

Factors associated with the consumption of five daily servings of fruits and vegetables by students

Fatores associados ao consumo de cinco porções de frutas e hortaliças em escolares

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ABSTRACT

Objective

To evaluate and associate the frequency of consumption of five daily servings of fruits and vegetables with socioeconomic and demographic factors of students in the city of *Santa Cruz do Sul*, Brazil.

Methods

A cross-sectional study with a sample stratified by clusters of 1,578 students aged 7 to 17 in the city of *Santa Cruz do Sul* (*Rio Grande do Sul* state), Brazil. Volunteers were asked whether they consumed five daily servings of fruits and vegetables. This consumption was classified as irregular or regular. Data regarding gender, age, socioeconomic status, domicile area, and information on the nutritional status of students were also collected. The prevalence ratio was calculated with a significance level of $p < 0.05$.

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Results

The consumption of at least five servings of fruits and vegetables per day was reported by 40.6% of students. The irregular consumption of fruits and vegetables was higher among students aged 10-12 (69.7%, $p<0.001$), boys (60.9%, $p<0.001$), and urban area residents (61.8%, $p<0.001$). There were no significant differences between the consumption of fruits and vegetables and the students' socioeconomic status ($p=0.094$), nor with their nutritional status ($p=0.999$).

Conclusion

The students presented an irregular consumption of fruits and vegetables in relation to the recommendations of five servings per day. However, age and domicile area, which were significantly associated with the consumption of fruits and vegetables, were not associated with their socioeconomic and nutritional status.

Keywords: Eating habits. Nutritional status. Socioeconomic factors.

RESUMO

Objetivo

Avaliar e associar a frequência do consumo de 5 porções ao dia de frutas e hortaliças com fatores socioeconômicos e demográficos em escolares de Santa Cruz do Sul (Rio Grande do Sul), Brasil.

Métodos

Este foi um estudo transversal com uma amostra estratificada por conglomerados de 1.578 escolares, com idade entre 7 e 17 anos de Santa Cruz do Sul (Rio Grande do Sul), Brasil. O consumo de 5 porções de frutas e hortaliças foi questionado e por conseguinte classificado em consumo irregular ou regular de frutas e hortaliças. Coletou-se também informações referentes ao sexo, a idade, condição socioeconômica, zona de domicílio, bem como informações sobre o estado nutricional dos escolares. A razão de prevalência foi calculada com nível de significância de $p<0,05$.

Resultados

O consumo de pelo menos 5 porções de frutas e hortaliças ao dia foi relatado por 40,6% dos escolares. O consumo irregular de frutas e hortaliças, em relação à recomendação, foi mais elevado entre os escolares com idade entre 10 e 12 anos (69,7%, $p<0,001$), entre os do sexo masculino (60,9%, $p=0,077$) e os residentes da zona urbana (61,8%, $p<0,001$). Não houve diferença significativa entre o consumo de frutas e hortaliças e a condição socioeconômica ($p=0,094$) nem com o estado nutricional ($p=0,999$).

Conclusão

Os escolares apresentaram consumo irregular de frutas e hortaliças em relação às recomendações de 5 porções ao dia. Entretanto, a idade e a zona de domicílio, que tiveram associação significativa em relação ao consumo de frutas e hortaliças, não mostraram estar associado a condição socioeconômica e ao estado nutricional.

Palavras-chave: Hábitos alimentares. Estado nutricional. Fatores socioeconômicos.

INTRODUCTION

The Brazilian population dietary pattern has undergone profound changes due to a greater consumption of processed foods replacing traditional home-cooked foods [1,2]. In addition, during adolescence, which is a period of intense body modification, inadequate eating habits are associated with negative metabolic changes [3]. Changes brought about by the modern lifestyle, especially among children and adolescents, have led to an increase in the prevalence of overweight and obesity mainly due to the increase in physical inactivity and the ingestion of fat- and sugar-rich foods, and sugary drinks (with a high glycemic level). The reduction in the consumption of cereals and/or whole products, fruits and vegetables consequently reduced the consumption of foods which are sources of fiber, vitamins, and minerals [1,3,4].

