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Development, sensory evaluation, and nutritional composition of food preparations for sportspersons

Desenvolvimento, avaliação sensorial e da composição nutricional de preparações destinadas a esportistas

Abstract

Introduction: The association of balanced diets with physical exercise is increasing due to the population's current concern with physical well-being and a healthy lifestyle. However, food preparations that offer good nutritional value along with attractive sensory characteristics are not found often by the public. *Objective:* The objective of this study is to develop four food preparations (protein bar, date candy, sweet potato pie, and caprese pate) for sportspersons and to verify the nutritional profile, acceptability, and consumption intention of each food preparation. *Methods:* Sensory and consumption intention evaluation were performed with 224 tasters using a hedonic scale of 9 points. Ingredients with reduced levels of sugars, sodium, and saturated fats were prioritized for the development of the food preparations. *Results:* In the consumption intention and sensory evaluation tests, for all attributes evaluated, the food preparations protein bar, date candy, sweet potato pie, and caprese pate presented average scores higher than 6, and an acceptability index higher than 75%. Regarding the nutritional value, the protein bar and sweet potato pie presented good protein, energy, and carbohydrate content, and the date candy and the caprese pate stood out for the low number of calories, and total and saturated fats. *Conclusion:* It is concluded that the results found are satisfactory, given that a large number of consumers, amid a harsh daily routine, are in search of food preparations that can combine flavor, practicality, and cost-benefit, that will ultimately result in health and physical well-being.

Keywords: Athletes. Physical exercise. Diet, Culinary. Sensory analysis. Health.

Resumo

Introdução: A associação entre dietas balanceadas e exercícios físicos é crescente devido à preocupação atual da população com o bem-estar físico e um estilo de vida mais saudável. No entanto, preparações que ofereçam bom valor nutricional com características sensoriais atrativas não são frequentemente encontradas por este público. *Objetivo:* Desenvolver quatro preparações (barra proteica, docinho de tâmara, torta de batata-doce e patê caprese) destinadas a esportistas e verificar o perfil nutricional, a aceitabilidade e a atitude de consumo de cada receita. *Métodos:* A avaliação sensorial e a atitude de consumo foram realizadas com 224 julgadores utilizando escala hedônica de nove pontos. No desenvolvimento das preparações, foram priorizados ingredientes com teores reduzidos de açúcares, sódio e gorduras

saturadas. *Resultados:* As preparações barra proteica, docinho de tâmara, torta de batata-doce e patê caprese apresentaram, no teste de intenção de consumo e na avaliação sensorial, para todos os atributos avaliados, notas médias superiores a 6, e índice de aceitabilidade superior a 75%. Quanto ao valor nutricional, a barra proteica e a torta de batata-doce apresentaram bom conteúdo proteico, de energia e de carboidratos; e o docinho de tâmara e o patê caprese se destacaram pela baixa quantidade de calorias, gorduras totais e saturadas. *Conclusão:* Conclui-se que os resultados encontrados são satisfatórios, dada a realidade de grande parte dos consumidores que, em meio à atribulada rotina diária, estão em busca de produtos que possam aliar sabor, praticidade e melhor custo-benefício, e que resultarão em saúde e bem-estar físico geral.

Palavras-chave: Atletas. Exercício físico. Dieta, Culinária. Análise sensorial. Saúde.

INTRODUCTION

Strategies to promote the practice of physical exercises are increasing today, implying improvement in health, physical and mental well-being, weight control, body aesthetics, and physical performance.^{1,2} In this scenario, attention to the quality of food is important, considering that this is one of the most effective variables for achieving optimal physical performance and recovery after sports activities.^{3,4}

Sportspersons need constant monitoring of their diet and nutrient balance, to avoid varied lesions and complications in the body and to improve body performance.⁵ Thus, nutritional orientation in sport is necessary to ensure the quality of life of sportspersons, since inadequacies in nutrition can bring harm to health and performance. Allowing the best use of nutrients by the body before, during, and after training, and avoiding recurrent complications due to low or excessive daily intake is extremely important.^{4,6}

