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ANTHROPOMETRIC PROFILE, NUTRITIONAL STATUS, AND BODY COMPOSITION IN SCHOOLCHILDREN WHO PRACTICE AND DO NOT PRACTICE FUTSAL

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ABSTRACT

This study aimed to measure the anthropometric variables of schoolchildren who practice and do not practice futsal, evaluating their nutritional status and body composition. The research was conducted between February and December 2023 with 851 students from schools in Anapurus, Brejo, and Buriti, Maranhão. The sample was divided into 250 futsal players and 601 non-players. Variables such as total body mass (TBM), height, BMI, body fat percentage (BFP), fat mass (FM), and fat-free mass (FFM) were collected, along with the classification of nutritional status and body composition. The statistical analysis included the Student's t-test for group comparisons. The results indicated that, although the differences in anthropometric characteristics between futsal players and non-players were not statistically significant ($p<0.05$), futsal players showed a more balanced body composition profile, with lower body fat percentage and higher lean mass. Furthermore, futsal players had a lower prevalence of malnutrition and overweight. In conclusion, although futsal practice did not show significant differences in anthropometric variables, it is associated with a healthier body composition and may be beneficial in preventing nutritional problems. This suggests that regular futsal practice contributes positively to the overall health of schoolchildren.

Key words: Anthropometry. Schoolchildren. Futsal.

RESUMO

Perfil antropométrico, estado nutricional, e composição corporal em escolares praticantes e não praticantes de futsal

Este estudo teve como objetivo mensurar as medidas antropométricas de escolares praticantes e não praticantes de futsal, avaliando seu estado nutricional e composição corporal. Foi conduzida entre fevereiro e dezembro de 2023 com 851 alunos de escolas de Anapurus, Brejo e Buriti, Maranhão. A amostra foi dividida em 250 praticantes e 601 não praticantes de futsal. Foram coletadas variáveis como massa corporal total (MCT), estatura, IMC, percentual de gordura (PG), massa gorda (MG) e massa isenta de gordura (MIG), com a classificação do estado nutricional e da composição corporal. A análise estatística incluiu o teste t de Student para comparações entre os grupos. Os resultados indicaram que, embora as diferenças nas características antropométricas entre praticantes e não praticantes de futsal não fossem estatisticamente significativas ($p<0,05$), os praticantes apresentam um perfil de composição corporal mais equilibrado, com menor percentual de gordura e maior massa magra. Além disso, os praticantes de futsal apresentaram menor prevalência de desnutrição e sobrepeso. A conclusão apontamos que, embora a prática de futsal não tenha mostrado diferenças significativas nas variáveis antropométricas, ela está associada a uma composição corporal mais saudável e pode ser benéfica para a prevenção de problemas nutricionais. Sugerindo assim que a prática regular de futsal contribua positivamente para a saúde geral dos escolares.

Palavras-chave: Antropometria. Escolares. Futsal.

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INTRODUCTION

Anthropometry is considered one of the most recommended parameters for evaluating and classifying nutritional status, as well as analyzing body composition, due to the ease of obtaining measurements that provide reliable estimates, provided that adequate training is in place for measuring the variables of this method (Gibson, 2005).

In this context, the evaluation and classification of nutritional status involve the use of indicators capable of providing detailed information on the nutritional adequacy of an individual or population, based on a standard aligned with long-term health, according to the parameter and protocol employed (Gomes, Anjos, Vasconcellos, 2010).

The World Health Organization (WHO), regarding anthropometric measures, proposes the Body Mass Index (BMI) as a tool for evaluating and classifying nutritional status. BMI is calculated as the ratio of total body mass to height, expressed in kg/m^2, obtained by dividing body mass by height squared (Duarte, 2007). Based on the result of this equation, nutritional status can be classified by considering percentiles.

Body composition, in turn, involves analyzing the components of the human body, based on the fractionation of total body mass.

It results from the accumulation of nutrients and other substrates acquired from the environment throughout life and retained by the body (Santana et al., 2023).

Body composition can be assessed by various methods, with anthropometric evaluation being one of the most commonly used. This approach employs tools such as a measuring tape and caliper to measure and analyze the different body components (Silva et al., 2023). One common method for assessing body composition is skinfold thickness measurement, which is cost-effective and uses a caliper to measure the thickness of subcutaneous adipose tissue.

Although a simple method, the accuracy of results may vary depending on the evaluator's technique and the correct application of the instrument in terms of position and location (Lewandowski et al., 2022).