In addition, an adequate consumption of fruits and vegetables is related to a lower incidence and prevention of Non-communicable Chronic Diseases such as cardiovascular diseases, type 2 diabetes, obesity, and the development of cancer [5-7]. In order to avoid such an association, the National Cancer Institute has launched the 5 a Day for Better Health Program in order to increase the average consumption of fruits and vegetables to five or more daily servings. The aim is, in the long term, to reduce the incidence of cancer and other chronic diseases through dietary improvements [8].

In Brazil, the Ministry of Health, according to the government-produced Brazilian Food Guide, recommends a daily consumption of at least three daily servings of fruits and three servings of vegetables, reinforcing the importance of varying the consumption of such foods in meals during the week [9]. In addition, in its updated version, it also recommends that *in natura* foods such as fruits and vegetables be the basis of Brazilian food [10].

Data from the *Pesquisa Nacional de Saúde do Escolar* (PeNSE, National School Health Survey) [11] and the *Estudo dos Riscos Cardiovasculares em Adolescentes* (ERICA, Study on Cardiovascular Risk in Adolescents) [3] showed a low consumption of vegetables and fruits by adolescents, pointing to a low consumption of healthy foods. In addition, the low prevalence of consumption of fruits and vegetables is prevalent among boys and adolescents living in urban areas [12]. It is also associated with economic and social factors. Therefore, such changes in dietary habits among children and adolescents should be a focus of special attention. In these age groups, changes in lifestyle and the development of inappropriate eating habits exert marked and negative effects. Monitoring the health risk factors for this population is fundamental for the promotion of public health [11]. In this sense, the present study aims to evaluate and to associate the frequency of consumption of five daily servings of fruits and vegetables by students in the city of *Santa Cruz do Sul* to socioeconomic and demographic factors.

METHODS

This is a cross-sectional study carried out between 2007 and 2008. It consists of 1,578 schoolchildren aged between 7 and 17, randomly selected from a sample stratified by conglomerates. Students belonging to 18 public (state and city) and private schools: 14 schools in the urban area, and four schools in the rural area of the city of *Santa Cruz do Sul*, in the state of *Rio Grande do Sul*, Brazil. The sample size estimate was based on the school population (20,540 elementary and middle school students attending 69 public and private schools in the urban and rural areas of *Santa Cruz do Sul*). The confidence level was 2.5% and the significance level was 95%. Thus, a sample of 1,427 subjects was regarded as a representative of the city population. A surplus of 10.0% was added because of possible losses and refusals. The final sample comprised 1,578 students.

Epidemiological variables

Data regarding the volunteers in the categories of sex (female and male), domicile zone (urban and rural), age (7-9, 10-12, and 13-17), and socioeconomic status (following the classification criteria of the *Associação Brasileira de Empresas de Pesquisa* (ABEP, Brazilian Association of Research Companies); [13]) were collected. For the assessment of their nutritional status, the Body Mass Index (BMI) was calculated using the formula $BMI = \text{weight}/\text{height}^2$ (kg/m^2), after having being weighed and having their height measured (individuals were barefoot and wearing as few clothes as possible). Data obtained were classified according to the cut-off points established by the World Health Organization for sex and age [14].

Volunteers were asked on whether or not they consumed five daily servings of fruits and vegetables through a questionnaire adapted from Nahas *et al.* [15] and validated by Both *et al.* [16]. It contained the following question: "Does your daily diet include at least five servings of fruits and vegetables?". The following answers were provided: never, sometimes, almost always, and always. The answers were reclassified into irregular (never and sometimes) and regular (almost always and always) daily consumption.

For the statistical treatment of data, the Statistical Package for the Social Sciences 20.0 software for Windows (SPSS Inc., Illinois, Chicago, United States) was used. Descriptive statistics were used. The Prevalence *Ratio* (PR) of the consumption of five servings of fruits and vegetables per day was calculated considering the following variables: sex, age, social class, domicile area, and BMI classification to test the association between variables. The chi-square test was used to compare groups. It was adopted a significance level of $p < 0.05$.

