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Research

Chronic Non-Communicable Diseases in College Students in the Brazilian Western Amazon Region

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Abstract

The objective of this study was to analyze the prevalence of chronic non-communicable diseases (CNCDs) and associated lifestyle factors in college students in Rio Branco, Acre, Brazilian Western Amazon region. A cross-sectional study was conducted in 874 undergraduate students from a public university. The general prevalence of CNCDs was 15.6%. After adjusting for sex and age, the CNCD-associated lifestyle factors included the following: sedentary during leisure time (prevalence ratio (PR): 1.67; 95% confidence interval (CI): 1.12 - 2.48), sedentary in locomotion by walking (PR: 1.34; 95% CI: 1.00 - 1.79), current smoker (PR: 1.66; 95% CI: 1.07 - 2.58), unsatisfactory self-rated health status (PR: 2.31; 95% CI: 1.84 - 2.88), overweight (PR: 1.67; 95% CI: 1.14 - 2.46) and obese (PR: 3.30; 95% CI: 2.18 - 5.01). The high prevalence of CNCDs identified in this group of college students highlights the need for swift action to promote healthy lifestyles among youth.

Keywords

Chronic Disease, Epidemiological Factors, Students, Cross-Sectional Studies

1. Introduction

Chronic non-communicable diseases (CNCDs), being a global public health concern [1]-[3], are characterized by long duration, slow progression and non-infectious. The main CNCDs are cardiovascular diseases, diabetes,

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cancers and chronic respiratory diseases. Currently, alcohol abuse, obesity, smoking, physical inactivity and unhealthy diet are the major risk factors contributing to CNCDs [4].

Furthermore, these diseases are associated with poverty and socioeconomic inequality [5]. In this context, a high prevalence of CDCNs occurs in developing countries, such as Brazil (32.6%), [6] South Africa (50.7%) [7] and Vietnam (33.4%) [8]. In Brazil, 72% of the deaths recorded in 2007 were associated with CNCDs [1]. Regional disparities were identified in Brazil; the southern and southeastern regions had a lower CNCDs prevalence than the northern and northeastern regions did, which were the poorest regions in Brazil [1].

Despite the prevalence of CNCDs has been published for Brazilians citizens, the burden of CNCDs in specific groups should be investigated [9]. Specifically in the education level, the increase in the number of years of schooling is inversely associated with decreased prevalence of CDCNs [6] [10].

Lifestyle changes have been observed in students entering university [11]. These lifestyle changes, which are thought to be related to adaptation to the university setting and new social networks, lead to greater exposure to CNCDs-related risk factors. For incoming students who are already affected by a CNCD, failure to maintain healthy behaviors exposes them to aggravation of their CNCDs.

In the Brazilian Western Amazon, dissemination of scientific information on the prevalence of CNCDs risk factors in college students is still limited. In the city of Rio Branco, Acre state, college students show a high prevalence of overweight and obesity, a low intake of fruits and green vegetables and a high prevalence of sedentary behavior [12] [13]. Because of the importance of CNCDs nationally and the lack of relevant studies in the Brazilian Western Amazon, this investigation aims to analyze the prevalence of CNCDs and the associated lifestyle factors in college students in this region.

2. Methods

This was a cross-sectional study conducted in the second semester of 2010. The study population comprised approximately 4500 students enrolled in 34 undergraduate courses at the public university located in Rio Branco, Brazilian Western Amazon. Two-stage cluster sampling was used. In the selection of academics, the primary sampling units were the courses, and the secondary sampling units were the periods of the courses. The minimum sample size was determined using an expected prevalence of 50%, a fixed accuracy for a sampling error of 0.05, a confidence level of 95% and a design effect of 2. For inclusion, students had to be registered and attending classes in an undergraduate program. This project was submitted to and approved by the Human Research Ethics Committee of Acre Federal University (Process no. 011544/2010-94).

A previously designed questionnaire was used to collect information on demographics, lifestyle, self-rated health status, anthropometrics and reported morbidities. Age was categorized in the following groups: 19 years or younger, between 20 and 29 years and 30 years or older. Self-reported health status was investigated using the question "*How do you classify your health status*?" The data were coded as either satisfactory (excellent or good) or unsatisfactory (fair or bad). Body mass index (BMI) was determined by dividing weight (in kilograms) by height (in meters) squared. Using World Health Organization recommendations [14], BMI was classified into three categories: eutrophic (less than 25 kg/m^2), overweight (between 25 and 30 kg/m^2) and obese (greater than 30 kg/m^2).

Smoking status was categorized as either current smoker (daily and occasional smoking) or non-smoker (individuals who had never smoked and former smokers). Consumption of alcoholic beverages in the 30 days prior to the study was measured by the procedure used by the Brazilian Health Ministry [10] in the study "Vigitel Brazil 2013: protective and risk factors for chronic diseases by telephone survey". Men who consumed 5 or more doses of alcoholic beverages met the criteria for intake. Five doses could be 5 cans of beer; 5 glasses of wine; or 5 doses of *cachaça*, whiskey or any other distilled spirits. For women, the minimum intake was 4 doses of alcoholic beverages. Participants who did not meet these criteria were categorized as "no intake".

