their class (McCargar and Crawford, 1992).

Creating the necessity of reducing bodyweight in a short period of time, making the athletes use a series of aggressive measures. Among the most used procedures there are the following: highly restrictive diets, intense exercise, dehydration achieved by restricting water intake, saunas, and exercising in hot environments while many times wearing something made of plastic or rubber materials (ACSM, 1996; Stenn and Brownell, 1990).

There has been little work evaluating the nutritional profile of professional MMA athletes, along with characterizing them anthropometrically, and verifying the dietary adequacy of the macronutrients, according to the prescribed recommendations.

Therefore, the goal of the current research was to evaluate the dietary profile and anthropometry of professional MMA athletes.

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MATERIALS AND METHODOS

Sample

The sample used was a cross-section sample

Evaluation of body composition and anthropometry

The evaluation of body composition and anthropometric evaluation of the athletes was made by skin folds, height and weight. The Body Mass Index (BMI), defined by the division of the body mass in kilos to the square root of the height in meters (Kg/m2). The BMI is an anthropometric variable of high importance to indicate the nutritional state of adults (Anjos, 1992).

The measuring of height was made with a 3-meter portable stadiometer (Cescorf). To classify the BMI (kg/m^2) the second World Organization of Health (WHO, 2005) parameters were used, where 18.5-24.9 kg/m^2 for eutrophic; 25.0-29.9 kg/m^2 for overweight; 30.0-34.9 kg/m^2 for degree I of obesity; 35.0-39.9 kg/m^2 for degree II obesity; ≥ 40.0 kg/m^2 for morbid obesity. The weight was measured with a bodyweight scale (Tanita BC-558 Ironman Segmental Body Composition Monitor).

For the body composition estimate, skinfolds were collected from the following locations: triceps, sub-scapular, biceps, supra iliac, supra spinal, abdominal, and calf using an audiometer skinfold calipers (Harpenden Skinfold Caliper).

The measurements were taken from the right side of the subjects and the average of three measures were used for consistency in measurement., The measurements were made following the patterning of the International Society for Advancement in Kinanthropometry (ISAK).

Body Density (BD) was determined with the seven-site equation from Jackson and Pollock (1978). From the BD it was defined as the Percentage of Fat Mass following the Siri equation (1961).

Evaluation of food intake

The evaluation of food intake was made according to the Food Registry of 24 hours (FR24h) and used for its specificity in describing the preparations of foods and for being largely accepted in the literature (Slater and collaborators, 2004).

The volunteers were oriented to fill out the FR24h containing two non-consecutive weekdays and one weekend day. The FR24h were filled by each participant and later calculated in the MyFitnessPal app.

Data Analysis

All of the data is expressed as average +/- standard deviation (SD). The data acquired by the surveys were put into tables and the descriptive calculations later processed using the MacBook version of Excel 2016 (Microsoft Corporation).

Ethical Aspects

All of the volunteers accepted and signed the Free and Informed Consent Form. This work was approved by the ethics committee of the Municipal University of São Caetano do Sul in accordance with the Statement of Assent prepared in accordance with Resolution 510/2016-CNS / CONEP.

RESULTS

The average age, height, weight, BMI, fat free mass, and fat mass of the athletes are in Table 1.

The BMI of the athletes was 23.5kg/m^2 and a classification of normal weight (WHO, 2005). The percentage of fat mass was 9.95 ± 2.6% which is classified as excellent by the American College of Sports Medicine (ACSM, 2009). According to the ACSM, the percentage of body fat of athletes depends on the gender and sports modality practiced, where the minimum demanded for male athletes is 5% and 12% for females.

Table 2 shows the average daily caloric intake which was 2,271.0 kcal/day and the average caloric intake relative to total body mass was 29.8 kcal/day. It is believed that the caloric intake of an athlete is around 3000kcal/day to 6000/kcal/day or more which ranges according to the gender, age, body mass, type of activity, intensity, frequency and duration of activity (American Dietetic Association, 1987).

The average of total carbohydrate consumption (TCC) was 221.6g per day, the average of total protein consumption (TPC) was 180g per day, and the average of total fat

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consumption (TFC) was 55g per day according to table 3.

The average consumption of carbohydrate by body mass was 2.8g/kg/day (table 4), lower than the 6g/kg/day recommendation of the Brazilian Society of Sports Medicine (2009).

The average consumption of proteins by body mass was 2.3g/kg/day (table 4), higher than the 1.6-1.8g/kg/day recommendation of Brazilian Society of Sports Medicine for high intensity exercise (2009).

The average consumption of fats by body weight was 0.71g/kg/day (table 4), lower than the 1g/kg recommendation of the Brazilian Society of Sports Medicine 2009).

Table 1 - Anthropometric Data expressed as Average +/- SD

Variables	Average	+/- SD
Age (years)	31,5	10,0
Height (cm)	177	8,6
Weight (kg)	78,6	7,8
BMI (kg/m2)	23,5	0,7
FFM (kg)	62,0	7,0
FM (kg)	9,0	2,0

Note: BMI (Body Mass Index); FFM (Fat Free Mass); FM (Fat Mass).

Table 2 - Daily caloric intake.

Variables	Average	+/- SD
TCV	2.271,0	312,6
Kcal/kg/day	29,8	4,6

Note: TCV: total caloric Value.

Table 3 - Daily consumption of macronutrients.

Variables	Average	+/- SD
TCC (g)	221,6	64,2
TCP (g)	180,0	30,4
TCF (g)	55,0	6,4

Note: TCC (total consumption of carbohydrates); TCP (total consumption of proteins); TCF (total consumption of fats).