The availability of flavorful food preparations described in the literature is wide-spread, but these do not always offer nutritional quality. In recipes, several ingredients can be introduced or replaced to improve the nutritional and sensory value of food preparations, making them suitable and flavorful for regular consumption, in addition to offering health benefits. The increased demand for balanced and healthy food preparations makes it necessary to diversify the supply of food preparations that meet this new profile of consumers.⁷

Considering the public engaging in physical activity and, consequently, presenting specific nutritional needs, information on the preparation of practical and nutritious food preparations can be of great interest to them, as well as to the population that worries about health in general. Thus, the aim of this study is to develop four food preparations aimed at sportspersons and verify the acceptability, consumption intention and nutritional composition of each preparation.

MATERIAL AND METHODS

Development of food preparations

Four food preparations were developed for sportspersons, adapting ingredients and/or preparation form to meet the needs of the target consumer (table 1). Two sweet preparations were elaborated: protein bar and date candy, and two salted preparations: sweet potato pie and caprese pate. The ingredients were selected taking into account appearance, flavor, and nutritional composition.

Table 1. Final formulation of the food preparations (g/100 g). Belo Horizonte, MG, 2016.

Protein bar		Date candy	
<i>Ingredients</i>	<i>Gross weight (g)</i>	<i>Ingredients</i>	<i>Gross weight (g)</i>
Agave syrup	24.7	Dry date	60.8
Filtered water	23.3	Filtered water	51.2
Raisin	22.7	Unflavored concentrated Whey Protein powder	14.6
Flaked oats	22.0	Cocoa powder	7.4
Quinoa	14.3	Agave syrup	2.7
Brazil nuts	11.1		
Unflavored concentrated Whey Protein powder	8.2		
Cocoa powder	5.2		
Vanilla extract	1.2		
Cinnamon powder	1.1		

Source: the authors

Table 1. Final formulation of the food preparations (g/100 g). Belo Horizonte, MG, 2016. (Continues)

Caprese pate		Sweet potato pie	
<i>Ingredients</i>	<i>Gross weight (g)</i>	<i>Ingredients</i>	<i>Gross weight (g)</i>
Tomato	28.5	Sweet potato	63.9
Cottage cheese	18.3	Chicken fillet	35.7
Skimmed yogurt	18.3	Onion	9.5
Chicken fillet	16.9	Flaked oats	3.0
Onion	11.1	Lemon	3.0
Lemon	5.3	Olive oil	0.7
Fresh basil	2.8	Garlic	0.6
Garlic	1.8	Salt	0.6
Salt	1.4	Fresh chives	0.6
Fresh chives	1.4	Fresh parsley	0.3
Olive oil	0.9	Black pepper	0.1
Fresh parsley	0.4		

Source: the authors

The food preparations were developed and tested in the Laboratory of Dietetic Technique of the Pontifícia Universidade Católica de Minas Gerais (Pontifical Catholic University of Minas Gerais), located in the city of Belo Horizonte. The ingredients were purchased from supermarkets in the city. After the tests, the food preparations were standardized in terms of forms of preparation, ingredients, quantities in grams, homemade measurements such as use of spoons and cups, preparation mode, portion, and nutritional composition.

Nutritional Composition

A portion of each food preparation was established based on the adequacy of macronutrients and their proportions.⁸ The nutritional values of the ingredients were calculated according to the information present in their labels and the Brazilian Food Composition Table.⁹

Sensory Analysis

The study was previously approved by the Ethics Committee on Research with Human Beings of the Pontifícia Universidade Católica de Minas Gerais (Pontifical Catholic University of Minas Gerais), protocol no. 59121615.8.0000.5137.

Acceptance and consumption intention tests were performed with 224 untrained tasters of both sexes, aged between 18 and 60 years, belonging to a CrossFit academy in Belo Horizonte, and the participants signed the informed consent form.

