49 - COMPARISON OF THE DIETETIC AND ANTHROPOMETRIC PROFILE OF HANDBALL ATHLETES DURING A TRAINING PERIOD

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INTRODUCTION

Handball is a sport featuring high intensity effort and short duration with pause between efforts, with great energy consumption, both in competitions and in trainings. Because of these factors, an excellent nutrition is indispensable to the athletes to improve their performance in matches and post-training recovery (González-Gross et al., 2001).

In spite of the increasing participation of females in competitive sports and of the advances in medicine and sports nutrition, there are not many studies about nutritional aspects which are specific to that population yet (Maughan, R.J, Shirreffs, S.M., 2007). Nutrition is essential to athletic performance. Balanced feeding can reduce fatigue, maximize training and recovery, as well as optimize health and the athlete's performance, and the nutritional need is influenced by various individual factors such as frequency, intensity, training duration, among others (Maughan & Burke, 2004). Besides an adequate amount of calories, it must be considered in the feeding plan an adequate quantity of carbohydrates (CHO), proteins (prot.), lipids (Lip.), vitamins, minerals e water, in order to permit optimal training and recovery conditions, and for better results in competitions (Gonzales-Gross et al, 2001). Carbohydrates are the main energy source during physical exercise and the daily provision coming from them to supply the demands of exercise as well as to restore the losses caused by training, must be between 50 and 70% of the total energy content (TEC) of the diet, or between 6 to 10g/kg/day (Pamplona, A.P., Kazapi, I.A.M, 2004; Pereira, B.; Souza, Jr, T.P., 2005). Regarding proteins, their main function is to serve as a structural element, but, in some conditions like prolonged exercise and fasting, this nutrient can be oxidized to promote ATP resynthesis (Tarnopolski, M.A., 1999). In addition, when there is an insufficient provision of carbohydrates in the diet, a greater muscle protein catabolism occurs in order to satisfy the energy needs, affecting the athlete's strength and performance (Lancha Jr, 2002). The recommendation of proteins to athletes has a little increment when compared to sedentary population (0,8 to 1,2g/Kg/day) (DRI, 2002), being recommended 1,2 to 1,8g/Kg/day (Tanopolski, M.A., 1999; SBME, 2009) since there is no need for larger amounts in order to promote protein synthesis. This quantity is normally obtained with a protein intake about 12 to 15% of TEC. Lipids, besides their energetic function, are also used in hormones synthesis, participate in the structure of cellular membranes and help with the transport of liposoluble vitamins, therefore, recommendation must be between 25 and 30% of TEC (Soares, E.A, 2001). Since there are not many studies which approach strategies for nutrition of female athletes, especially in the field of handball, this paper aimed to compare the dietetic and anthropometric profile of female handball athletes in pre-training and post-training period (after four months training).

MATERIALS AND METHODS

An assessment of the nutritional profile of 16 women handball athletes was performed. For the anthropometric assessment the following variables were verified: weight, height and skin folds (tricipital, suprailiac, abdominal and thigh). In order to do so, a Filizola scale, a Gofeca stadiometer, and a Cescorf adipometer were used, respectively. The athletes were wearing a minimum of clothes, barefoot and in a comfortable environment. The body fat percentage was calculated using the equations proposed by Jackson (1980) and classified according to the reference of Lohman (1992) quoted by Heyward, V.H. and Stolarczyk, L.M. (2000). Food consumption was evaluated by a feeding inquiry on three days of the week, without taking weekends into account, and calories and macronutrients were determined using DietWin Profissional software. Since there are no specific recommendations for female athletes and studies on these groups are still limited, the results were compared with the recommendations proposed by ADA (American Diet Association, Dietitians of Canada, American College of Sports Medicine, 2009). The project was authorized by the Research Ethics Committee from Feevale University, RS, Brazil. The participation of athletes in this study happened through informed consent authorization. The statistical analysis occurred through the statistical package SPSS 12.0 (Statistical Package for Social Science), using descriptive statistics: mean and standard deviation, and t test, Pearson's correlation coefficient to a significance level of 5%.

