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ORIGINAL ARTICLE

Cardiovascular risk factors in students at a public college institution in Brazil

Fatores de risco cardiovasculares em universitários de uma instituição de ensino superior pública do Brasil

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KEYWORDS

Cross-sectional studies
Health behavior
Lifestyle
Students

ABSTRACT

Objective: To compare the prevalence of cardiovascular risk factors in university students from a Brazilian public higher education institution between three surveys.
Methods: Cross-sectional surveys were conducted with 1,084, 1,085, and 1,041 university students in 2010, 2012, and 2014, respectively, from an institution located in Bahia, Brazil. Outcomes were cardiovascular risk factors: overweight, leisure-time physical activity for < 150 min per week, low consumption of fruits and vegetables, consumption of meat and chicken with fat, fried snacks, soft drinks or artificial juices, smoking, drinking alcohol abuse, and negative self-assessment of stress in life. The independent variable was the year of the survey. The measure of association was the Prevalence Ratio (PR). The significance level was 5%.
Results: In all surveys, there was a higher prevalence of college students with insufficient leisure-time physical activity, low consumption of fruits and vegetables, consumption of fatty and savory meat, and negative self-assessment of stress. Overweight and consumption of chicken with fat increased over the years of the survey. Prevalence decreased in the last survey among college students concerning the consumption of fruits, vegetables, snacks, and artificial soft drinks or juices (PR: 0.66; 95% CI: 0.52-0.84).
Conclusions: There was an increase in overweight; however, there were also positive modifications in eating habits among college students.

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PALAVRAS-CHAVE

Comportamentos relacionados com a saúde
Estilo de vida
Estudantes
Estudos transversais

RESUMO

Objetivo: Comparar as prevalências de fatores de risco cardiovasculares em universitários de uma instituição de ensino superior pública brasileira entre três inquéritos.
Métodos: Realizou-se inquéritos transversais com a participação de 1.084, 1.085 e 1.041 universitários nos anos de 2010, 2012 e 2014, respectivamente, de uma instituição localizada no estado da Bahia, Brasil. Os desfechos foram os fatores de risco cardiovasculares: excesso de peso, atividade física no lazer por < 150 min por semana, baixo consumo de frutas e vegetais, consumo de carnes e frango com gordura, salgados fritos, refrigerantes ou sucos artificiais, fumar, beber bebida alcoólica em excesso e autoavaliar negativamente o estresse na vida. A variável independente foi o ano da pesquisa. A medida de associação foram as Razões de Prevalência (RP). O nível de significância foi de 5%.
Resultados: Em todos os inquéritos houve maiores prevalências de universitários com prática insuficiente de atividade física no lazer, baixo consumo de frutas e vegetais, com consumo de carne gordurosa, salgados e autoavaliação negativa de estresse. O excesso de peso e o consumo de frango com gordura aumentaram entre os anos da pesquisa. Prevalências diminuíram no último inquérito em universitários em relação ao consumo de frutas, vegetais, salgados e refrigerantes ou sucos artificiais (RP: 0,66; IC 95%: 0,52–0,84).
Conclusões: houve aumento do excesso de peso, entretanto, também houve modificações positivas para os hábitos alimentares entre os universitários.

INTRODUCTION

Several health risk factors can contribute to the emergence of chronic diseases, such as cardiovascular diseases and diabetes, which can increase mortality risk[1] and favor the impact of infectious diseases, such as covid-19[2]. Among these risk factors, it is possible to mention some behavioral aspects such as physical inactivity[1], inadequate eating habits[3], consumption of cigarettes[1] and alcoholic beverages[1]. Also, body weight excess[1] and high levels of perceived stress[4] can be considered important health risk factors.

University students represent a group that may be more susceptible to these health risk factors[5-7]. Studies show a high prevalence of physical inactivity[5], consumption of alcoholic beverages[7], and cigarettes[6]. It is possible to estimate that specific segments of students are more prone to risk factors such as overweight[8] in men, and physical inactivity[9], and stress in women[10].