In this sense, obtaining data on nutritional status and body composition serves as a health indicator, with the classification of these variables through anthropometric measurements being essential for health professionals.

Thus, the objective of this study was to measure the anthropometric parameters of schoolchildren who practice and do not practice futsal, classifying their nutritional status and body composition in both groups.

MATERIALS AND METHODS

This study is characterized as cross-sectional in nature (Thomas, Nelson, Silverman, 2012).

The study was conducted in the municipalities of Anapurus, Brejo, and Buriti, Maranhão, Brazil, involving students regularly enrolled in middle school (Fundamental II) and high school at the following schools: Isidorio Pires Monteles (São Lourenço neighborhood), Nadir Monteles Cruz (Santo Antônio neighborhood), Colégio Militar Tiradentes (Aeroporto neighborhood), Escola Reino do Saber (Turi neighborhood), Centro de Ensino Thaynara Sousa Cabral, Centro de Ensino Deputado Júlio Pires Monteles, and Centro Educa Mais Vicente Garreto de Vasconcelos (downtown Anapurus, Maranhão, Brazil).

Additionally, middle and high school students from Unidade Integrada Prefeito Elias and Centro de Ensino Cândido Mendes, located in the Palestina neighborhood in Brejo, Maranhão, Brazil, and middle school students from Unidade Escolar Antônio Pedreiro in the Quebra Coco neighborhood of Buriti, Maranhão, Brazil, participated in the study.

A total of 851 students participated in the study. Middle school students had an average age of 13.6 ± 1.16 years, and high school students had an average age of 16.9 ± 1.86 years. The sample selection considered established inclusion and exclusion criteria. Students present at the schools on the day of data collection who met the study's selection criteria and obtained parental or legal guardian authorization to participate by signing the Free and Informed Assent Form (TALE) were included.

Students were excluded if they were absent on the data collection day, illiterate, lacked parental or legal guardian permission, did not complete the questionnaires, or completed the questionnaires but did not participate in the anthropometric assessment.

The study population consisted of 1,610 students enrolled in the participating schools. Of

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these, 759 students did not meet the inclusion criteria and were excluded.

The sample was one of convenience. To determine the necessary sample size, a finite population sampling formula was applied, considering a total population of 1,610 students, a 5% margin of error, a 95% confidence level, and an estimated proportion of 50% (p=0.5). The calculation indicated a minimum required sample of 311 students. However, the study included a final sample of 851 students, which strengthened the analysis and provided greater robustness to the results.

For the anthropometric assessment, including Total Body Mass and Height, a Fitmetria scale with a maximum capacity of 180 kg, 0.1 kg precision, 28x28 cm platform size, and 76 mm x 40 mm LCD screen was used, along with an AvaNutri portable stadiometer with a measurement range of 20 cm to 200 cm. Nutritional status was classified using the Body Mass Index (BMI), calculated by dividing total body mass by height squared. The classification criteria adopted were those of the World Health Organization (WHO, 2007), which propose a nutritional status classification for children and adolescents aged 5 to 19 years. This criterion categorizes BMI values as underweight, normal weight, overweight, and obesity.

To assess nutritional status, the protocol of Weststrate and Deurenberg (1989) was applied, using variables such as fat percentage, fat mass, and fat-free mass. Body composition classification was defined as 10.10% to 20.00% ideal for boys and 15.10% to 25.00% ideal for girls.

The study complies with Resolution 466/12 of the National Health Council of the Brazilian Ministry of Health. It was submitted via the Brazil Platform to the Ethics Committee for Research Involving Human Subjects of the University Hospital of the Federal University of Maranhão and approved under CAAE 15948719.2.0000.5086, opinion number 3.443.502.

This study was conducted between February 2023 and December 2023. Initially, the project was presented to the participating schools, where the data collection methodologies were explained. After the presentation, the free and informed assent form was distributed to students and their guardians for signatures. During the same occasion, the data collection period was scheduled. Questionnaires were administered on paper at the schools, and participating students completed the questions.

For statistical analysis, the Kolmogorov-Smirnov normality test, Student's t-test for sample comparisons, and descriptive statistics techniques such as mean, standard deviation, absolute frequency, and percentage were used.

RESULTS

The sample consisted of 851 schoolchildren with a mean age of 14.8 years and a standard deviation of 2.17. All participants were regularly enrolled in middle school (Fundamental II) or high school in the municipalities of Brejo, Anapurus, and Buriti.