RESULTS AND DISCUSSION

The sample consisted of 16 female handball players with a mean age of 21,5 years (± 3,2), and training five days a week, which comprised working out, running, practice with ball and game and competitions according to the state and national handball calendar.

The characteristics of the sample as for means and standard deviations for weight, height, Body Fat % (%G) and Fat-free Mass (MM) of the female athletes can be observed in table 1.

Table 1 – Means and standard deviations for weight, height, %G and MM in both periods

Variables	Pre-training	Post-training
Weight (kg)	56,84Kg (± 9,14) *	58,62Kg (± 8,23) *
Height (cm)	164,18cm (± 6,88)	164,6cm (± 6,31)
Body Fat (%)	23,2 % (± 3,2)	22,4% (± 2,8)
Fat-free Mass (kg)	47,91Kg (± 4,7)*	49,28Kg (± 5,3)*

* Significant difference p<0,05 between pre and post-training

The average daily consumption for the three-day analysis is represented in table 2. The energy consumption in calories was significantly lower (p< 0,05) in pre-training when compared to post-training period. CHO consumption is below recommended continuing the same during all training period, and protein consumption although being adequate, increased significantly in the post-training period when compared to pre-training, just like lipids consumption. Liquids intake didn't reach the recommendation in both periods of the study.

Table – 2 Average consumption of calories, macronutrients and liquids

Variables	Recommendations	Pre-training	Post-training
Total energy content (TEC) Kcal/day	2103,08 to 2330,44 [a] 2168,34 to 2402,37 [b]	1883,41Kcal/day (±628,03)*	2101,62Kcal/day (±804,85)*
CHO g/day	341,04 [a] 351,72 [b]	284,35 (±90,39)	280,55 (±118,06)
Protein g/day	68,2 to 90,9 [a] 70,34 to 93,7 [b]	74,82 (±27,21)*	83,65 (±30,91)*
Lipids (%)	25 to 30 [a; b]	25,74 (±8,59)*	32,74 (±9,97)*
Liquids (Liters/day)	2,6 Lts	1,78	1,82

Liquids (Liters/day)2,6 Lts1,78 1,82Pre-training recommendationa; Post-training recommendation b
* Significant difference p<0,05 between pre and post-training

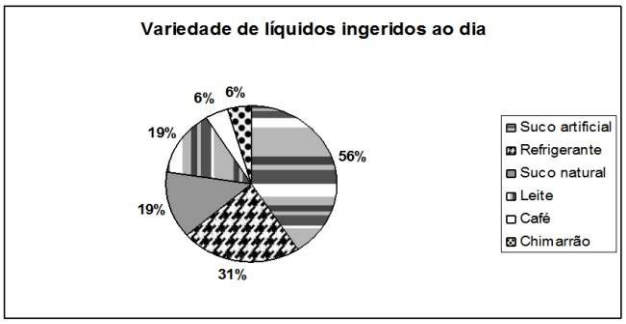


Chart 1: Variety of liquids ingested per day

Regarding the percentage of body fat we observe that there was a significant difference between the collections. The reduction was from 23,2 % (± 3,2) to 22,4% (± 2,8) in the first and in the second collection, respectively, both considered normal for female athletes, however in the superior limits (until 24%). Analyzing the mean of fat-free mass found in the athletes, we verify an increase in it. In the preparation period the athletes had 47,91Kg of fat-free mass, but right after four months training, this amount increased to 49,28Kg (Table 1). Since some athletes are in growing phase, we verified an increase in height (not significant, though) between the two different collection stages. There was also an increase in weight, and since we verified a reduction in the body fat percentage, we can relate this rise to fat-free mass and not to the athletes' body fat. Analyzing the total energy content (TEC), we can verify that there was a significant difference between the two periods. In pre-training period caloric consumption was 1883,41Kcal/day (±628,03) and in post-training (after four months of practice) the caloric value increased, remaining 2101,62Kcal/day (±804,85), but in both periods the consumption did not reach the minimum recommended (37 Kcal/kg/day) (Burke, L.M. 2001; SBME, 2009) (Table 2). When we analyze the ingestion of carbohydrates in grams, we verify a significant reduction between the two distinct stages of training. Both samples are below the mean ingestion of carbohydrates considered as ideal (6g/Kg of weight/day) (Burke, L.M. et al 2006) but we can observe that instead of a rise in the consumption of this macronutrient, the athletes diminished its ingestion. In the first collection the ingestion of carbohydrates was 284,35g per day (±90,39) considering that the ideal mean for this stage would be 341,04g per day and in the second collection this amount decreased to 280,55g (±118,06), regarding that the ideal mean for this stage would be 351,72g as we can see in table 2.

