

Dietary intake in kickboxing fighters

Consumo alimentar de lutadores de kickboxing

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ABSTRACT

Kickboxing is a combat sport modality which prioritizes classifying competitors by weight categories for their participation. The aim of this study was to analyze Kickboxing athletes' food intake. Fourteen Kickboxing fighters aged seventeen to twenty-eight participated in the study: twelve men and two women. The 24-hour food recall was used as an instrument. Athletes' food intake data was analyzed in the Virtual Nutri Plus® program. Average daily caloric intake was below the limit recommended in both sexes (2142.85 kcal/day – 2125.74 kcal/day median). As for macronutrients; carbohydrates (484g ± 302g) 70% of the sample, lipids (71.3g ± 28.4) 60% and protein (1.76 ± 1.03 g/kg weight) 22% were all below the recommended amount. Fiber consumption was 60% lower than recommended, while 50% of volunteers consumed sodium above the amount recommended. This study found inadequacies in the consumption of macronutrients and micronutrients, underlining the importance of multidisciplinary work between nutritionists and other professionals responsible for an athlete's performance.

Keywords: Nutrition, Combat sports, Martial arts.

RESUMO

O Kickboxing é uma modalidade esportiva de combate ao qual tem como prioridade aos competidores a classificação de peso por categorias para as competições. O objetivo do presente estudo foi analisar o consumo alimentar de lutadores de Kickboxing. Participaram do estudo catorze lutadores de Kickboxing sendo doze homens e duas mulheres com idade entre dezessete a vinte e oito anos. O instrumento utilizado foi o recordatório alimentar de 24 horas. A análise dos dados do consumo alimentar dos atletas foi realizada no programa Virtual Nutri Plus®. A média da ingestão calórica diária foi abaixo do recomendado ambos os sexos (2142,85kcal/dia – mediana 2125,74 kcal/dia), quanto aos macronutrientes carboidrato (484g ± 302g) 70% da amostra foram, lipídeos (71,3g ± 28,4) 60% e proteína (1,76 ± 1,03 g/kg peso) 22%, todos abaixo do recomendado. O consumo de fibras 60% foi abaixo do recomendado, em contrapartida, 50% dos voluntários consomem sódio acima do recomendado. Neste estudo foi possível constatar inadequações no consumo de macronutrientes e micronutrientes, sendo importante a inserção de nutricionistas junto aos demais profissionais responsáveis pelo rendimento.

Palavras-chave: Nutrição, Esportes de Combate, Artes Marciais.

1 INTRODUCTION

Combat sports have gained popularity, with millions of spectators worldwide (BOLELLI, 2016). Over the years, rules have been changed to preserve athletes and make the show visibly pleasing to the public (BOLELLI, 2016). Among its varied modalities, Kickboxing is one of the most well-known and practiced (DUARTE et al., 2020), allowing punching, kicking and knee strikes (LYSTAD, 2015). With its importance in mind, kickboxing is one of the modalities trained and used by mixed martial arts (MMA) athletes (LA BOUNTY et al., 2011).

When we talk about sport in a high-performance context, there is a huge pressure on athletes (MAZZEI et al., 2013), in which good sporting performance during combat is considered multifactorial and dependent on technical-tactical (ARTIOLLI et al., 2006), physiological (DE OLIVEIRA et al., 2015), psychological (BALI, 2015) and nutritional factors (FETT, FETT, 2003). Within the field of nutrition, kickboxing and other combat sports are separated by weight categories (OUERGUI et al., 2014). The weight loss methods adopted by these athletes are often harmful to health (ARTIOLI et al., 2016).

Hillier et al. (2019) when analyzing weight loss methods in professional and amateur MMA athletes of different categories and genres, their findings showed that for both sexes and categories, marked weight loss happened a week before the fight. being more drastic in professional athletes and during the twenty-four hours before weighing. The most commonly used method by these athletes were restricting fluid intake,

decreasing caloric intake and using sweatpants. In another study, where male Muay Thai athletes adopted aggressive methods of weight loss, they lost manual pressure strength in both hands on the day of weighing (RIBAS et al., 2019). These findings show that sudden weight loss can affect an athlete's performance.