Monitoring risk factors in university students has not been the subject of systematic research, although this group has grown in Brazil in recent years[11]. Thus, the realization of repeated data collection in this population may contribute to a better understanding of health risk factors and the impact of time and experiences at the university in the lives of college students. Additionally, institutional projects and programs can be performed considering the health risk factors. This study compared the prevalence of cardiovascular risk factors in college students from a Brazilian public college institution between three surveys moments.

METHODS

This study is part of the Monitoring of Health Indicators and Quality of Life in Academics (MONISA) Study, with university students of one public college from Bahia, Brazil. Three cross-sectional surveys in different years were conducted. The details of the methodological design of this study have already been published in a previous article[12]. The MONISA Study was approved by the research ethics committee (protocol nr. 382/2010) of the State University of Santa Cruz. All participants signed the free and informed consent form prior to their inclusion in the study, and all research guidelines followed the Declaration of Helsinki.

University students enrolled in on-site undergraduate courses offered in the second semester (held between August and December) of each year of the research were included in the target population. Freshmen students and those with special enrollment (holding a higher education diploma) were excluded from the target population (2010, N = 5,461; 2012, N = 5,767; 2014, N = 5,244).

The samples were calculated for each year of the survey, being independent of each other. The calculation considered the total population, a prevalence of 50%, 3% acceptable error, and 95% confidence level, and after was increased by 20% considering the possibility of losses/refusals and 15% to carry out association studies. The samples of university students were 1,232 in 2010, 1,243 in 2012, and 1,223 in 2014, and were stratified according to the number students among the courses of institution, study shift, and years of acceptance in the institution. In each stratum, the university students were drawn by simple random selection, with the help of the enrollment list at the institution, in alphabetical order, using the Research Randomizer software.

The approach of the selected students took place in up to three attempts on different days and times. There was no replacement for losses and refusals. During July and August, the teams (university students not participating in the sample, and professors from the institution, comprising 6 in 2010, 27 in 2012, and 39 in 2014) were trained to collect the data. Between September and November of each year of the survey, the data were collected. The students self-completed the questionnaires in the institution's classrooms before, during, or after classes, in small groups of up to 30 university students, or individually. The average time to answer the questionnaire was 30 min. The ISAQ-A questionnaire (Indicators of Health and Quality of Life in

Academics) was used for data collection, respecting the guidelines for applying this instrument[13]. This instrument has been validated for application in Brazilian university students and has satisfactory validity and reproducibility[13].

The outcomes of this study include biological, behavioral, and perceptive measures. Body mass index (BMI) was calculated (Kg/m^2) by dividing the self-reported weight (kg) by stature (meters), and after, it was estimated the body weight excess of students (BMI ≥ 25 kg/m^2)[14]. The practice of < 150 min (sum of activity minutes in a typical week) of moderate to vigorous leisure-time physical activity (MVLTPA) was considered a risk[8]. For foods, the risks were low intake of fruit (< 5 days per week)[15], low intake of vegetables (< 5 days per week)15, habitual fatty meat (1 or more days per week)[16], habitual fatty chicken (1 or more days per week)[16], fried savory intake (1 or more days per week)[16] and soft drink or artificial fruit juice intake (5 or more days per week)[16]. Positive report of smoking and alcohol consumption (5 or more doses on a single occasion in the last 30 days)[15], and the negative self-assessment of stress in life (always, almost always, and sometimes stressed)[10] were considered a health risk.