The present study is a cross-section of a broader study entitled "Health and lifestyle in school and in the family: School health indicators and their relationship with family health in urban and rural areas of *Santa Cruz do Sul*". It investigates eating habits and other behaviors related to the lifestyle of students and their parents/relatives. It was approved by the Research Ethics Committee of the *Universidade de Santa Cruz do Sul* (UNISC, University of *Santa Cruz do Sul*), registration No. 4913/07. Only students whose parents signed the informed consent participated in the study.

RESULTS

Table 1 shows the sociodemographic characteristics of the students. There was a male prevalence (54.5%) and the urban area accounted for 77.2% of the studied population. In addition, students enrolled in public schools (88.4%) were more representative of private schools. The prevalence of overweight/obesity was 26.9% in the population studied and the majority of schoolchildren (56.3%) presented socioeconomic status C/D/E.

Table 2 shows that 59.4% of schoolchildren reported infrequent consumption of 5 servings of fruits and vegetables per day, no association with sex ($p = 0.077$). Schoolchildren aged 10-12 years, regardless of sex, had the highest prevalence of infrequent consumption (69.7%), of fruits and vegetables in relation to other ages and boys [RP=1.40 (1.22-1.61)], ($p < 0.001$).

It was also verified that rural schoolchildren consumed more portions of fruits and vegetables (48.9%) than urban ones (38.2%) [$p < 0.001$, RP=1.10 (1.0-1.17)]. (38.2%) [$p < 0.001$, PR = 1.10 (1.0-1.17)]. Nutritional status and socioeconomic status did not differ significantly with the frequency of consumption of 5 servings of fruits and vegetables per day ($p > 0.050$).

DISCUSSION

The present study shows that less than half of the sample students (40.6%) reported consuming five servings of fruits and vegetables per day. Five servings is the amount recommended for the prevention of Non-Communicable Diseases [17] (Table 2).

In Brazil, the low consumption of fruits and vegetables among adolescents has been established over time [3,11,12]. In a study conducted by Mendes & Catão [18] evaluating adolescents in the city of *Formiga* (MG), students reported a low consumption of fruits and vegetables (79.1% and 75.6%,

Table 1. Sociodemographic characteristics of students (N=1,578) in the city of *Santa Cruz do Sul* (RS), Brazil, 2008.

Variable	Total	
	n	%
<i>Sex</i>		
Female	718	45.5
Male	860	54.5
<i>Age</i>		
7-12	854	54.1
13-17	724	45.9
<i>Domicile area</i>		
Urban	1,218	77.2
Rural	360	22.8
<i>School</i>		
Private	183	11.6
Public	1,395	88.4
<i>Nutritional status</i>		
Eutrophy	1,154	73.1
Overweight/ obesity	424	26.9
<i>Socioeconomic condition</i>		
A-B	753	47.7
C/D/E	825	56.3

Table 2. Association between the frequency of consumption of five servings per day of fruits and vegetables and socioeconomic and demographic factors of students in the city of *Santa Cruz do Sul* (RS), Brazil, 2008.

Variable	Consumption of five daily servings of fruits and vegetables				PR (CI95%)	p
	Frequent		Not frequent			
	n	%	n	%		
<i>Sex</i>						
Female	313	42.2	429	57.8	1	0.077
Male	327	39.1	509	60.9	0.94 [0.85-1.03]	
<i>Age</i>						
7-9	199	43.4	260	56.6	1	<0.001
10-12	219	30.3	504	69.7	1.40 [1.2-1.61]	
13-17	640	40.6	938	59.4	1.09 [0.93-1.2]	
<i>Domicile area</i>						
Urban	469	38.2	759	61.8	1	<0.001
Rural	171	48.9	179	51.1	1.10 [1.0-1.17]	
<i>Nutritional status</i>						
Eutrophy	469	40.6	685	59.4	1	0.999
Overweight/obesity	171	40.3	253	59.7	0.99 [0.9-1.06]	
<i>Socioeconomic condition (ABEP)</i>						
A-B	469	40.6	685	59.4	1	0.094
C/D/E	171	40.3	253	59.7	0.94 [0.85-1.05]	

Note: ABEP: Associação Brasileira de Empresas de Pesquisa (Brazilian Association of Research Companies); PR: Prevalence Ratio.

respectively). Another study evaluating adolescents in the city of *Petrolina* (PE), also reported a low consumption of fruits and vegetables [4], corroborating the present study.

