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FOOD PATTERN OF UNIVERSITY STUDENTS AND THEIR IMPLICATIONS ON CARDIOVASCULAR RISK FACTORS

PADRÃO ALIMENTAR DE ESTUDANTES UNIVERSITÁRIOS E SUAS IMPLICAÇÕES SOBRE OS FATORES DE RISCO CARDIOVASCULAR

ESTÁNDAR DE ALIMENTOS DE ESTUDIANTES UNIVERSITARIOS Y SUS IMPLICACIONES EN FACTORES DE RIESGO CARDIOVASCULAR

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ABSTRACT

Objective: describe the dietary pattern and cardiovascular risk factors of university students and correlate it with body mass index and systolic blood pressure. **Methodology:** This cross-sectional study, with 128 students from a Federal University south of the country, subjected to investigated through a Food Guide questionnaire, and collect anthropometric and systemic blood pressure measures. The following analyzes were performed: descriptive and Pearson's correlation ($p<0,05$). **Results**: Low dietary pattern, high consumption of sausages (75,7%) and carbohydrates (54,6%), predominance of physical activity below the recommended (57,0%). It was found strong and negative correlation between body mass index and inadequate dietary pattern ($r =-0,77$; $p=0,040$), that is, the unsatisfactory dietary pattern was related to the higher body mass index. **Conclusion:** Unsatisfactory eating patterns are common among university students, as well as physical inactivity. There is a relationship between the body mass index and the dietary pattern of university students.

Descriptors: Students; Food pattern; Risk factors; Cardiovascular diseases.

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RESUMO
Objetivo: descrever o padrão alimentar e os fatores de risco cardiovasculares dos estudantes universitários, correlacionando-os ao índice de massa corporal e à pressão arterial sistólica. **Métodos:** estudo transversal, com 128 estudantes de uma Universidade Federal do Sul do país, que responderam o questionário Guia Alimentar para População Brasileira, houve coleta de medidas antropométricas e pressão arterial sistêmica. Procederam-se as análises: descritiva e correlação de Pearson ($p<0,05$). **Resultados:** observou-se padrão alimentar insatisfatório com consumo elevado de embutidos (75,7%) e carboidratos (54,6%), e prática de atividade física abaixo do recomendado (57,0%). Verificou-se correlação forte e negativa entre índice de massa corporal e padrão alimentar insatisfatório ($r =-0,77$; $p=0,040$), ou seja, o padrão alimentar insatisfatório relacionou-se ao maior índice de massa corporal. **Conclusão:** o padrão alimentar insatisfatório é frequente entre os universitários, bem como a inatividade física. Há relação entre o índice de massa corporal e o padrão alimentar de universitários.
Descritores: Estudantes; Padrão Alimentar; Fatores de risco; Doenças cardiovasculares.

RESUMEN
Objetivo: Describir el patrón dietético y los factores de riesgo cardiovascular de los estudiantes universitarios y correlacionarlo con el índice de masa corporal y la presión arterial sistólica. **Metodología:** Estudio transversal, con 128 estudiantes de la Universidad Federal sur del pais, hecho bajo entrevista a través de cuestionario Guía de Alimentos, y colección de medidas antropométricas, presión arterial sistémica. Los análisis se realizaron: descriptivo y correlación de Pearson ($p<0,05$). **Resultados:** Bajo patrón dietético, alto consumo de embutidos (75,7%) y carbohidratos (54,6%), predominio de la actividad física por debajo de lo recomendado (57,0%). Fue encontrado correlación fuerte y negativa entre el índice de masa corporal y el patrón dietético inadecuado ($r =-0,77$; $p=0,040$), es decir, el patrón dietético insatisfactorio se relacionó con un indice de masa corporal más alto. **Conclusión:** Los patrones de alimentación insatisfactorios son comunes entre los estudiantes universitarios, así como la inactividad física. Existe una relación entre el índice de masa corporal y el patrón dietético de los estudiantes universitarios.
Descriptores: Estudiantes; Estándar de alimentos; Factores de riesgo; Enfermedades cardiovasculares.