Out of the 851 students, 250 were engaged in futsal practice, while 601 were not.

Table 1 presents the total anthropometric description of the schoolchildren, including those who practice futsal and those who do not.

Table 01 - Anthropometric description of the sample (n=851).

Variables	Mean	Standard deviation	Minimum	Maximum
TBC (kg)	50,20	12,00	27,20	104.00
Height (m)	1,57	0,10	1,20	1,90
BMI (kg/m^2)	20,20	3,74	12,9	36,30
BF (%)	15,90	4,90	4,48	37,50
FM (kg)	8,40	4,49	1,48	39,00
FFM (kg)	41,80	8,14	23,30	69,70

Legend: TBC = Total Body Mass; kg = Kilogram; m = Height; BMI = Body Mass Index; kg/m^2 = Kilogram per square meter; BF = Body Fat Percentage; % = Percentage; FM = Fat Mass; FFM = Fat-Free Mass.

In Table 02, we present the comparison between the groups using the Student's t-test.

In Table 03, we present the nutritional status of schoolchildren who practice and do not practice futsal.

In Table 04, we present the body composition of schoolchildren who practice and do not practice futsal.

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Table 02 - Comparison of the sample using the Student's t-test.

Variable	Futsal practice?	n	Mean	Standart deviation	p
TBC (kg)	Yes	250	50,9	11,3	0,22
	No	601	49,8	12,3	
Height (m)	Yes	250	1,59	0,10	0,34
	No	601	1,56	0,10	
BMI (kg/m^2)	Yes	250	20,00	3,32	0,41
	No	601	20,30	3,90	
BF (%)	Yes	250	15,90	4,90	0,44
	No	601	15,80	5,09	
FM (kg)	Yes	250	8,53	3,92	0,56
	No	601	8,34	4,71	
FFM (kg)	Yes	250	41,80	8,14	0,14
	No	601	41,50	8,22	

Legend: TBC = Total Body Mass; kg = Kilogram; m = Height; BMI = Body Mass Index; kg/m² = Kilogram per square meter; BF = Body Fat Percentage; % = Percentage; FM = Fat Mass; FFM = Fat-Free Mass.

Table 03 - General description of the nutritional status classification distinguishing between those who practice and those who do not practice futsal.

Variable	Futsal Practice?	n	Classification	f(a)	%
Nutritional Status	Sim	250	Undernutrition	27	3,17
	Não	601		66	7,75
	Sim	250	Eutrophic	182	21,38
	Não	601		438	51,46
	Sim	250	Overweight	30	3,52
	Não	601		63	7,40
	Sim	250	Obesity	11	1,29
	Não	601		34	3,99

Legend: f(a) = Absolute Frequency; % = Percentage.

Table 04 - General description of the body composition classification, distinguishing between those who practice and those who do not practice futsal.

Variable	Futsal Practice?	n	Classification	f(a)	%
Body Composition	Sim	250	Low	43	5,05
	Não	601		184	21,62
	Sim	250	Ideal	179	21,03
	Não	601		368	43,24
	Sim	250	High	28	3,29
	Não	601		49	5,75

Legend: f(a) = Absolute Frequency; % = Percentage.

DISCUSSION

In the present study, Table 1 provides a description of the anthropometric characteristics of a sample composed of 851 schoolchildren, including futsal practitioners and non-practitioners. The variables analyzed in the table include Total Body Mass (TBM), Height, Body Mass Index (BMI), Body Fat Percentage (BFP), Fat Mass (FM), and Lean Body Mass (LBM). Each of these variables is discussed below based on their means, standard deviations, and minimum and maximum values.

The analysis revealed an average body mass of 49.8 kg, an average height of 1.56 m, an average BMI of 20.3 kg/m^2, an average body fat percentage of 15.8%, an average fat mass of 8.34 kg, and an average lean body mass of 41.5 kg. The variables showed moderate and relevant variability, reflecting the diversity in the physical characteristics of the schoolchildren and suggesting the influence of factors such as age, gender, physical activity level, and dietary habits.

According to anthropometric characteristics, Ferreira, Szwarcwald, and Damacana (2019) point out that there is strong

evidence that obesity in adults may have its origins in habits developed during childhood and adolescence, which tend to be carried over into adulthood. Therefore, these life stages are considered crucial for interventions that promote habit modification and encourage healthy behaviors, such as regular physical activity.