Data were collected by a previously trained team. Initially, a questionnaire structured as a face-to-face interview was performed. The following aspects were investigated: a) sociodemographic variables: age, gender, and schooling; b) questions to determine whether candidates were able to carry out the tests; and c) eating habits and preferences.

In the acceptability test, each food preparation was offered to 112 tasters, one at a time and randomly, to evaluate the attributes, such as color, aroma, flavor, and global impression, on a structured hedonic scale of nine points, where 1 was allotted to "I really disliked" and 9 to "I really liked".¹⁰ With the averages of the acceptability test, the acceptability index (AI) was calculated, using the following formula: $AI = (A \times 100) / B$, in which A = average of the scores attributed to the product and B = maximum score attributed to the product.

The consumption intention test was performed on a structured hedonic scale of nine points, where 1 was allotted to "would only eat this if forced" and 9 to "eat it whenever I had the opportunity".¹¹

The evaluation was carried out in individual cabins, with good lighting. The food preparations were served on disposable white dishes coded with three-digit numbers at room temperature, and balanced order. The caprese pate was served accompanied by an industrialized wheat-based mini toast; sweet potato pie and protein bar were served in rectangular slices; and the date candy, in round shape. The samples weighed approximately 25 g each.

For each attribute of sensory analysis and the consumption intention scale, mean and standard deviation of the obtained scores were calculated.

RESULTS E DISCUSSION

In the development of sweet preparations in this study, the ingredients commonly used in conventional sweets have been replaced by natural foods, and the amount of whey proteins has been increased to improve the protein content of these preparations. In the salty preparations, we chose to prioritize cheese and thin meat, skimmed yogurt, as well as herbs, spices, lemon, and onion to add flavor (table 1).

Participated in the sensory analysis 224 tasters, 112 for evaluation of the salty preparations and 112 for the sweet preparations. Majority of the participants were male (58.0%), under 29 years (53.5%), had completed higher education (81.2%) and had healthy eating habits according to self-assessment (87.1%).

Table 2 shows the results of the attributes evaluated by the tasters in the acceptability and consumption intention tests. All the means of the scores assigned by the tasters in the acceptability test were higher than 6 on the hedonic scale, demonstrating that the food preparations were at least "liked slightly" by the tasters. The sweet preparations - date candy, and protein bar, obtained averages equal to or greater than 6.8 and 7.0 for all attributes, respectively. The salty preparations, sweet potato pie and caprese pate presented averages equal to or greater than 6.1 and 7.2 for all attributes, respectively.

Regarding the attributes evaluated, the color of the date candy obtained a lower mean score (6.8), possibly due to the color of date and cocoa used in the food preparation, conferring a darker color to the product. On the other hand, global impression obtained the best evaluation (7.3), revealing good general acceptance of the food preparation. Regarding the scores obtained by the protein bar, the aroma attribute was evaluated highly by the tasters (7.5), possibly due to the use of dried fruits, cocoa, and agave. Like sweet potato pie, the caprese pate stood out for its flavor, receiving an average of 7.8 for this attribute, probably due to the use of herbs and spices. These results reveal good perspectives to expand the application of Gastronomy in the area of Sports Nutrition.

For a product to be considered "acceptable", it must present at least 70% acceptability.¹⁰ According to the indices described in Table 2, all food preparations exceeded the value considered "acceptable", with the lowest and highest acceptability index being for the sweet potato pie (75.6%) and the protein bar (87.8%), respectively.

The consumption intention test reproduced the acceptability results, with greater intention of consumption for the protein bar and caprese pate. It is noteworthy that the average scores for the date candy and sweet potato pie were higher than 6, which corresponds to "I like this and would eat from time to time" on the hedonic scale of consumption intention (table 2).

Table 2. Sensory preferences, acceptability, and consumption intention of the food preparations Belo Horizonte, 2016.