INTRODUCTION

Every year, the number of new students in the higher education network increases. In 2016, around 3 million people enrolled in Brazilian universities.[1] In this scenario, access to university is marked, for students, as a phase of changes in their lives, since, when moving away from if from the family bond, they start to assume new responsibilities, such as taking care of their own food, thinking about housing and carrying out the financial management of their lives. Given this new routine, practical and fast foods become the most consumed, causing less healthy eating patterns.[2]

The Ministry of Health (MH)[3] understands healthy eating as a human right. In this sense, it understands an adequate dietary pattern as one that meets the biological and social needs of individuals according to the stages of life.

Busatto et al.[4] report in their study that food has a comprehensive meaning, as it involves choices, selections, occasions, rituals and also emotions, in addition, it is inserted in the context of health promotion.

A balanced diet can prevent many diseases, including cardiovascular diseases (CVD), promoting improvements in quality of life. Studies have already proven the effects of a healthy diet and suggest food models capable of promoting cardiovascular protection, one of the most cited for this is the Mediterranean diet, due to its relationship with fewer cerebrovascular and cardiovascular events.[5]

The university population consists mostly of healthy young people, but with the presence of some cardiovascular risk factors (CVRF) intrinsic to the academic environment, with cognitive prevention resources and behavior change. Many behaviors are indicated and can be implemented within the university environment for a healthy lifestyle, diet being one of them.[6]

Framingham's[7] study highlights the traditional CVRF as smoking, obesity, systemic arterial hypertension (SAH), dyslipidemia and diabetes mellitus as factors that increase the probability, in ten years, for the development of CVD. Other epidemiological studies list different risk factors for developing CVD and draw attention to non-traditional CVRF, such as lifestyle, stress and protective diet.[8] The American Heart Association[9] and the Brazilian Society of Cardiology[8] emphasize and state that poor diet, physical inactivity and obesity are highly relevant triggering factors for the development of CVD.

Thus, it is identified that young people, especially university students, due to academic demands, require attention and care, with emphasis on the implementation of programs aimed at improving dietary patterns, as well as those aimed at primary prevention of CVD, as an incentive to the practice of physical activity and a balanced diet, since this is a healthy population with countless possibilities for preventing and minimizing CVRF.[10]

In view of this scenario, this study aims to describe the dietary pattern and cardiovascular risk factors of university students, correlating them with body mass index (BMI) and systolic blood pressure (SBP).

METHOD

Cross-sectional study, carried out between June and July 2018, with 128 university students from a Federal University in the south of the country. The

sample was selected for convenience; and data collection was performed using the Food Guide for the Brazilian Population of MS (2014) questionnaire, which contains 14 questions. In addition, a questionnaire with sociodemographic information (age, gender and nationality), undergraduate course attended and means of transport used to go to the University was used.

Health questions were also applied, including smoking, family history with a history of CVD and regular physical activity, which was measured by the marked answers (does not practice, practices at least 30 minutes a day and practices 2 to 4 times a week). The classification into practitioners and non-practitioners of regular physical activity was based on the indications of the American College Sports of Medicine (ACMS)[12], which recommends performing 30 minutes of physical activity, 5 days a week, with moderate intensity – if the practice is more rigorous, it recommends 20 minutes 3 days a week.

The target audience included students enrolled in full-time courses, who were attending between the third and ninth semester of graduation, aged 18 years or over. Those with self-reported CVD and those who did not authorize the verification of their anthropometric measurements were excluded.

At the time of the instruments application, the abdominal circumference (AC) was measured to identify visceral fat, being AC female ≥ 80 cm and AC male ≥ 94 cm, following the measurement recommendations of theACMS.[12] Systemic blood pressure (SBP) was also verified, following the standardized auscultatory method according to Potter[13], in which SBP was considered ≤ 120 mmHg and diastolic blood pressure (DBP) ≤ 80 mmHg as a reference of normality.[8]

For the anthropometric assessment, parameters associated with cardiovascular risk were extracted, such as BMI, which assesses nutritional status, calculated from self-reported weight and height. In addition, the classification was made following the normality parameters based on MS11, namely: BMI < 18.5 underweight, BMI between 18.5 and < 25 kg/m² eutrophic, BMI ≥ 25 and < 30 kg/m² overweight, BMI ≥ 30 kg/m² obesity.