The hours per week spent watching TV and using a computer were dichotomized as "less than or equal to 34.9 weekly hours" or "greater than or equal to 35 weekly hours". Data on the weekly frequency and duration of physical activity performed in the subjects' leisure time and walking as a means of locomotion were also collected. According to criteria by Haskell *et al.*, [15] the variables measuring leisure-time physical activity and walking were categorized as either active or sedentary.

Weekly frequency of fruit and green vegetable intake was also measured, excluding potatoes, cassava and yams. The variables were combined and analyzed dichotomously: regular intake of fruit and green vegetables on

5 or more days and irregular intake of fruit and green vegetables on 4 days of the week or fewer.

Presence of CNCDs was reported in the diagnostic report of a health care professional who evaluated the following parameters: dyslipidemia, high blood pressure, diabetes mellitus and cardiovascular events (infarction or stroke). The procedure for data collection on reported CNCDs was validated by Robinson *et al.* [16] and Martin *et al.* [17]. The college students were classified as having either one or more reported CNCDs or no reported CNCDs.

The data were entered using procedures specified by the EpiData software package. Statistical analyses were performed using Stata™ 10. The prevalence of CNCDs with 95% confidence intervals (CI 95%) was calculated for both total and stratified samples by gender and age. The prevalence ratios of the CNCDs for both crude prevalence and prevalence adjusted for age and gender were determined according to generalized linear models by using binomial distribution with a *log* link. The statistical power *aposteriori* was calculated using the GPower 3.1 program.

3. Results

Of the 874 students interviewed, 61.6% were female, and 38.4% were male. Additionally, 26.2% were 19 years old or younger, 54.0% were between 20 and 29, and 19.8% were 30 years old or older.

The overall prevalence of CNCDs was 15.6%. Males showed a higher prevalence of CNCDs than females (18.1% compared with 13.9%). For both genders, CNCDs prevalence increased linearly with age. The highest prevalence rates were observed among participants age 30 years or older: 32.3% for males and 28.8% for females (**Table 1**).

The prevalence and prevalence ratio for CNCDs are shown in **Table 2** according to the lifestyle factors, self-rated health status and BMI of college students in Rio Branco. After adjustment for gender and age, the variables measuring leisure-time physical activity, locomotion by walking, smoking, self-rated health status and BMI were identified as factors associated with CNCDs (**Table 3**). Students who were sedentary during leisure time and students who were sedentary in terms of locomotion by walking were found to have higher magnitudes of association with CNCDs: 1.67 (CI 95%: 1.12 - 2.48) and 1.34 (CI 95%: 1.00 - 1.79), respectively. Current smokers were 1.66 times as likely as non-smokers to have a CNCDs. Similarly, participants who reported unsatisfactory health status were 2.31(CI 95%: 1.84 - 2.88) times as likely as those with satisfactory health status to have a CNCDs. A linear relation between the BMI and CNCDs was observed in the analysis of associated factors (p for linear tendency = 0.000). *A posteriori*, a prevalence ratio equal to or higher than 1.20 was estimated as statistically significant (p = 0.05) to the statistical power of 80%.

4. Discussion

The prevalence of CNCDs was 15.6%, and male college students 30 years of age or older were more susceptible. In 2010, the overall CNCDs prevalence for Brazilians was 32.6%, which is twice as high as the prevalence among college students in this study [6]. However, the majority of the college students were younger than 30 years old (81.2%); therefore, they did not suffer from changes resulting from senescence, which would predispose them to the onset of CNCDs.

The procedure for using self-report to collect information on morbidities was validated [16] [17] to be used in health inquiries, and its simplicity and low cost are considered to be advantages. However, the quality of the information reported may vary by socioeconomic differences in accessing health care services and by sensitivity in perceiving one's health status. In this study, it was inferred that the college student's level of education reflected a minimum level of knowledge of their rights to access to health care services and a better understanding

Table 1. Prevalence of CNCDs by gender and age of college students from Rio Branco, Acre, Brazil, 2010.

	Males (n = 336)		Females (n = 538)	
	%	CI 95%	%	CI 95%
All	18.1	(14.02; 22.28)	13.9	(11.00; 16.87)
19 years or younger	8.1	(1.83; 14.37)	9.6	(4.82; 14.48)
Between 20 and 29 years	15.5	(10.17; 21.03)	11.5	(7.77; 15.32)
30 years or older	32.3	(21.13; 43.57)	28.8	(19.78; 37.94)

Table 2. Prevalence and prevalence ratio of CNCDs by lifestyle factors, self-rated health status and body mass index of college students from Rio Branco, Acre, Brazil, 2010.