Table 2 presents a comparison of anthropometric characteristics between futsal practitioners and non-practitioners, using the t-test to determine the significance of differences between the groups. Although futsal practitioners showed a slight tendency towards better anthropometric indices, none of these differences were considered statistically significant. This suggests that, despite the presence of some variations, there is no clear evidence that futsal practice is associated with significant differences in anthropometric characteristics when compared to non-practitioners within the analyzed sample. This result supports the findings of Junior (2012), who did not find significant differences in anthropometric variables but emphasized that futsal practitioners were within favorable health ranges.

Regarding nutritional status and body composition, a positive association was observed between futsal practice and improved health indicators. These findings are consistent with the literature linking regular engagement in sports activities to improvements in body composition, as well as reductions in health risk factors.

The anthropometric analysis revealed that the schoolchildren who practiced futsal generally had superior body composition indicators, such as lower body fat percentage and higher lean body mass. These results align with the research by Silva et al. (2018), which associated regular futsal practice with more balanced body composition.

Adequate body composition contributes to a positive body image, which is important in the sports context as an indicator of strength and health. High fat mass can negatively impact sports performance by reducing speed and making movement execution more difficult (Costa, 2019).

Based on the nutritional status in Table 03, this study showed that most schoolchildren were classified as eutrophic, and the incidence of overweight and obesity among futsal players was low. These findings corroborate Minderica's (2016) research, which highlighted that athletes do not require a drastically different diet compared to non-athletes, although the distribution of macronutrients (carbohydrates, proteins, and lipids) should be adjusted to meet energy and metabolic needs.

When comparing futsal practitioners and non-practitioners, it was observed that non-practitioners had a higher prevalence in the malnutrition and overweight groups. This suggests that futsal practice may be beneficial for improving nutritional status and preventing obesity.

Table 04 indicates that most of the sample is classified with ideal body composition, which is a positive sign in terms of overall health. Futsal practice is associated with a higher prevalence of ideal body composition among schoolchildren, reinforcing the importance of maintaining sports activity for health and proper body composition. However, it is important to highlight that the proportion of schoolchildren with below-ideal body composition is significantly lower among futsal practitioners (5.05%) compared to non-practitioners (21.62%). This data suggests that futsal practice may be associated with a lower risk of poor body composition, likely due to the health benefits of regular practice and maintenance of muscle mass.

Body composition plays a key role in the sports context, being an important indicator of physical fitness and overall health (Brum, 2020). It involves the balance between muscle and fat and can directly affect performance in various sports. In highly demanding sports such as futsal, proper monitoring of body composition is essential for practitioners to achieve and maintain ideal physical parameters.

Moreover, it is important to emphasize that futsal practice may have benefits beyond the improvement of the observed anthropometric variables. Although no statistically significant difference was found between the groups, the data suggest that schoolchildren who practice futsal tend to have more balanced body composition, with lower fat percentage and higher lean mass. These results align with studies stating that regular physical activity, such as futsal, may play an important role in the prevention of eating disorders and childhood obesity (Corrêa et al., 2024; Junior, 2012; Teixeira et al., 2008).

Another factor to consider is the frequency and intensity with which schoolchildren practice futsal. The literature suggests that for the benefits in terms of body

composition to be more evident, the practice needs to be regular and of minimum intensity. Therefore, a more detailed analysis of these aspects could provide further insights into the relationship between futsal and anthropometric characteristics.

Additionally, although the analysis did not reveal significant differences between the groups, other variables such as diet or participation in other physical activities may also influence the results. Future studies could evaluate the impact of a combination of factors, including dietary habits and the practice of different sports, for a more holistic analysis of schoolchildren's health.

CONCLUSION

This study revealed that, although no statistically significant differences were found in anthropometric variables between futsal practitioners and non-practitioners, sports practice is associated with a more balanced body composition, with lower body fat percentage and higher lean body mass.

The schoolchildren who practiced futsal also showed a lower prevalence of malnutrition and overweight, indicating benefits for nutritional status and overall health.

Although the results were not statistically significant in the variables, the data suggest that regular futsal practice may positively contribute to maintaining a healthy body composition and preventing issues related to ideal nutritional status.

REFERENCES

1-Brum, S.P.S.Z. Composição Corporal, Ingestão Nutricional e Perceção da Influência da Alimentação na Prática Desportiva em Atletas Praticantes de Futsal: Um Estudo Exploratório. Dissertação de Mestrado. Universidade Aberta. Portugal. 2020.