The dietary pattern was dichotomized into satisfactory and unsatisfactory. The daily intake recommendations were followed, being for fruits 3 to 5 servings/day, vegetables 3 to 5 tablespoons/day, animal protein 1 to 2 units, slice/day, carbohydrates 6 servings/day, sausages 1 portion/week and water between 6 to 8 glasses/day, as recommended by the Food Guide for the

Brazilian Population.[3] In this sense, to classify as satisfactory, those who were within the recommended consumption and unsatisfactory were those that did not reach the minimum consumption or even exceeded the recommended one.

Data were analyzed using the GraphPad Prism version 7.05 program. Continuous variables (BMI, BP and AC) were described using mean and standard deviation. The categorical (dietary pattern, physical activity, smoking, family history) were expressed in absolute numbers and percentages.

To correlate BMI and SBP with dietary pattern, the Pearson correlation coefficient was used, taking into account, for this calculation, the consumption above the recommended intake of carbohydrates and sausages and the low consumption of fruits and vegetables. Thus, it was classified as weak ($0<r<0.3$), moderate ($0.3 \leq r <0.5$) and strong ($r \geq 0.5$) correlation.[14] Tests were considered significant when $p \leq 0.05$.

However, to assess cardiovascular risk, it would be necessary to see the dosages of Low Density Lipoprotein (LDL), High Density Lipoprotein (HDL) cholesterol and triglycerides, as well as an adjustment for the standardized age of 60 years, such as already demonstrated by Backer.[15] Therefore, data were only correlated with some predisposing factors of cardiovascular risk, especially modifiable ones.

The project that allowed the research to be carried out was approved with CAAE 69324917.8.0000.5564, with the signature of the free and informed consent form being collected.

RESULTS

Among the participants in the current study, there was a predominance of females (55.5%), mean age of 21.6 (3.2) for women and 22.8 (5.0) years for men. Another issue to be highlighted is that the majority (73.4%) used public transport (Table 1).

Table 1– Sociodemographic data and characteristics of university students. Chapecó, SC, Brazil, 2018.

Variables	n	%	M	SD
Sample:	128			
Age:				
Female			21,6	3,2
Male			22,8	5,0
Gender:				
Female	71	55,5		
Male	57	44,5		
Nationality:				
Brazilian	122	95,3		
Others	6	4,7		
Means of transport:				
Collective	94	73,4		
Own	27	21,1		
School	7	5,5		
Graduation course:				
Management	28	21,9		
Agronomy	57	44,5		
Environmental engineering	43	33,6		

Source: authors' data.
Note: M = Mean; SD = standard deviation.

Regarding the classification of the dietary pattern of the sample, it was found that 14.0% of students consumed fruits within the values indicated as satisfactory per day. Regarding the intake of animal protein, it is within the recommended standards, since the majority (71.1%) consumed what was recommended (Table 2).

As for the intake of carbohydrates and sausages, unsatisfactory consumption was found, that is, beyond what was recommended (54.7%) and (75.8%) (Table 2).

Table 2- Classification of the eating pattern of university students, stratified by food groups. Chapecó, SC, Brazil, 2018.