Variables	Protein bar	Date candy	Sweet potato pie	Caprese pate
Color	7.4±1.7	6.8±1.8	6.1±1.7	7.3±1.5
Aroma	7.5±1.5	7.0±1.7	6.8±1.6	7.2±1.4
Flavor	7.0±1.9	7.1±1.7	7.2±1.7	7.8±1.2
Global Impression	7.3±1.7	7.3±1.7	6.9±1.6	7.6±1.2
Acceptability Index	87.8%	78.9%	75.6%	83.3%
Consumption Intention Test	7.2±1.9	6.6±2.0	6.5±1.8	7.1±1.5

Values expressed as mean ± standard deviation. Source: the authors.

Regarding nutritional composition, the four food preparations presented good nutritional characteristics (table 3). All the food preparations offered high protein content (ranging from 5 to 14 g per portion), due to protein from the constituent food, or by addition of whey protein. It is well known that not only the amount of protein, but also the type of protein (high biological value, rich in leucine, or offered in particular up to two hours after the training session) exerts influence on protein synthesis and repair of damaged structures.^{8,12-14}

Table 3. Nutritional composition of the portions and 100 g of the food preparations Belo Horizonte, 2016.

Nutritional Facts	Protein bar		Date candy		Sweet potato pie		Caprese pate	
	Portion	100 g	Portion 40 g	100 g	Portion	100 g	Portion 60 g	100 g
	40 g				120 g			
Caloric value (kcal)	182.0	433.0	100.0	250.0	233.5	195.0	52.0	87.0
Carbohydrate (g)	30.6	72.9	17.9	44.8	32.6	27.2	3.5	5.8
Protein (g)	6.5	15.5	5.6	14.0	14.1	11.8	5.4	9.0
Fat (g)	4.5	10.7	0.5	1.3	5.0	4.2	2.1	3.5
Saturated fat (g)	1.1	2.6	0.3	0.8	1.3	1.1	0.7	1.2
Trans fat (g)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cholesterol (g)	0.0	0.0	0.0	0.0	91.7	76.4	7.5	12.5
Fibers (g)	2.7	6.4	2.8	7.0	3.3	2.8	1.6	2.7
Sodium (mg)	3.63	8.64	3.7	9.3	228.7	190.6	195.8	326.3

Source: the authors

The protein bar (40 g), in addition to the protein content (6.5 g), offered high energy (182 kcal), carbohydrate content (30.6 g), and fibers (2.7 g), which is unusual in these types of bars. The associated supply of carbohydrates and proteins through a small snack such as the bar can be of interest to physically active people. In addition to practicality and ensuring satiety, it simultaneously assists in the replacement of glycogen and in muscle recovery. Similarly, a portion of sweet potato pie (120 g) can offer significant amount of nutrients (32.6 g of carbohydrates and 14.1 g of proteins) when consumed during lunch or dinner. In addition, sweet potatoes, the base ingredient, have a low glycemic index (GI),^{9,15} which is one of the indicators

of carbohydrate quality in food. Adequate consumption of low to moderate GI food, especially before training, allows the maintenance of muscle glycogen and blood glucose stocks; prevents complications such as early fatigue, protein depletion, low glucose stock, hunger and hypoglycemia during training; and is an important substrate for ensuring physical performance and maintaining immunity, especially for a high-intensity performance.¹⁶⁻¹⁸ The use of chicken breast fillet in the food preparation helped reduce the glycemic load of the meal and contributed proteins of high biological value. Protein is an important nutrient for muscle recovery and physical performance of the active public.

All the food preparations presented good fiber content. However, to achieve the daily recommendation (14 g/1.000 kcal), it is necessary to include other food/meal sources of fiber throughout the day. Its known benefits are - promoting proper bowel functioning; and prevention of cardiovascular diseases, type 2 diabetes mellitus, obesity, dyslipidemia, and neoplasms. Most populations do not achieve the daily recommendation.¹⁹

Observational studies show the benefits associated with reducing saturated fat intake, proportionally increasing unsaturated fat intake, and consumption of whole grains and plant proteins in combating cardiovascular diseases.²⁰ Date candy and caprese pate stood out for the low number of calories, total fats and saturated fats.