In the study of Pamplona and Kazapi (2004), in which the food consumption was evaluated, though only in men practicing various sports categories, it was observed consumption below recommended for carbohydrates in all categories, exactly like our study. Almeida and Soares (2003) have also verified the low ingestion of carbohydrates in female athletes practicing volleyball. Researches carried out with Brazilian athletes from different sports categories indicate that the daily ingestion of carbohydrates is about, in average, 45 to 50% from the total of energy consumed, a quantity below the orientations proposed to active individuals (Biesek, S. et al., 2005). When we analyze the ingestion of proteins in grams, the values in the first and second collection are within what is considered ideal for the athletes (minimum of 1,2g/Kg of weight per day and maximum of 1,6g/Kg of weight per day or 10 to 15%). There was a significant change between the two collections. In the pre-training period the athletes had an ingestion of 74,82g (±27,21) of proteins per day and in post-training this amount increased to 83,65g (±30,91) per day (Table 2). Differently from other studies with different sports which showed protein consumption above recommendations (Pamplona and Kazapi, 2004). As for the consumption of fat in the athletes' feeding, we can observe a significant change between the two stages of collection. In pre-training period, we verify an ingestion of lipids of 25,74% (±8,59), that is, near the inferior limit considered as ideal (25%). After the four months of practice, however, fat ingestion increased significantly to 32,74% (±9,97), even exceeding the ideal superior limit (30%), as it can be observed in table 2. This fact may be related with the period of this collection which was made during the winter, when it is known, there is a higher consumption of calories and mainly lipids, in the southern region of the country, both because of the way food is made and of the kind of ingredients used. In the work of Kazapi and Ramos (1998) with swimmers, it was also found a high consumption of lipids if compared with ideal recommendations. Grandejean (1997), studying elite athletes, showed values between 29 and 49% for the consumption of lipids, however. When we analyze liquids ingestion, we verify that the athletes had an average intake of 1,78Lts per day and what is considered ideal for the age range and gender assessed in this study, is 2,5Lts per day (DRI, 2005) (table 2), therefore, below recommended. Regarding the kinds of liquids ingested during the day, 100% of the athletes mentioned they drank water daily. The second most cited liquid was artificial juice, with 56% (n=9) of acceptance, soda with 31% (n=5), natural juice and milk with 19% (n=3) to each (Chart 1).

CONCLUSION

Based on the results obtained in this study, we verified that there was a little increase in the consumption of calories, and that this rise was caused by the increment of proteins and fats, since the consumption of CHO decreased. It is conceived that the rise in proteins comes from the belief that proteins are fundamental elements for physical performance and that the increase in fats occurred due to the period of collection, which was made during the winter. The hydration of the athletes is not adequate in amount as well and though everyone of them told us they drink water, other beverages with empty calories were also cited with great acceptance such as soda and artificial juice.