In the Boguszewski et al. (2012) study, Kickboxing athletes of both sexes experience weight loss ten days before the fight, increasing their training intensity, reducing caloric intake, and wearing special clothing that activates sweat glands to release sweating. With a decrease in body weight by these methods, anxiety levels among athletes tend to increase (BOGUSZEWSKI et al., 2012). It is common for athletes to reduce their weight to fight in lower categories, seeking theoretical advantages when fighting "smaller" and more "fragile" opponents" (ARTIOLI et al., 2016).

No studies were found where Kickboxing fighters' food intake was analyzed. Keeping in mind athletes' interest in achieving and/or maintaining their category weight, the objective of this study was to analyze the kickboxing fighters' food intake.

2 LITERATURE REVIEW

Combat sports modalities

In the east, combats have been present since prehistorical times, where trained soldiers conducted tribal wars (JOHNSON, HA, 2015). In the West, the first athletic battles took place in Ancient Greece (POLIAKOFF, 1987). Currently, combat sports are linked to gyms, federations and confederations that prepare their professionals and organize competitive events (FRANCHINI, DEL VECCHIO, 2011). With the appearance of the Ultimate Fighting Championship (UFC) in the 1990s, combat sports increased in popularity and so did the number of practitioners (PAIVA, 2009).

In order to promote fair, interesting combat and reduce possible injuries caused by large differences in weight and strength, combat sport athletes compete in weight categories (PETTERSSON, EKSTRÖM, BERG, 2013), ranging from light weight at 48 kg to super heavy at 91 kg (WALILKO, VIANO, BIR, 2005). So, often there are many strategies for weight loss that are harmful to athletes' health and performance, such as laxatives, diuretics, sauna and the use of plastic or rubber clothing (FRANCHINI, BRITO, ARTIOLI, 2012).

According to Duarte, Pasa and Fett (2019) there are various modalities with different characteristics such as turns, strangulations, traumatic strokes and ground control. Paiva (2015) differences combat sports, classifying them by distance such as:

long distance (Kendo and Fencing); medium distance (Muay Thai and Taekwondo) and short distance (Sambo and Sumo). These rankings do not prevent a Muay Thai fighter from shortening the distance or a Sambo fighter from staying in the middle distance, it's all about tactics. Já Drury, Lehman and Rayan (2017) make a dichotomy in the conceptualization of different combat sports which includes the categories: Striking, where there are blows to the opponent's body (kicking, punching, knee and elbow strikes) including Boxing, Kickboxing, Karate, Muay Thai and Taekwondo. The category named Grappling, on the other hand, consists of fights that use falls, strangulations and submissions, including Judo, Olympic Fight and Brazilian Jiu-Jitsu.

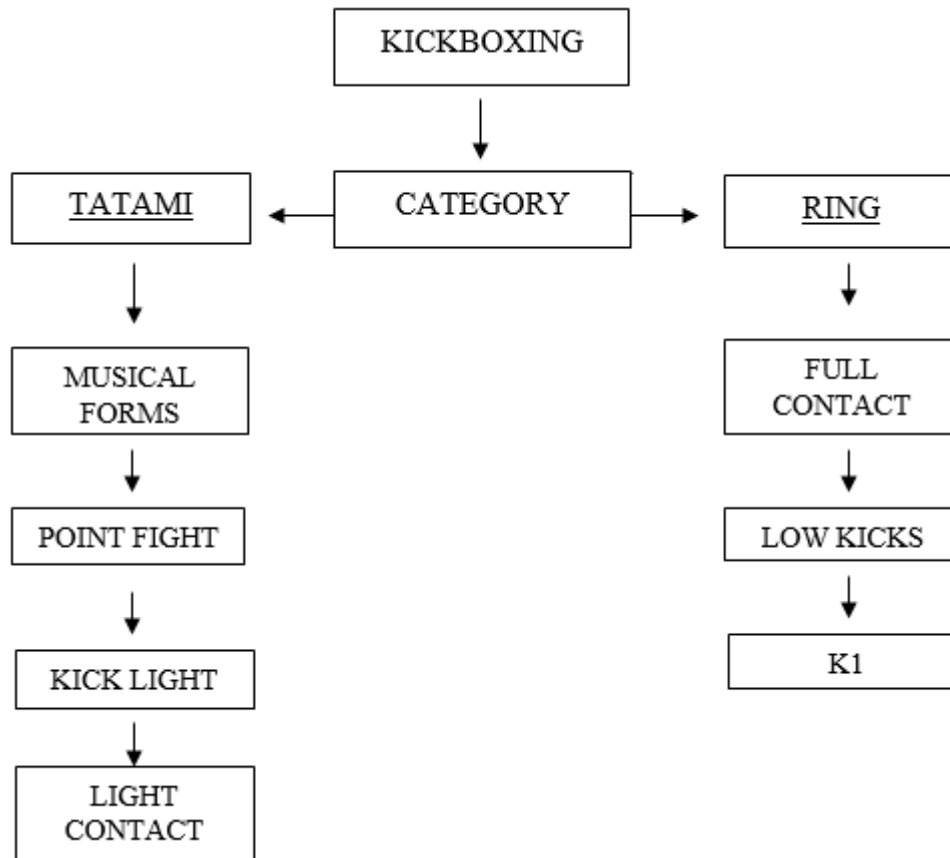
The practice of combat sports is done not only for competitive purposes, but also with the aim of improving health conditions. Several studies show the health benefits of some include the prevention of osteoporosis (CHOW et al., 2018), depression (YANG, KO, ROH, 2018) and diabetes (BENBENEK-KLUPA, MATEJKO, KLUPA, 2015). Combat sports can be practiced by children, adults and the elderly of both sexes with the required adaptations according to the needs of the population.