Simple sugar was not added to any food preparation. There is evidence indicating that excessive sugar consumption is a precursor for positive energy balance, leading to weight gain and chronic non-communicable diseases.^{21,22} Table sugar has high GI and its frequency in the diet can lead to fluctuations in the insulin response, because it is rapidly metabolized into glucose, leading to early feelings of hunger.²³ In this context, it is important to develop healthier sweet preparations, such as the date candy and protein bar, prepared with agave syrup, which is a natural sweetener, with a greater sweetening power and a lower glycemic index. Due to its chemical composition being rich in fructose, it also contributes to the flavor of the food preparations.²⁴

In the date candy and the protein bar, cocoa was used in place of chocolate powder and milk chocolate, respectively, giving the food preparations a greater input of fibers and antioxidants.^{25,26} Dried fruits are sources of vitamins, mineral salts, and phenolic compounds with antioxidant properties, and are important for energy metabolism.²⁷ The presence of vitamins and minerals in food is essential for the regulation of metabolic and neurological processes, energy synthesis and prevention of cell destruction.¹⁴ For sportspersons, vitamins and minerals also favor the maintenance and/or gain of muscle mass, and reduction of lesions and cramps.²⁸

The caprese pate was prepared with the intention of presenting attractive flavors, and the use of herbs and spices, in addition to nutritional aspects. The ingredients such as skimmed yogurt, cottage cheese, and chicken breast fillet, have low caloric content, unlike traditional pates, which are produced with higher caloric and greasy ingredients such as mayonnaise. In addition, caprese pate had a reduced content of calories, carbohydrates, and lipids per portion. As it is usually accompanied by other food items (for example, toast, breads, and salads among others), it can provide flavor without increasing the energy and fat content considerably. It may also increase the supply of proteins of high biological value, which are extremely important for muscle repair and recovery.^{13,14}

It is worth mentioning the absence of trans fat in all sweet and salty food preparations, and the low sodium content in each portion. Excessive consumption of these components is directly related to unhealthy eating habits that bring harm to health.²⁹

The nutritional characteristics and good acceptance of the food preparations elaborated here are extremely important in the field of Sports Nutrition, with meals offering greater protein content, quality in the sources of carbohydrates and fats, and presence of fibers, vitamins, and minerals. Thus, it is possible to obtain flavorful meals, ensuring greater adherence to good eating practices and, consequently, health, combining sensory quality with the nutritional value of meals.^{30,31} This study highlights simple and practical food preparations, and aims to facilitate access to and preparation of healthy foods that use fresh products instead of processed foods, based on principles addressed in the current Food Guide for Brazilian Population.³⁰

All the four food preparations described here use most ingredients commonly found in supermarkets, and are therefore easily accessible, without the need for costly and unusual ingredients present in stores specialized in health and/or sports nutrition. Thus, meal consumption and preparation become easier, taking into account the need for healthy, accessible, practical, and nutritionally adequate eating suited to individual needs.

More studies are needed to explore the two areas, Gastronomy and Sports Nutrition, to disseminate the prescription of healthy, adequate, and pleasurable eating to physically active people and the general public. Disseminating information on easy culinary practices that extend autonomy to make varied and more accessible choices on a daily basis is fundamental, given the lack of time in large urban centers, which leads people to surrender to countless industrialized food options.

In product development, it is essential to optimize parameters such as shape/form, color, appearance, aroma, flavor, texture, and consistency, and to seek the interaction of the different components, in order to achieve an integral balance that translates into excellent quality and good acceptability.