Changes in the lifestyle of modern society have caused an increase in the caloric intake mainly due to the consumption of foods with a high caloric density, and a decrease in the intake of healthy foods, such as fruits and vegetables [2,3]. The daily consumption of fruits and vegetables is essential. These foods are composed of vitamins, minerals and phytochemicals (such as flavonoids and other phenolic compounds) that can promote protective effects on the body [19]. In addition, the intake of fruits and vegetables has a protective effect against cardiovascular diseases and type 2 diabetes [17]. Data from the ERICA [3] study, as well as from the PeNSE [11] survey, showed extremely low consumption levels of fruits and vegetables for both sexes and all age groups evaluated. The present study also reports a low consumption of five daily servings of fruits and vegetables for both sexes, but without any significant differences between them. However, girls consumed fruits and vegetables more frequently than boys did. On the other hand, our results show a significant difference. There is a high prevalence in the irregular consumption of fruits and vegetables among students aged 10-12.

Urbanization has also contributed to change the population lifestyle, especially their eating habits. This change caused an increase in the availability of food in general, and media-stimulated foods, which are the richest in sugar and sodium [4,20]. Similar to our study, Xavier *et al.* [20], evaluating the frequency of consumption of fruits and vegetables among adolescents living in urban and rural areas in the state of *Pernambuco*, also reported a lower consumption of fruits and vegetables among students in urban areas compared to the ones in rural areas. This result can be partly explained by the culture of the studied population. Rural students have a greater availability of fruits and vegetables. At the same time, industrialized products are less common.

The decrease in the consumption of fruits and vegetables can also be influenced by other factors such as a lack of time, a lack of information, cultural issues, the media, and the individual's socioeconomic status [4,18]. Similar to the present study, Mendes & Catão [18] also observed a prevalence in the low consumption of fruits and vegetables by the group with a greater purchasing power among adolescents of the city of *Formiga* (MG). These findings may be related to the current society's food culture. Households with a higher purchasing power have a greater availability and access to industrialized foods, reducing the consumption of fruits and vegetables.

Finally, our results evidence a food profile associated with an inadequate consumption of fruits and vegetables, reaffirming the importance of recommendations aiming to reduce the consumption of foods with a high caloric density, and interventions to promote healthy eating habits for adolescents. Thus, a greater emphasis is needed on the promotion of policies aiming at the determinants related to the students' health. It can be done by using systems for monitoring the health risk factors of children and adolescents. An adequate diet and the consumption of fruits and vegetables should be stimulated.

CONCLUSION

The present study evidences an irregular consumption of five or more daily servings of fruits and vegetables compared to health recommendations, which aim at reducing the incidence of cancer and other chronic diseases. In addition, the socioeconomic and the nutritional status of the volunteers, were not associated with the consumption of fruits and vegetables. However, they were associated with age and domicile area.

The consumption of five or more daily servings of fruits and vegetables contributes to the supply of fiber, vitamins, minerals, and antioxidants, which are essential elements in the prevention of Non-Communicable Diseases. Further studies are needed in order to verify the eating habits of students, aiming at the formulation of effective proposals for the development of nutritional education strategies and health promotion actions among this population group taking into account their age and domicile area.

CONTRIBUTORS

CS PEREIRA and SIR FRANKE collaborated in the design of the paper. CS PEREIRA, CP REUTER, and D PRÁ performed the experimental design. P MOLZ and CP REUTER collaborated in the analysis and interpretation of data. All authors were responsible for reviewing, and approving the final version of the manuscript.

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