Kickboxing

Kickboxing is a mix of martial arts that is based on barefoot kicking as in Karate and punching as in Boxing (SALCI, 2015). As a North American combat sport, created in the 70s by karate practitioners who were dissatisfied with their sport's limiting rules, in which it was not possible to hit the opponent with force, and just score (BRUENO, TORRES, 2014).

According to the Brazilian Kickboxing Confederation (CBKB), the first Karate Full Contact Championship was held in the city of Los Angeles in the United States in 1973 and in 1980 it was named Kickboxing. A formal kickboxing competition has three rounds that last 2 minutes with an interval of 1 minute between each round (SALCI, 2015). There are different modalities, that go from ring to tatami modes, where ring modality's intention is to knockout the opponent and tatami's touse controlled hits with the aim to score. (OUERGUI et al., 2019). In tatami the modalities are: Musical Forms, Kick Light, Point Fight and Light Contact, while in ring they are: Full Contact, Low Kicks and K1 (organization chart. 1). The best-known modalities are Full Contact and K1 (OUERGUI et al., 2016; WELLS, 2012).

Organization chart. 1 - The seven Kickboxing modes classified by Tatami and Ring



Kickboxing’s popularity around the world is steadily increasing on November 2018 it received recognition from the International Olympic Committee (DUGONJI; KRSTULOVI; KUVAI, 2019), becoming an Olympic sport in June 2021. Regular and proper kickboxing practice can generate cardiorespiratory resistance, muscle resistance, muscle strength, speed, agility, improved reaction time, power, balance, coordination and flexibility (SLIMANI et al., 2017).

Nutrition and performance in combat sports modes

The combat athlete needs pre-training. The nutritional support for a kickboxer consists in reaching the desired weight, being ideal that the sportsman has a higher weight and muscle mass developed, since it allows for greater functionality and more muscle strength during an attack, as well as stability to receive blows from the opponent (SOLDATI et al., 2019).

Regarding nutritional recommendations, the sportsman must maintain a balanced diet, with intake of all macronutrients, according to their nutritional status and total energy expenditure. Before training, it is recommended to ingest complex carbohydrates with a

low glycemic index so the energy supply during training is gradual; lean protein sources and low fat to delay gastric emptying. (BARANAUSKAS et al, 2020)

The replenishment of depleted nutrients is aimed at an optimal recovery of the sportsman and avoids catabolism. At this time, nutritional ergogenic resources such as protein with a rapid absorption (serum protein), carbohydrates with a high glycemic index (dextrose and/or maltodextrin), branched chain amino acids (BCAA), and glutamine administered apart or even immediately after training (BARANAUSKAS et al., 2020; GARTHE et al., 2013). Hydration is another important aspect and the sportsman should guarantee the ingestion of at least 3 liters of water daily. After every kickboxing practice, the ingestion of 600 - 1200ml of water is recommended, depending on the athlete's weight (RODRIGUEZ et al., 2009).

The Mediterranean diet is also recommended for Kickboxers, as these athletes can achieve good results by maintaining a long-term dietary balance, with polyunsaturated and monounsaturated fats, whole-grain foods and good protein sources. It is also worth noting that the synergy between physical activity and food is always a necessary combination to achieve good results in Kickboxing as in any other combat sport (SOLDATI et al., 2019; BARANAUSKAS et al., 2020).