The independent variable was the year of research (2010, 2012, and 2014). Control variables included gender (male and female), age group (17 to 20 years, 21 to 23 years and 24 years or more), marital status (without partner and with partner), personal income in minimum wages (MW) — classified as *do not have income*, *less than 1* MW, 1 to *less 3* MW, 3 to *less 5 MW*, and *5 MW or more*; father and mother education (never studied, incomplete primary education, complete primary education, complete secondary education and complete higher education, for each one); area of study (Health Sciences, Exact and Earth Sciences, Biological Sciences, Engineering, Agrarian Sciences, Social and Applied Sciences, Human Sciences and Linguistics, Languages and Arts), according to the institution courses; study shift (day and night); period/stage of study in the university, according to the entrance year: 2010 survey (1st year, entrance in 2010; 2nd year, in 2009, 3rd year, in 2008; 4th year or earlier, in 2007 or previous years); 2012 survey (1st year, entrance in 2012; 2nd year, in 2011; 3rd year, in 2010; 4th year or earlier, in 2009 or previous years); and 2014 survey (1st year, entrance in 2014; 2nd year, in 2013; 3rd year, in 2012; 4th year or earlier, in 2011 or previous years); and self-rated health, divided in negative (very poor, poor and regular) and positive (good and very good).

The data were tabulated in EpiData software v. 3.1 and analyzed in the Statistical Package for Social Sciences for Windows v. 24.0 (SPSS, Chicago, IL). Descriptive analyses were expressed as mean, standard deviation, minimum and maximum values. The comparisons between the surveys years and control variables were performed by chi-square test for linear trend. The associations between independent variables and each outcome were estimated using Poisson regression. Results were reported as prevalence ratio (PR) and 95% confidence interval (95%CI) in crude and adjusted analyses. All control variables were included in the adjusted analyses, with the outcomes that were not investigated in each analysis. The associations were considered by the Wald test with a significance of 5%.

RESULTS

Figure 1 shows the sampling procedures and final sample in each survey. There was no statistical difference between the sample of this study and the number of college students in the target population, considering the sampling characteristics, as courses, year of admission to the university, and period of study (data do not show). Sample loss was related to not founding the participants, except for four refusals in the 2010 survey.

The mean age was 23.55 ± 5.24 years (variating from 17 to 52) in 2010; 23.99 ± 6.01 years (17 to 54) in 2012; and 23.55 ± 5.24 years (17 to 56) in 2014. Table 1 shows the characteristics of the sample of each year. There were characteristics similar between the surveys, with the predominance of women.

Table 2 shows the prevalence of inadequate biological, behavioral, and self-reported health characteristics, according to the survey year. A higher prevalence of university students who presented < 150 min of MVLTPA, irregular fruit consumption, irregular vegetable consumption, habitual fatty meat, fried savory intake, and negative self-rated stress was found in all surveys.

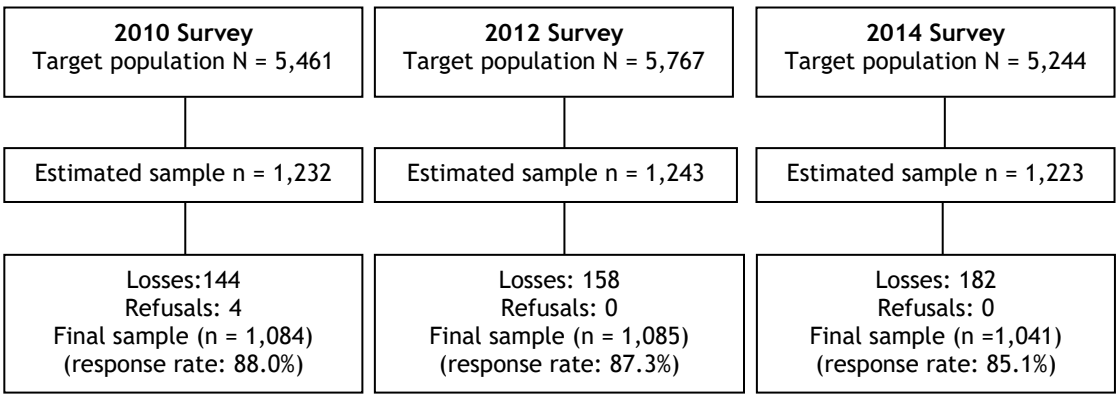

Figure 1 — Flowchart of sampling procedures and final sample participants in the 2010, 2012 and 2014 surveys. Bahia, Brazil.