Table 4 - Daily consumption of macronutrients divided by weight.

Variables	Average	+/- SD
TCC/kg/day	2,8	0,8
TCP/kg/day	2,3	0,1
TCF/kg/day	0,71	0,1

Note: TCC (total consumption of carbohydrates); TCP (total consumption of proteins); TCF (total consumption of fats).

DISCUSSION

In the current work, the value of BMI to classify the nutritional state of athletes shows athletes are within normal levels. BMI has been used as an indicator of subnutrition (Ricardo, Araújo, 2002), malnutrition, and obesity (Vasconcelos and Portela, 2001).

BMI does not necessarily reflect the body distribution or the degree of body fat in different groups given the biological specificities inherent to the referred groups. It is possible that gender differences, ethnicity, patterns of regular physical activity, and, consequently, the temporal influence in the level of adiposity interfere in the consistency of BMI (Guerrero, 2000).

Our study does not correspond with the findings of Do Nascimento and Alencar (2007) which suggest a percentage of 47.8% of overweight male athletes.

According to Assis and collaborators (2015), BMI was used to classify the nutritional state of athletes and MMA enthusiasts. The authors found an average BMI value of 25.3which indicates overweightness. However, when the authors used the skin fold method of evaluation, they concluded that the individuals have a muscle mass percentage within the norm for athletes.

In this study, we found an average body fat percentage of 9.95% while Assis and collaborators (2015) found medium values of 10.8%.

Fabrini and collaborators (2010) recommended the evaluation of body composition of Judo athletes and found that fighters should not compete with body fat below 5%. The high reduction in the lipid's storage could reduce the capacity of energy utilization via oxidative pathways, specifically during rest and muscle recovery.

In this study the average calorie consumption was of 2271kcal, with an average of 29.8kcal/kg. Christina and Economos collaborators (1993) recommended the intake of 45 to 87 kcal/kg/day for aerobic sports and 23 to 57 kcal/kg/day for anaerobic sports. The limited research available suggests that the MMA combat consists in high intensity activated intercalated with periods of low intensity activity in a relation effort/rest of 1 : 2 and 1 : 4 (Del Vecchio and collaborators, 2011).

The intermittent activity of high intensity that occurs in MMA has the potential of impacting a spectrum of physiological properties. The primary potential response of these stimuli is metabolic, even though the neuromuscular and musculoskeletal systems are also impacted (Buchheit and Laursen, 2013).

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The volume increasing in activities of high intensity found in MMA competitions stimulate a considerable cardiovascular load and a peripheral oxidative response (Buchheit and Laursen, 2013), this puts a bigger proportion of demand in the aerobic metabolism at the expense of the glycolytic system (Gaitanos and collaborators, 1993).

This way, as the fight gets longer the aerobic requirements increase. This takes us to the conclusion that 29.8kcal/kg is low for MMA athletes.

The average consumption of proteins was 180g/day and an average of 2.3g/kg/day, which is above the recommendation by current literature. The current recommendation of protein for athletes is still being debated, but studies suggest that active athletes demand more than the Recommended Daily Allowance (RDA) of 0.8g/kg/day (Burke and Read, 1987).

While the American Dietetic Association (1987) recommends the intake of 1g of protein per kilo per day for athletes. For some endurance athletes, the requirements of protein could be as high as 1.6g/kg/day (200% of the RDA) (Brouns and collaborators, 1987).

However, Ellerbroake and collaborators (2015) discuss the consumption of 2.4g/kg/day alongside a resistance training program could generate benefits related to body composition. Case and Haube (2010) concluded that high protein diets do not harm the athletic performance of fighters.

The average carbohydrate consumption was 221.6g/day and 2.8g/kg/day. Carbohydrates are the primary source of energy for men and have the following functions: energy reserve (glucose and starch), structural (celulose), and energy source (glucose) (Palermo, 2014).

The current carbohydrate recommendation for athletes is 6 to 10g/kg of bodyweight or 55 to 60% of total calories with 45% in the complex form and 9-14% in the simple form (American Dietetic Association, 1987). This translates to a much higher amount than what was found in our study. The sharp reduction of carbohydrate intake can lead to a reduction in the liver glycogen levels, which can be harmful to combat athletes (Chagas and Ribeiro, 2012).

The low consumption of carbohydrates can lead to metabolic acidosis by the formation of ketone bodies and protein breakdown, while it can also cause a drop in performance and an increase of the post-workout recovery time (Coelho and collaborators, 2009).

The average consumption of fats was 55g/day with an average of 0.71g/kg/day. The daily fat consumption for athletes is 25 to 30% of total calories according to the American Dietetic Association (1987).

In our study, the athletes were consuming 21.7% of calories coming from fats, which is lower than the ADA recommendation (1987).

Despite that, carbohydrates are the primary source of energy, fats can also provide energy for the organism, which most part comes from fatty acids. This is another interesting aspect in that this nutrient offers fatty acids that are needed by cell membranes, skin, hormones, and fat-soluble vitamins transport (Guerra, 2004).

CONCLUSION

The MMA athlete from the present study have a diet high in protein, therefore a reduced intake of carbohydrates and fats. A deficient diet can increase the risk of injuries, decrease performance, and harm recovery.

Thus, these athletes may not reach their full athletic potential. The most important aspect of the diet of professional athletes is to follow the basic healthly eating guidelines.

To obtain more information and useful data, further research about dietary practices by professional MMA athletes must include more in-depth methods to determine the dietary intake, energy needs, nutritional state, body composition, and a larger number of athletes to be evaluated.

There is a clear need for more formal studies about the nutritional habits of these athletes so that an efficient nutritional intervention can be developed in a more effective manner.

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