2-Corrêa, Y.K.; Koehler, C.R.; Souza, N.G.; Souza, N.G.; Oliveira, C.S.D.C.; Diniz, M.D.F.G.; Barbosa, F.A.C.; Aguiar, T. P. Obesidade infantil e a prática de atividade física, uma revisão. Brazilian Journal of Health Review. Vol. 7. Núm. 3. 2024. p. 1-13.

3-Costa, A. Caraterização da composição corporal e ingestão nutricional de jovens atletas de basquetebol ao longo da semana de treino e competição. 2019. Dissertação (Licenciatura) – Faculdade de Ciências da Nutrição e Alimentação da Universidade do Porto, Porto, Portugal.

4-Duarte, A.C.G. Avaliação Nutricional Aspectos Clínicos e Laboratoriais. Atheneu. 2007. p. 17-193.

5-Ferreira, A.P.D.S.; Szwarcwald, C.L.; Damacena, G.N.; Prevalência e fatores associados da obesidade na população brasileira: estudo com dados aferidos da 105 Pesquisa Nacional de Saúde, 2013. Revista brasileira de epidemiologia. Vol. 22. 2019. p. e190024.

6-Gibson, R. S. Principles of nutritional assessment. New York: Oxford University Press. 2005.

7-Gomes, F.D.S.; Anjos, L.A.D.; Vasconcellos, M.T.L.D. Antropometria como ferramenta de avaliação do estado nutricional coletivo de adolescentes. Revista de Nutrição. Vol. 23. Num. 4. 2010. p. 591-605.

8-Junior, S.G.D. Perfil antropométrico de atletas de futsal em fase escolar da cidade limoeiro-pe. Revista Brasileira de Futsal e Futebol. São Paulo. Vol. 4. Núm. 14. 2012. p. 275-279.

9-Lewandowski, Z.; Dychała, E.; Pisula-Lewandowska, A.; Danel, D.P. Comparison of Skinfold Thickness Measured by Caliper and Ultrasound Scanner in Normative Weight Women. Int J Environ Res Public Health. Vol. 19. Núm. 23. 2022. p. 16230 doi: 10.3390/ijerph192316230.

10-Minderica, C. Nutrição, treino e competição. Lisboa: Instituto Português do Desporto e Juventude. 2016.

11-WHO. Organização Mundial de Saúde. Growth reference data for 5-19 years. 2007. Disponível em: https://www.who.int/growthref/who2007_ bmi_for_age/en/index.html padronizações. 4ª edição. Pallotti. Porto Alegre. 2009. p. 57-69.

12-Santana, D.S.M.P.; Rezende, A.J.; Fortes, R.C. Influência do acompanhamento nutricional sobre a composição corporal de indivíduos praticantes de treinamento de resistência.

Revista Brasileira de Nutrição Esportiva. São Paulo. Vol. 17. Núm. 106. 2023. p. 551-559.

13-Silva, P.R.S.; Greve, J.M.D.; Novilho, H.N.E.; Haddad, S.; Santos, C.R.P.; Leme, R.B.; Franco, R.R.; Cominato, L.; Araújo, A.T.M.; Santos, F.M.; Damiani, D.; Rica, R.L.; Bocalini, D.S. Futsal improve body composition and cardiorespiratory fitness in overweight and obese children. A pilot study. Motriz: Revista de Educação Física. Vol. 24. Núm. 3. 2018. p. e003618.

14-Silva, P.M.F.; Souza, Y.L.L.; Santos, A.V.; Xemenes, R.C.C. Métodos de avaliação da gordura corporal e análise da ferramenta de ultrassonografia em pacientes obesos. Arquivos de Ciências da Saúde da UNIPAR. Vol. 27. Núm. 8. 2023. p. 4742-4753. doi: 10.25110/arqsaude.v27i8.2023-036

15-Teixeira, P.C.; Costa, R.F.D.; Matsudo, S.M.M.; Cordás, T.A. A prática de exercícios físicos em pacientes com transtornos alimentares. Archives of Clinical Psychiatry. Brasil. Núm 36. Vol. 4. 2008. p. 145-52.

16-Thomas, J.R.; Nelson, J.K.; Silverman, S.J. Métodos de pesquisa em atividade física. 6ª edição. Artmed. 2012.

17-Weststrate, J.A.; Deurenberg, P. Body composition in children: proposal for a method for calculating body fat percentage from total body density or skinfold thickness measurements. American Journal of Clinical Nutrition. Vol. 50. Núm. 5. 1989. p.1104-1115.

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