Table 1 — Descriptive characteristics of college students. Brazil, Bahia. 2010, 2012 and 2014. Values expressed as n (%).

Variables	2010	2012	2014
Gender			
Male	491 (45.3)	489 (45.1)	494 (47.5)
Female	592 (54.7)	595 (54.9)	547 (52.5)
Age group			
17 to 21 years	285 (26.7)	304 (28.3)	322 (31.2)
22 to 23 years	400 (37.4)	358 (33.3)	352 (34.1)
24 or more	384 (35.9)	412 (38.4)	357 (34.6)
Personal income in minimum wages (MW)			
Do not have income	348 (33.3)	411 (39.1)	438 (43.2)
Less than 1 MW	324 (30.9)	305 (29.1)	311 (30.7)
1 to less 3 MW	296 (28.2)	242 (23.1)	199 (19.6)
3 to less 5 MW	60 (5.7)	53 (5.0)	32 (3.2)
5 MW or more	20 (1.9)	39 (3.7)	33 (3.3)
Father's education			
Never studied	6 (0.6)	29 (2.8)	21 (2.1)
Incomplete elementary education	300 (29.7)	298 (28.7)	220 (22.4)
Complete elementary education	142 (14.1)	165 (15.9)	134 (13.7)
Complete high school education	410 (40.6)	441 (42.6)	429 (43.8)
Complete college education	151 (15.0)	104 (10.0)	176 (18.0)
Mother's education			
Never studied	2 (0.2)	25 (2.3)	12 (1.2)
Incomplete elementary education	234 (22.6)	256 (24.1)	155 (15.4)
Complete elementary education	114 (11.0)	142 (13.3)	122 (12.1)
Complete high school education	477 (45.9)	443 (41.7)	444 (43.9)
Complete college education	210 (20.3)	198 (18.6)	276 (27.4)
Marital status			
Without partner	937 (86.4)	921 (85.3)	905 (87.4)
With partner	147 (13.6)	159 (14.7)	131 (12.6)
Period of study			
Day	735 (67.8)	731 (67.4)	747 (71.8)
Night	349 (32.2)	354 (32.6)	294 (28.2)
Year regarding University acceptance			
1st year	233 (21.5)	230 (21.2)	200 (19.2)
2nd year	267 (24.6)	263 (24.2)	199 (19.1)
3rd year	225 (20.8)	216 (19.9)	227 (21.8)
4th year or more	359 (33.1)	376 (34.7)	415 (39.9)
Self-rated health			
Positive	747 (69.8)	673 (63.0)	611 (60.9)
Negative	323 (30.2)	396 (37.0)	393 (39.1)

Table 2 — Prevalence of inadequate biological, behavioral, and self-reported health characteristics, according to the year of the survey. Brazil, Bahia. 2010, 2012, and 2014. Values expressed as n (%).

Variables	2010 n (%)	2012 n (%)	2014 n (%)
Body weight excess	232 (24.5)	247 (26.3)	274 (29.9)
<150 min of MVLTPA	692 (66.3)	657 (61.9)	639 (62.7)
Irregular consumption of fruit	862 (81.2)*	847 (79.2)	756 (73.5)
Irregular consumption of vegetable	602 (57.0)*	579 (55.5)	537 (52.6)
Habitual fatty meat	950 (90.6)	930 (90.3)	914 (90.2)
Habitual fatty chicken	496 (46.9)	538 (52.2)	543 (53.7)
Intake of fried savory	959 (90.6)	910 (88.9)	874 (86.5)
Intake of soft drink or artificial fruit juice	235 (21.8)	229 (21.4)	144 (13.9)
Smoking	33 (3.1)*	24 (2.2)	24 (2.4)
Binge drinking	443 (41.3)*	412 (38.5)	392 (38.8)
Negative self-rated stress	784 (72.4)	764 (70.4)	770 (74.1)

*Data represent by Sousa, José and Barbosa[15].