3 MATERIAL AND METHODS

Type of study and location

This is a cross-sectional study, approved by the Ethics Committee of the Julio Müller University Hospital (HUJM - nº658 / CEP-HUJM09) and carried out by the UFMT's Metabolic Research, Sport and Health (TIMES) research group.

Sample

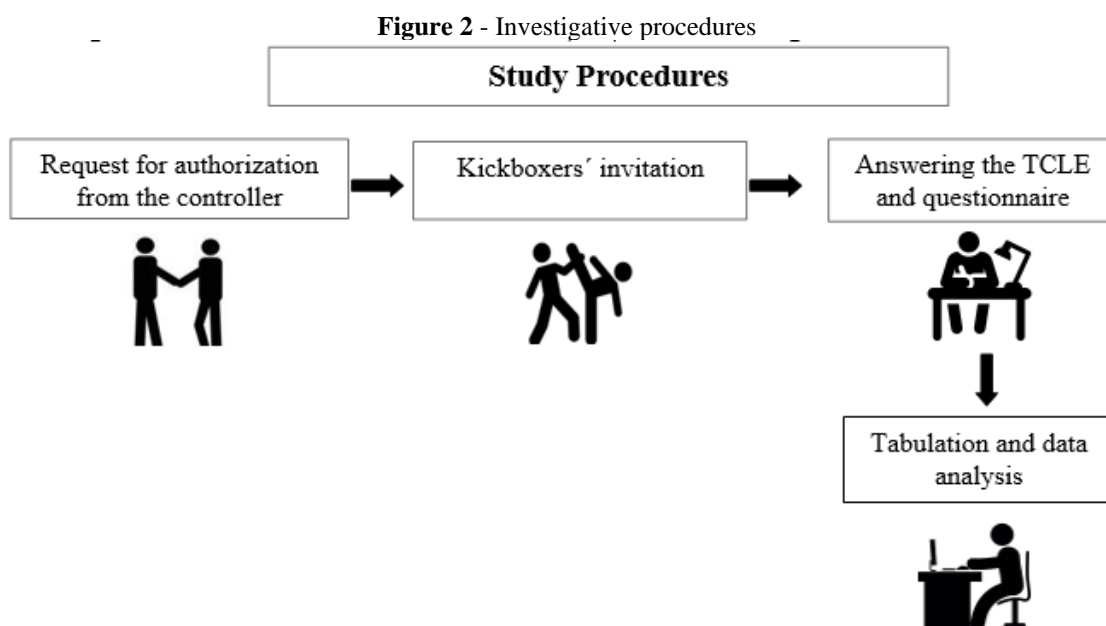
This study involved fourteen Kickboxing volunteers, twelve men and two women, between the ages of seventeen and twenty-eight, from a gym located in Cuiabá, Mato Grosso state (Figure 1).

Figure 1 - Kickboxing class



Procedure

With the approval of the team leader, combatants were invited to participate in the study. The responsible researchers thoroughly clarified the objectives, methods and benefits of the research. Following the confirmation of voluntary participation, athletes signed the Free and Informed Consent Form (ICF) as shown in Figure 2.



Instruments

To measure food intake, the 24-hour food recall was applied, which analyzes nutrient intake as well as adjustments or inadequacies. The analysis of the food consumption data of athletes was carried out in the Virtual Nutri Plus® program, tabulating the macro and micronutrients of each participant.

Statistical Analysis

It was done with the Avanutri 4.0 software. Macronutrients and micronutrients were adjusted according to DRI (Dietary Reference Intakes), 2002, but macronutrients were also compared with recommendations from the Brazilian Society of Medicine in Sport (2003).

4 RESULTS AND DISCUSSION

When calculating the daily meal using a 24-hour food withdrawal, an average daily energy intake of 2125.74 kcal/day was found. Of the two athletes surveyed, one had a lower total energy intake than the amount recommended for athletes. Judo athletes also showed a food intake below the recommendation which was 2399.29 kcal/day, the recommended amount is 3.150 -4.300 kcal/day (ZONTA, BERGOZZA, FIAMONCINI, 2011).