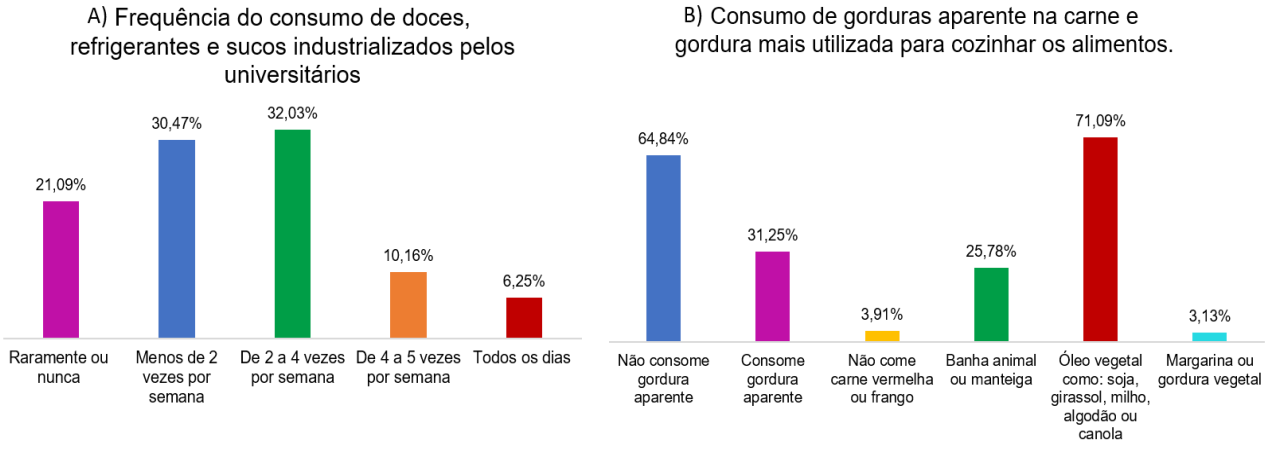
Food group	*Portions/ day	*Criteria adopted for adequacy	Food classification	
			Satisfactory n (%)	Unsatisfactory n (%)
Fruits	3-5	≥ 3 servings/day	18 (14.0)	110 (85.9)
Greens/Vegetables	3-5	≥ 5 scoops, soup/day	59 (46.1)	69 (53.9)
Animal protein	1-2	1-2 unit, slice/ day	91 (71.1)	37 (28.9)
Carbohydrate	6	6 servings/day	58 (45.3)	70 (54.7)
Sausages	1	1 portion/ week	31 (24.2)	97 (75.8)
Water	6-8	6-8 glasses/day	53 (41.4)	75 (58.6)

Source: authors' data.
Note: *Food Guide for the Brazilian Population.[3]

It was identified that 32.0% of students consumed sweets from 2 to 4 times a week; and 6.3% every day, which is a satisfactory result (Figure 1 A).

Regarding the consumption of fats (Figure 1 B), it was found that the majority (64.8%) did not consume apparent fat in meat. In addition, 3.9% of students did not consume red meat or chicken.

Figure 1- A) Consumption of sweets and B) Consumption of fats. Chapecó, Santa Catarina, Brazil, 2018



Source: authors' data.

With regard to the results of the CVRF, it was identified that 57.3% of the students do not practice regular physical activity (Table 3).

It was found that most female (69.0%) and male (94.7%) students had adequate AC (Table 3), however, the lower percentage among women stands out.

It was found that 17.9% and 0.8% of students had altered SBP and DBP, respectively (Table 3). The mean SBP was 111.6 (14.5); and a DBP of 71.2 (8.7) which showed results within normal values.

The highest percentage (72.6%) was classified as eutrophic. However, it is noteworthy that 16.4% of students were overweight. The mean BMI in the sample was 23.8 kg/m² with a standard deviation of 3.6.

Table 3- Cardiovascular risk factors of university students. Chapecó, SC, Brazil, 2018.

Variable	n	%	M (SD)
- Physical activity:			
Does not practice regular physical activity	73	57,0	
Practice at least 30 min. per day	22	17,2	
Practice 2 to 4 times a week	33	25,8	
- Family history:			
Yes	52	40,6	
No	76	59,4	
- Smoking			
Smokers:	6	4,7	
Non smokers	122	95,3	
-Abdominal circumference:			78,8 (9,2)
Above recommended:			
Female:	22	17,2	
Male:	3	2,3	
-Systemic blood pressure:			
Systolic:			111,6 (14,5)
Diastolic:			71,2 (8,7)
Above recommended:			
Systolic:	23	17,9	
Diastolic:	1	0,8	
- Body mass index:			23,8 (3,6)
Low weight:	4	3,1	
Eutrophy:	92	72,6	
Overweight:	22	16,4	
Obesity:	10	7,8	

Source: authors' data.
Note: M (SD) = mean (standard deviation).