The crude and adjusted analysis between biological, behavioral, and perceptive characteristics and survey years are presented in Table 3. There was an increase in body weight excess and habitual fatty chicken among survey years. However, lower prevalence was observed in university students regarding irregular consumption of fruit (PR: 0.91; 95% CI: 0.86 – 0.96), irregular consumption of vegetable (PR: 0.90; 95% CI: 0.83 – 0.99), intake of fried savory (PR: 0.96; 95% CI: 0.92 – 0.99), soft drink and artificial fruit juice (PR: 0.66; 95% CI: 0.52 – 0.84).

DISCUSSION

The results showed a higher prevalence of college students with MVLTPA < 150 min, irregular consumption of fruits, irregular consumption of vegetables, habitual meat fatty, intake of fried snacks, and self-assessment of negative stress. Over the surveys, there has been an increase in excess body weight and habitual fatty chicken, and reduction of irregular consumption of fruits and vegetables, intake of fried snacks, intake of soft drinks or artificial juices among university students.

The practice of MVLTPA at lower levels has stabilized in about six of 10 students in the three surveys. In this study, the lower physical activity levels have been observed as recurrent in Brazilian students[5] and other places such as Ireland[17]and Slovenia[18]. A cause for this result may be related to the irregular participation of university students in physical education classes in primary education, which could contribute to the maintenance of physical activity levels in adult life[19,20] and the high demand for academic activities that hinder the practice of physical activity[21].

Also, there was a high prevalence related to poor eating habits in this study. Bad eating habits can be observed in Brazilian university students[22,23], which leads to a high risk for developing chronic non-communicable diseases[3]. Alternatively, there was a decrease in the prevalence of irregular consumption of fruits and vegetables, fried snacks, soft drinks, or artificial juices among students in this study. The frequent consumption of vegetables can be noticed in Brazilian university students in the health area[24]. The predominance of high consumption of foods with fat, soft drinks, and artificial juices can also be noted in this group[24,25]. In this study, changes in eating habits may have occurred due to institutional policies that favor students' accessibility to the institution's restaurant through greater availability of affordable quotas.

Regarding the habitual fatty chicken, there was an increase in prevalence among surveys. It can be seen in a study conducted with university students from Saudi Arabia that in terms of eating habits, most students, regardless of the course, chose foods rich in fat[26]. Most of the time, the university environment does not provide access to nutritious foods, which may generate less concern with the increase in fat content that favors cardiovascular risk[25].

The prevalence of excess body weight was higher in the last survey than the first survey conducted in 2010. The level of physical activity, eating habits, and stress are factors related to health that can affect body weight maintenance in this public[8,25,27]. In this study, it was possible to note, among the surveys, high prevalence for these characteristics (insufficiently leisure-time physical activity, bad eating habits, and perceived levels of stress), which may clarify these findings regarding the increase in excess body weight.

Two crucial health risk factors have shown stability over the years. Smoking prevalence has been lower among university students, but excessive consumption of alcohol on a single occasion was high. This trend has been similar in national[6] and international[11,28,29] studies. However, the consumption of alcohol and cigarettes has been higher in other studies in countries in Asia and Europe when compared with the results presented in this research[29,30]. In Asian countries, the prevalence was 32% for tobacco use[30] and 20.3% for excessive alcohol consumption[29]. However, in Europe, the prevalence of excessive alcohol beverages consumption was 48.1%[28], and tobacco use was 24.2%[28]. A factor associated with a greater prediction of these habits in this population is the positive perception of alcohol and tobacco consumption by peers[29-31] and the negative attitude toward university[31].

It was observed among the surveys the stability of the negative self-assessment of stress among students. This result shows the necessity to assess the characteristics that may cause greater vulnerability to stress in university students, for example, less involvement in moderate to vigorous physical activities[10,32]. Stress has been a health risk factor observed in research with university students[10,32,33], due to academic, financial, and psychosocial stress[34].