In terms of carbohydrate intake, an average intake of 484g ± 302g was observed. In terms of protein intake, an average of 1.76 ± 1.03 g / kg / weight was found, the minimum amount consumed was of 0.65 g / kg / weight and there was a maximum of 5.7 g / kg / weight. In terms of daily lipid intake, the mean observed was 71.3 g ± 28.4. Table 1 shows the evaluation results of macronutrient intake and the recommended amounts for athletes.

Table 1 - Evaluation of macronutrient consumption of athletes evaluated

Nutrient	SBME*	Low		Appropriate		Above	
		N	(%)	N	(%)	N	(%)
Carbohydrate	60%-70%	10	70	1	8	3	22
Protein	1,2 a 1,6 g/kg/p	3	22	5	36	6	42
Lipids	25% a 30%	9	64	3	22	2	14

*SBME = Brazilian Society of Sports Medicine

Fiber intake was low in the group, in which 60% of athletes had an intake below the recommended (25 to 30g, according to the Integrated Diagnostic and Recommendation System (DRIS). Unlike sodium intake, which was expressively high in individuals, 50% of athletes had a higher consumption than recommended (2400 mg, being 5 g table salt, according to DRIS).

The percentage of carbohydrate and lipid macronutrient consumption was lower than our findings 23.79% and protein consumption was higher and of 22.76% (1.9 g/kg) in Jiu-Jitsu practitioners (SÁ et al., 2015). Another study with Judo wrestlers showed food consumption with 44.29% carbohydrates, 35.16% lipids and 20.48% proteins (RODRIGUES et al., 2017). Such findings are similar to the prevalence of macronutrient consumption in our study.

The carbohydrate intake in our study was less than adequate, the low digestion of this macronutrient can bring several damages to athletes. Inadequate consumption can result in poor storage of glycogen, initiating early fatigue and the use of proteins as a source of energy, thus reducing muscle mass (RODRIGUES et al., 2009). In Kickboxing, the actions that score/attack are decisive by the ATP-CP anaerobic pathways and glycolysis (SALCI, 2015).

Most of the analysis demonstrated adequate protein consumption and higher amounts than recommended. Karate athletes of both sexes have been shown to be hyperprotein consumers (RIBAS et al., 2017). Athletes believe that protein consumption increases strength and performance (MENON, SANTOS, 2012). Protein intake promotes reduction of body fat and reduces muscle mass loss during weight loss (HARAGUCHI, ABREU, PAULA, 2006).

In our findings, most Kickboxing fighters consume lipids below recommendations. Cobtrary to a study with judo athletes where lipid consumption was high (RODRIGUES et al., 2017). Lipids, as well as all macronutrients, are important for maintaining health and sports performance (MARTINELLI, PAIXÃO, 2019).

However, in combat sports where rapid movements are needed, wrestlers with high levels of body fat tend to have a disadvantage (PIETER, BERCADES, DO KIM, 2006). Elite kickboxers of both sexes showed low body fat levels from 6.1 to 11.4% (SLIMANI et al., 2017). However, in sports such as Judo and Sumo it is common to find the practice of increasing body weight in order to improve the athlete's stability, making it difficult for the opponent to move (FETT, FETT, 2003).

In 60% of those analyzed, fiber intake was lower than recommended. These results are worrying because fibers play an important role in human health, minimizing the risks of cardiorespiratory diseases, neoplasms, type 2 diabetes and obesity (BRONKOWSKA, KOSENDIAK, ORZEL, 2018). In contrast, 50% of those analyzed had a sodium intake above the amount recommended, in the long term it was associated with hypertension, insulin resistance, dyslipidemia and hypoadiponectinemia (BAUDRAND et al., 2014).

As a limitation, we had a small sampling universe, on the other hand, it represents the actual consumption of calories consumed by Kickboxing practitioners. We recommend new studies with percussion modalities such as Savate, Boxing, Jeet Kune Do and Wing Chun and of dominion such as Sambo and Sumo.

5 FINAL CONSIDERATIONS

This study found inadequacies in the consumption of macronutrients and micronutrients. Since wrestlers have a higher energy expense and metabolism rate, such deficiencies are a cause for concern, as proper nutrition is essential for physical growth and sports performance.

In view of this, the importance integrating a nutritionist along with the rest of the sport professionals working as technical trainers, physical trainers, doctors, physiotherapists and psychologists is verified, in order to properly educate athletes and their coaches on proper nutrition and its beneficial effects on athletes' body composition and physical performance.

Gratitude

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