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COMPARISON OF THE DIETETIC AND ANTHROPOMETRIC PROFILE OF HANDBALL ATHLETES DURING A TRAINING PERIOD

ABSTRACT

In spite of the increasing participation of females in competitive sports and of the advances in medicine and sports nutrition, there are not many studies about nutritional aspects which are specific to that population yet. Therefore, this paper aimed to compare the dietetic and anthropometric profile of female handball athletes during two distinct stages, in the pre-training (beginning of the season) and post-training (after four months training) period. Sixteen female athletes from a handball team were assessed. The methods used were: three-day food journal and verification of anthropometric measures, such as weight, height and skin folds. Analyzing the food consumption of three days, it was found, in the pre-training period an average consumption of 1883,41Kcal, 284,35g of carbohydrates, 74,82g of proteins and 25,74% of lipids. In the post-training period, however, the average consumption was of 2101,62Kcal, 280,55g of carbohydrates, 83,64g of proteins and 32,74% lipids. Regarding hydric intake, we verified that the consumption was below recommended, the athletes' average being 1,78Lts a day. Body fat percentage found was 23,2 % (± 3,2) and 22,4% (± 2,8) in the first and second collection respectively, and fat-free mass average was 47,91Kg (± 4,7) in pre-training and 49,28Kg (± 5,3) in post-training period. One concludes that the athletes' body fat percentage decreased after four months of training and there was an increase in fat-free mass. There was a significant difference in the handball athletes' feeding habits, in the different stages of training, and food consumption was inadequate regarding calories, macronutrients and hydric intake, if comparing it with the reference consumption. Therefore, this study enhances the need for more nutritional information and for monitoring of the athletes by a professional in the field of nutrition to the optimization of their performance during trainings and competitions.

KEY WORDS: Handball, Macronutrients, Body Fat Percentage.

COMPARAISON DU PROFIL DIETETIQUE ET ANTHROPOMETRIQUES DE ATHLÈTES DE HANDBALL LORS D'UN STAGE

RÉSUMÉ

En dépit de la participation croissante des femmes dans les sports compétitifs et des progrès de la médecine et de la nutrition sportive, il n'y a pas encore beaucoup d'études concernant les aspects nutritionnels spécifiques à cette partie de la population. On a vérifié les profils diététiques et anthropométriques de seize athlètes féminines d'une équipe de handball pendant deux péridodes distinctes. Les méthodes utilisées ont été: le journal alimentaire de trois jours et la vérification des mesures anthropométriques (poids, haunter et plis cutanés).

Lánalyse de la consommation alimentaire de trois jours, une pré-consommation moyenne de 1883,41 Kcal, 284,35 g de glucides, 74,82 g de protéines et de 25,74% de lipides. En période après la formation, la consommation moyenne a été de 2101,62 Kcal, 280,55 g de glucides, 83,64 g de protéines et de lipides 32,74%. En ce qui concerne l'apport hydrique, la consommation a été inférieure à celle recommandée étant donné que la moyenne des athlètes est de 1,78 Lts la journée. Le

pourcentage de graisse qui a été trouvé est de 23,2% (± 3,2) et 22,4% (± 2,8) la première et deuxième collècte respectivement, et la moyenne la masse maigre a été 47.91 kg (± 4,7) dans la période précédant la formation et 49.28 kg (± 5,3) après la formation. Le pourcentage des athlètes qui ont diminué la graisse après quatre mois d'entraînement et ils ont aussi eu une augmentation de la masse maigre. La consommation alimentaire est insuffisante en calories en ce qui concerne les macro éléments et un apport hydrique, si elle est comparée à la consommation de référence. Par conséquent, cette étude renforce le besoin d'une information plus nutritive et pour accompagnement des athlètes par un professionnel dans le domaine de la nutrition à l'optimisation de leur performance lors des formations et des concours.

MOTS CLES: Handball, Macro éléments, Pourcentage de graisse.