As a limitation in this study, the participation of a single public institution of a Brazilian state in the Northeast region can be cited since it may not represent all national particularities. However, this study has strengths, such as the robustness of the methodological procedure, with the participation of university students through simple random selection and stratification of the sample considering each course's specificities. Among other limitations is the possible memory bias related to using a questionnaire to assess health risk behaviors, which can favor assessing this conduct to the positive level[9]. However, agreement levels with the evaluated behaviors using the instrument employed are satisfactory for Brazilian university students[13]. Other limitations referred to the measure of weight and stature considering self-reported data for calculating the BMI. However, the validity of the measure reported was satisfactory in research with Brazilian university students[35].

This study indicated that university students have an unhealthy lifestyle, that most of them have bad eating habits and a low level of leisure-time physical activity. Co-responsibility between individual health and institutional policies for the health of this group must be developed to avoid possible health problems in the future. Repeated surveys show the behavior of characteristics related to the health of university students and thus assist in the establishment of interventions based on the local reality.

Table 3 — Association between biologic, behavioral and perceptive characteristics, and surveys years. Brazil, Bahia. 2010, 2012, and 2014.

Variables	Crude analysis PR (95%CI)				Adjusted analysis* PR (95%CI)			
	2010	2012	2014	p	2010	2012	2014	p
Body weight excess	1	1.07 (0.92-1.25)	1.22 (1.05-1.42)	< 0.01	1	1.02 (0.86-1.21)	1.18 (1.01-1.39)	0.04
<150 min of MVLTPA	1	0.93 (0.87-0.99)	0.95 (0.89-1.01)	0.09	1	0.94 (0.87-1.02)	0.95 (0.88-1.03)	0.25
Irregular consumption of fruit	1	0.98 (0.94-1.02)	0.90 (0.86-0.95)	< 0.01	1	0.98 (0.93-1.03)	0.93 (0.88-0.98)	< 0.01
Irregular consumption of vegetable	1	0.97 (0.90-1.05)	0.92 (0.85-0.99)	0.047	1	0.96 (0.88-1.04)	0.88 (0.81-0.97)	< 0.01
Habitual meat fatty	1	1.00 (0.97-1.02)	0.99 (0.97-1.02)	0.74	1	1.01 (0.98-1.04)	1.00 (0.96-1.03)	0.80
Habitual chicken fatty	1	1.11 (1.02-1.21)	1.15 (1.05-1.25)	< 0.01	1	1.12 (1.01-1.23)	1.15 (1.04-1.27)	< 0.01
Intake fried of savory	1	0.98 (0.95-1.01)	0.95 (0.92-0.98)	< 0.01	1	0.98 (0.94-1.01)	0.95 (0.92-0.99)	0.01
Intake soft drink of or artificial fruit juice	1	0.98 (0.84-1.16)	0.64 (0.53-0.77)	< 0.01	1	1.04 (0.86-1.27)	0.67 (0.53-0.85)	< 0.01
Smoking	1	0.73 (0.43-1.22)	0.77 (0.46-1.30)	0.33	1	1.15 (0.61-2.16)	0.88 (0.45-1.72)	0.71
Binge drinking	1	0.93 (0.84-1.03)	0.94 (0.85-1.04)	0.24	1	0.95 (0.84-1.07)	0.91 (0.80-1.02)	0.11
Negative self-rated stress	1	0.97 (0.92-1.03)	1.02 (0.97-1.08)	0.38	1	0.96 (0.90-1.03)	1.00 (0.94-1.07)	0.98

*Adjusted for gender, aged, marital status, study area, period study, years link with the University, self-rated health, and the outcomes of table.

CONCLUSION

This study showed a high prevalence of < 150 min of MVLTPA practice, irregular consumption of fruits and vegetables, habitual fatty meat, intake of fried snacks, and self-assessment of negative stress. Between the surveys, there was an increase in excess body weight and habitual fatty chicken, a decrease in irregular consumption of fruits and vegetables, intake of fried snacks, intake of soft drinks or artificial juices among university students.

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