CONCLUSION

The four food preparations presented good nutritional composition, high rates of acceptability, and high intention of consumption by the tasters. Since sportspersons should pay special attention to food due to the importance of adequate nutrients in physical performance, the preparation of flavorful and nutritionally appropriate food preparations for this consumer category should be increasingly explored to contribute to physical performance and health. It also strengthens the development of culinary skills, valuing the act of planning, preparing, and cooking food, rather than surrendering to industrialized foods with a large amount of artificial ingredients.

These results are of great relevance, as they show that the replacement of energy rich, fatty, and industrialized ingredients with healthier and easily accessible foods makes it possible to make food preparations with adequate sensory properties, nutritional quality, and high rates of acceptability.

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REFERENCES

1. Murray JM, Brennan SF, French DP, Patterson CC, Kee F, Hunter RF. Mediators of Behavior Change Maintenance in Physical

- Activity Interventions for Young and Middle-Aged Adults: A Systematic Review. *Ann Behav Med.* 2018; 52(6):513-529.
2. Silva ICM, Mielke GI, Bertoldi AD, Arrais PSD, Luiza VL, Mengue SS. et al. Overall and Leisure-Time Physical Activity Among Brazilian Adults: National Survey Based on the Global Physical Activity Questionnaire. *J Phys Act. Health.* 2018; 15(3): 212-218.
 3. Coelho RG. Integrações do metabolismo em exercício, jejum e no estado alimentado. *Ciência Atual* 2016; 8(2):2-9.
 4. Thomas DT, Erdman KA, Burke LM. Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance. *J Acad Nutr Diet.* 2016; 116(3):501-528.
 5. Maughan RJ, Shirreffs SM. Nutrition for sports performance: issues and opportunities. *Proc Nutr Soc.* 2012; 71(1):112-119.
 6. Chagas BF, Nascimento MVS, Raposo OFF, Mendes Netto RS. Treinadores apresentam maior conhecimento em nutrição básica do que em nutrição esportiva. *Rev Bras Nutr Esportiva* 2016; 10(60):627-636.
 7. Silva FD, Pante CF, Prudêncio SH, Ribeiro AB. Elaboração de uma barra de cereal de quinoa e suas propriedades sensoriais e nutricionais. *Alim Nutr* 2011; 22(1):63-69.
 8. Hernandez AJ, Nahas RM, editores. Modificações dietéticas, reposição hídrica, suplementos alimentares e drogas: comprovação de ação ergogênica e potenciais riscos para a saúde. *Rev Bras Med Esporte* 2009; 15(3):3-12.
 9. NEPA – Núcleo de Estudos e pesquisas em Alimentação. Tabela brasileira de composição de alimentos. 4. ed. Campinas: UNICAMP; 2011.
 10. Dutcosky SD. Análise sensorial de alimentos. 4. ed. Curitiba: Champagnat; 2013.
 11. Oliveira AF. Análise Sensorial dos Alimentos. Londrina: Universidade Tecnológica Federal do Paraná; 2010.
 12. Batista MA, Gama LLA, Almeida LP, Ornellas CBD, Santos LC, Cruz LL, et al. Desenvolvimento, caracterização e análise sensorial de formulações alimentares com proteínas do soro de leite ou albumina para crianças. *Braz J Food Technol.* 2015; 18(1):31-41.
 13. Huang WC, Chang YC, Chen YM, Hsu YJ, Huang CC, Kan NW, et al. Whey Protein Improves Marathon-Induced Injury and Exercise Performance in Elite Track Runners. *Int J Med Sci.* 2017; 14(7):648-654.
 14. Kerksick CM, Wilborn CD, Roberts MD, Smith-Ryan A, Kleiner SM, Jäger R, et al. ISSN exercise & sports nutrition review update: research & recommendations. *J Int Soc Sports Nutr.* 2018; 15(38):1-57.
 15. Foster-Powell K, Holt SH, Brand-Miller JC. International table of glycemic index and glycemic load values: 2002. *Am J Clin Nutr.* 2002; 76(1):5-56.
 16. Fontan JS, Amadio MB. O uso do carboidrato antes da atividade física como recurso ergogênico: revisão sistemática. *Rev Bras Med Esporte.* 2015; 21(2):153-157.
 17. Li D. The Research on the Effect of the Food with Different Glycaemic Index and Glycaemic Load on the Immunity of Endurance Athletes. *Open Biomed Eng J.* 2015; 9:305-309.
 18. Kanter M. High-Quality Carbohydrates and Physical Performance: Expert Panel Report. *Nutr Today* 2018; 53(1):35-39.
 19. Lie L, Brown L, Forrester TE, Plange-Rhule J, Bovet P, Lambert EV, et al. The Association of Dietary Fiber Intake with Cardiometabolic Risk in Four Countries across the Epidemiologic Transition. *Nutrients* 2018; 10(5):628.
 20. Faludi AA, Izar MCO, Saraiva JFK, Chacra APM, Bianco HT, Afiune Neto A. Atualização da Diretriz Brasileira de Dislipidemias e Prevenção da Aterosclerose – 2017. *Arq Bras Cardiol.* 2017; 109(2):1-91.
 21. Divert C, Chabanet C, Schoumacker R, Martin C, Lange C, Issanchou S, et al. Relation between sweet food consumption and liking for sweet taste in French children. *Food Qual Prefer.* 2017; 56(Part A):18-27.
 22. Breda J, Jewell J, Keller A. The Importance of the World Health Organization Sugar Guidelines for Dental Health and Obesity Prevention. *Caries Res.* 2018; 53(2):149-152.
 23. Shikany JM, Thomas SE, Henson CS, Redden DT, Heimbürger DC. Glycemic Index and Glycemic Load of Popular Weight-Loss Diets. *Med Gen Med.* 2006; 8(1):22-30.
 24. Mellado-Mojica EM, Pérez MGL. Identification, classification, and discrimination of agave syrups from natural sweeteners by infrared spectroscopy and HPAEC-PAD. *Food Chem.* 2015; 167:349-357.
 25. Efraim P, Alves AB, Jardim DCP. Polifenóis em cacau e derivados: teores, fatores de variação e efeitos na saúde. *Braz J Food Technol.* 2011; 14(3):181-201.