	n	%	Crude PR	(CI 95%)	p
Leisure-time Physical Activity					
Active	325	11.6	1		
Sedentary	545	17.8	1.52	(1.10; 2.09)	0.010
Locomotion by walking					
Active	179	12.2	1		
Sedentary	665	16.8	1.37	(1.03; 1.81)	0.029
Hours of television watching					
less than or equal to 34.9 weekly hours	581	15.3	1		
greater than or equal to 35 weekly hours	265	16.2	1.05	(0.71; 1.57)	0.776
Hours of computer use					
less than or equal to 34.9 weekly hours	541	15.7	1		
greater than or equal to 35 weekly hours	301	14.2	0.90	(0.59; 1.38)	0.656
Smoking					
Non-smoker	821	14.9	1		
Current smoker	49	26.5	1.77	(1.12; 2.79)	0.014
Alcohol intake in the last 30 days					
No intake	653	14.4	1		
Intake	219	19.1	1.33	(0.96; 1.83)	0.079
Intake of fruit and green vegetables					
5x or more per week	128	17.1	1		
4x or more per week	735	15.5	0.90	(0.64; 1.26)	0.555
Self-rated health status					
Satisfactory	671	12.0	1		
Unsatisfactory	203	27.0	2.24	(1.77; 2.84)	0.000
Body Mass Index					
Eutrophic	586	11.0	1		
Overweight	169	21.8	1.97	(1.41; 2.76)	0.000
Obese	56	42.8	3.86	(2.61; 5.70)	0.000
Tendency p					0.000

of the information provided by health care professionals.

This study has limitations. First, the cross-sectional design makes it impossible to analyze the temporality between the onset of CNCDs and behavioral change. Another limitation is survival bias. We considered that the college students affected by CNCDs were in the stage of the chronic disease that enables locomotion, understanding of class content and participation in university life. Because the college students affected by CNCDs required regular follow-up by health care professionals, it is inferred that memory bias is minimal.

It was found that self-rated health status is closely related to the physical symptoms [18] in subjects with more years of schooling [19] [20]. Also, cross-sectional studies have revealed the association between self-rated health with several morbidity [21] [22]. These findings support the association between unsatisfactory self-rated health status and CNCDs in this study by showing the negative impact of CNCDs on the well-being of college students.

This study found associations between the onset of CNCDs and sedentary habits in both leisure-time activity and locomotion by walking. These associations are consistent with well-known findings on the benefits of physical activity in the prevention of CNCDs [4] [23]. A classic cohort study on alumni from a North American uni-

Table 3. Factors associated with CNCDs for college students from Rio Branco, Acre, Brazil, 2010.

	Adjusted PR*	CI 95%	p
Leisure-time Physical Activity			
Active	1		
Sedentary	1.67	(1.12; 2.48)	0.011
Locomotion by walking			
Active	1		
Sedentary	1.34	(1.00; 1.79)	0.049
Smoking			
Non-smoker	1		
Current smoker	1.66	(1.07; 2.58)	0.024
Self-Rated Health Status			
Satisfactory	1		
Unsatisfactory	2.31	(1.84; 2.88)	0.000
Body Mass Index			
Eutrophic	1		
Overweight	1.67	(1.14; 2.46)	0.008
Obese	3.30	(2.18; 5.01)	0.000
Tendency p			0.000

*Each variable adjusted for gender and age.

versity found that low physical activity increased the risk of CNCDs [24]. Many college students have double daily journey at work and studies at the university. As a result, there may be a decrease in the adhesion to leisure-time physical activityas a non-drug treatment for CNCDs.

In Brazil, the decline of some CDCNs occurred through tobacco control and improvement in health care [1]. Of the students in the study, 5.6% were considered to be smokers, which supportsthe trendof a lowersmoking prevalencein the population from Rio Branco [25]. Other Brazilian studies with college students showed divergent results in smoking prevalence. For example, it was found that 7.2% of students from Tocantins state [26] and 52.5% students from Pernambuco state [11] were current smokers. Despite the low prevalence of smoking in this sample, the data confirmed a significant association between smoking and CNCDs [4]. Additionally, some participants continued smoking even after a CNCDs diagnosis by a health care professional, thus hindering treatment and exposing these individuals to CNCDs-related complications.

Some studies have demonstrated that the prevalence of CNCDs increases linearly with increasing BMI [27] [28]. A study involving nurses showed that the presence of obesity tripled the risk for the onset of coronary diseases, [21] which supports the finding that overweight and obese status were significantly associated with the onset of CNCDs in college students in Rio Branco. This association indicates a low adherence to the Brazilian [29] and international [30] recommendations for BMI reduction as a non-drug treatment for CNCDs.

5. Conclusion

Finally, this study showed a worrisome prevalence of CNCDs associated with sedentariness in terms of both leisure-time physical activities and locomotion by walking, smoking, unsatisfactory self-rated health status, overweight, and obesity. These findings are particularly important because the great majority of college students are young. Thus, we highlight the need for university-based programs aimed at the prevention of CNCDs and the promotion of healthy behaviors.

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