COMPARACIÓN DEL PERFIL DE LA DIETA Y DE LA ANTROPOMETRÍA DE ATLETAS DE BALONMANO EN UN PERIODO DE ENTRENAMIENTO

RESUMEN

A pesar del aumento de la participación femenina en los deportes de competición y los avances en la medicina y la nutrición deportiva, hay pocos estudios sobre los aspectos nutricionales específicos para esta población. Este estudio tuvo como objetivo comparar el perfil de la dieta y la composición corporal de las atletas de balonmano en dos fases distintas. Los métodos utilizados fueron: tres días de interrogatorio del consumo de alimentos y las medidas antropométricas, como peso, talla y pliegues cutáneos. El análisis del consumo medio de alimentos en el periodo de pre-entrenamiento fue de 1.883,41 Kcal, 284,35 g de carbohidratos, 74,82 g de proteínas y 25,74% de lípidos. El promedio del consumo post-entrenamiento fue 2.101,62 Kcal, 280,55 g de carbohidratos, 83,64 g de proteínas y 32,74% de lípidos. Con respecto a la ingesta de agua, se observó un consumo por debajo del recomendado, con un promedio de 1,78 Lts. El porcentaje de grasa fue de 23.2% (± 3,2) y 22,4% (± 2,8) y la media de la masa corporal magra fue 47,91 kg (± 4,7) y 49,28 kg (± 5,3), en la primera y segunda evaluación, respectivamente. Se concluye que el porcentaje de grasa en los atletas disminuyó después de cuatro meses de entrenamiento y hubo aumento en la masa corporal magra. No hubo diferencias significativas en los hábitos alimenticios de los atletas de balonmano en las diferentes fases de entrenamiento, y el consumo de calorías, macronutrientes y de agua, fue insuficiente en comparación con el consumo de referencia. Así, este estudio refuerza la necesidad de más información nutricional y una supervisión de un profesional de la nutrición para un óptimo desempeño durante el entrenamiento y las competiciones.

PALABRAS CLAVE: Balonmano, Macronutrientes, Porcentaje de grasa.

COMPARAÇÃO DO PERFIL DIETÉTICO E ANTROPOMÉTRICO DE ATLETAS DE HANDEBOL DURANTE UM PERÍODO DE TREINAMENTO

RESUMO

Apesar da crescente participação feminina em esportes competitivos e dos avanços na medicina e nutrição esportiva, ainda são poucos os estudos sobre aspectos nutricionais específicos a esta população assim este trabalho objetivou comparar o perfil dietético e antropométrico das atletas de handebol durante duas fases distintas, no período pré-treinamento (início da temporada) e pós-treinamento (após quatro meses de treinamento). Foram avaliadas 16 atletas do gênero feminino de um time de handebol. Os métodos utilizados foram: diário alimentar de três dias e aferição das medidas antropométricas como peso, estatura e dobras cutâneas. Analisando o consumo alimentar de três dias, foi encontrado, no período pré-treinamento um consumo médio de 1883,41Kcal, 284,35g de carboidratos, 74,82g de proteínas e 25,74% de lipídios. Já no período pós-treinamento o consumo médio foi de 2101,62Kcal, 280,55g de carboidratos, 83,64g de proteínas e 32,74% de lipídios. Com relação à ingestão hídrica, verificamos um consumo abaixo do recomendado, sendo a média das atletas de 1,78Lts ao dia. O percentual de gordura encontrado foi de 23,2 % (± 3,2) e 22,4% (± 2,8) na primeira e segunda coletas respectivamente, e a média de massa magra foi de 47,91Kg (± 4,7) no período pré-treinamento e 49,28Kg (± 5,3) pós-treinamento. Conclui-se que o percentual de gordura das atletas diminuiu após os quatro meses de treinamento e houve um aumento da massa magra. Houve diferença significativa nos hábitos alimentares das atletas de handebol, nas diferentes fases de treinamento, e o consumo alimentar foi inadequado em relação as calorias, macronutrientes e ingestão hídrica, quando comparado com o consumo de referência. Sendo assim, este estudo reforça a necessidade de maiores informações nutricionais e um acompanhamento de um profissional da área de nutrição para a otimização do desempenho durante os treinos e competições.

PALAVRAS-CHAVE: Handebol, Macronutrientes, Percentual de Gordura.