Through the data presented in Table 4, it is possible to identify a significant correlation between BMI and dietary pattern, which is inversely proportional, indicating, in the studied sample, that unsatisfactory eating pattern is related to higher BMI, with p=0.040.

Table 4- Correlation between BMI, SBP and dietary pattern. Chapecó, SC, Brazil, 2018.

Variable	*r.	**p.
BMI x Food Standard	-0.77	p=0.040
SBP x Food standard	-0.34	p=0.09

Source: authors' data.
Note: *r (Pearson correlation); ** ($p<0.05$).

DISCUSSION

Analyzing the results described, it can be seen that they are in line with the profuse evidence base on dietary patterns in young people and CVRF. Some evidence of CVRF present in the sample was also established, such as regular physical activity below the recommended and unsatisfactory eating pattern in more than 50% of the subjects in all food groups (fruits, greens, carbohydrates, sausages and water), except for the item animal protein, as most consume the recommended amounts.

In the studied group, it was identified that young people are the ones who most attend university and that there was a prevalence of females, although the agronomy and environmental engineering courses have historically predominance of males, a result that is in accordance with the data from the 2016 higher education census[1], according to which the majority of university students in Brazil are currently women.

The most used means of transport was collective, indicating that most university students did not have their own car, encouraging them to walk to bus stops, on and off the university campus. However, as highlighted by the ACSM[12], to be considered regular physical activity, it must be performed with a minimum time of 150 minutes per week.

This study showed that university students ingest foods considered to protect against CVD, such as fruits and vegetables, less frequently on a daily basis. In this public, those foods considered to be at risk such as sausages and carbohydrates are consumed above the recommended by the Food Guide for the Brazilian Population.[3]

For a food to be considered adequate, that is, healthy, it needs to contain the best combination of nutrients. According to the HM[3], the adequate consumption of fruits and vegetables is related to a lower risk of developing chronic non-communicable diseases (NCDs) and to maintaining an adequate weight. Likewise, the research by Santos et al.[2] highlighted in its results low intake of fruits and vegetables among students. It is worth noting that a diet rich in sausages and poor in fruits and vegetables is among the main factors for the development of CNCD and CVD.[7,9]

As for the consumption of animal protein, the result showed satisfactory intake. It is noteworthy that the consumption of animal protein such as meat, eggs and fish is important due to its high biological value and large amount of functional proteins. However, high consumption predisposes to an increase in the development of CVD and some types of cancer.[3]

Carbohydrates constitute the majority of human food, being a source of energy and vitamins, essential for cell functioning and metabolism. However, excessive consumption increases the risk of obesity and other CNCDs, as well as causing repercussions on the cardiovascular system.[3]

A similarity was found in the study by Loureiro[10], in which the consumption of foods such as sausages increased considerably, both among university students and in the Brazilian population. These foods have high concentrations of fat and sodium, and high consumption has been identified as one of the main risk factors for CNCD and cancer worldwide.[3]

Regarding water consumption, it was observed that the intake is unsatisfactory among university students. Its use is essential for the maintenance of life, the amount that should be taken daily varies from individual to individual and according to the type of food, but most recommendations indicate that a healthy adult should drink a minimum of 2 liters of water per day.[3]

As for the consumption of sweets, the results corroborate the findings of Santos et al.[2] who also identified that the use among university students is sporadic. It is noteworthy that intake above the indicated contributes as FRCV by keeping blood glucose at high levels. Furthermore, it is related to CNCDs such as diabetes mellitus and obesity. These foods could be replaced by fruits, especially among students.[3]

Adequate fat feeding was observed and it was found that a large part of the sample does not eat the apparent fat in the

meat. The I Guideline on Fat Consumption and Cardiovascular Health[16] highlights that: "[...] when preparing any type of meat, it is necessary to remove the apparent fat and the skin (poultry), as the fat penetrates into the meat during the preparation". It was also verified the use of fat for cooking food. According to HM[3], the most suitable fat is that of vegetable origin such as oils, in agreement with what was observed in this sample.