26. Silveira PTS, Conceição ISR, Silva GS, Ferreira CD, Soares SE. Estudo prospectivo relativo ao cacau e produtos de cacau, como chocolate, contendo peptídeos e proteínas. *Cad Prospecção* 2018; 11:340-350.
27. Assirey EAR. Nutritional composition of fruit of 10 date palm (*Phoenix dactylifera* L.) cultivars grown in Saudi Arabia. *J Taibah Univ Sci.* 2015; 9(1):79.
28. Ribas MR, Machado F, Shuluga Filho J, Bassán JC. Ingestão de macro e micronutrientes de praticantes de musculação em ambos os sexos. *Rev Bras Nutr Esportiva* 2015; 9(49):91-99.
29. Gaudette NJ, Pietrasik Z. The sensory impact of salt replacers and flavor enhancer in reduced sodium processed meats is matrix dependent. *J Sens Stud.* 2017; 32(e12247):1-10.
30. Brasil. Ministério da Saúde. Guia alimentar para a população brasileira. 2. ed. Brasília: Ministério da Saúde; 2014.
31. Rodrigues B, Spuldaro LI, Biesek S. Intervenção nutricional em atletas adolescentes praticantes de futsal de uma associação atlética em Curitiba-PR. *Rev Bras Nutr Esportiva* 2016; 10(56):126-135..

CONTRIBUTORS

Ramos SA worked at all stages, from the conception of the study to the final review of the article; Santos BF, Silva FRF, and Carvalho LMC participated in the execution of the study and the writing of the article; Goston JL worked on the conception of the study, analysis and interpretation of the data, and the writing of the article.

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