After analyzing the results, it appears that the diet of college students is unsatisfactory, as, of the 9 food groups evaluated, it was identified that in 5 of them, consumption is not within the recommended standards. This result is attributed to changes in the common dietary pattern during the university period, as well as to the change of city or state, which indicates that the local culture can be a significant factor to be considered.[16]

In line with this study, the research by Loureiro10 states that the diet of students from different countries is considered inadequate, since, among them, the consumption of processed foods is high and the intake of healthy foods low.

In addition to the dietary pattern, the study identified other CVRF, including the level of physical activity, smoking, BMI, AC and BP, which, if permanently sustained, can precipitate or cause CVD and cerebrovascular, as well as represent a high cost in health care health.[17]

Some studies[10,17] highlight that university students have a high risk of developing CVD due to the fact that they neglect healthy lifestyle habits to the detriment of academic demands. Regarding physical activity, a modifiable factor, it was observed that regular practice was below the minimum recommended by the ACMS.[12] These findings corroborate the research by Santos et al.[2] in which most individuals (50.8%) did not practice regular physical activity, and 34.2% reported practicing between 1 to 3 times a week. Other analyses[2,10] relate the low level of physical activity with the lack of time, motivation, social support and the distance between homes and spaces for physical exercise.

This research identified that part of the university students had a direct family history of CVD. The study by Gomides et al.[18] highlights that heredity factors and low physical activity practice contribute to cardiovascular risk and that these are among the most prevalent risk factors in students.

As for smoking, 4.8% smoke, which is an expected and positive result. This is because in most research with university students, especially those carried

out in the last ten years, tobacco use is always low or irrelevant.[2]

AC is another parameter that acts as a complement to nutritional diagnosis because it shows the distribution of adipose tissue in the body, when this tissue is concentrated in the central region/abdomen, it has a direct relationship with morbidity and mortality.[11] It should be noted that results were obtained within reference values of normality.[12] In relation to BP, this sample did not show significant changes. On the other hand, the study by Ofori et al.[18] highlighted that the occurrence of SBP (45%) and DBP (32.5%) was high among students.

An interesting fact from this research was that, although university students present an unsatisfactory rate of eating, they mostly maintain normal BMI. Also in the study by Marconato et al.[19], the mean BMI identified was 21.8 kg/m2, despite dietary and physical activity patterns being below the recommended minimum. This fact may be because most university students comprise a young audience, but if bad habits are maintained, they can lead to an increase in BMI.

The correlation between BMI and dietary pattern was strong and inverse (negatively), indicating consistency with other studies in the area[19,20] and demonstrating that as the BMI increases, the eating pattern worsens. As for SBP and dietary pattern, there was no significant correlation, perhaps because it is a young and healthy sample, with BP and BMI mostly within the levels considered normal.

It is known that the main etiology of CVD is atherosclerosis, which begins in childhood. Thus, it is recognized that cardiovascular prevention should start early, with an emphasis on modifiable factors, and that the university environment has structural and organizational conditions capable of hosting and promoting specific health education actions, such as adapting university restaurants to healthy eating patterns, individual or group guidance, as well as the use of social media for dissemination knowledge, contributing to a healthier space and providing training for individuals who are aware of the importance of healthy eating and regular physical activity for their well-being.[20]

CONCLUSIONS

The students' eating patterns are unsatisfactory and there is the presence of CVRF, such as the practice of physical activity below the recommended minimum. It was identified that university students had low consumption of fruits, greens, vegetables and high consumption

of carbohydrates and sausages, factors that, through health actions, can be reversed in order to improve quality of life.

It is noteworthy that the time of exposure to predictive factors of CVD marks the possibility of prior intervention to major health problems, demonstrating the need for educational and preventive health measures, as the university is an environment for the production and transfer of knowledge and consequently an environment for health promotion.

The main limitation of this research refers to self-reported weight and height. The importance of further studies in this line and in others such as longitudinal and multicentric is also underlined, as, through their results, it is possible to identify, formulate and implement actions of intervention, prevention and health promotion in the university environment.

It ends by reinforcing that universities are a fertile space for the promotion of health education strategies and healthy lifestyles, with the possibility of carrying out activities aimed at reducing excess weight and obesity, encouraging the practice of physical activity and healthy eating so that there is a consequent decrease in FRCV.

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