Risk and protective factors for chronic diseases in adults: a population-based study

Fatores de risco e de proteção para doenças crônicas em adultos: um estudo de base populacional

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Abstract *The article describes the relative frequency ok of risk and protective behaviors for chronic non-communicable diseases (NCDs) in adults residing in Viçosa, Brazil. A cross-sectional population-based study including 1,226 adults living in the municipality. We used a structured questionnaire containing questions sociodemographic and behavioral The risk and protection factors evaluated were: smoking, physical activity, excessive consumption of alcohol and food consumption. The proportion of risk and protection factors was calculated in the total population, according to gender, education and socioeconomic status. The studied population has a high frequency of risk factors for NCDs, such as excessive consumption of alcoholic beverages, habit of consuming whole milk, habit of eating meat with visible fat, regular consumption of soft drinks and 78.5 did not achieve the minimum recommendation for physical activity in leisure time. With regard to protective factors, 86.2% of the population reported regular consumption of fruits and vegetables, and 73%, of beans. It was found the highest frequency of risk factors in among males, in younger people and middle socioeconomic status. This population has an urgent need for public policy of municipal planning to change this current scenario.*

Key words *Risk factors, Chronic disease, Health surveys*

Resumo *Este artigo descreve a frequência relativa de comportamentos de risco e de proteção para doenças crônicas não transmissíveis (DCNT) em adultos de Viçosa, Brasil. Foi realizado um estudo transversal de base populacional, incluindo 1226 adultos residentes do município. Utilizou-se um questionário estruturado, contendo questões sociodemográficas e comportamentais. Os fatores de risco/proteção avaliados foram: tabagismo, prática de atividade física, consumo abusivo de bebida alcóolica e consumo alimentar. A proporção dos fatores de risco/proteção foi calculada na população total, de acordo com sexo, escolaridade e nível socioeconômico. A população avaliada apresenta elevada frequência de fatores de risco para DCNT, como consumo abusivo de bebidas alcoólicas, hábito de consumir leite integral, ingerir carnes com gorduras visíveis, consumo regular de refrigerantes e 78,5% não atingiram a recomendação mínima para atividade física no lazer. Em relação aos fatores de proteção, 86,2% da população relataram consumir regularmente frutas e vegetais, e 73%, feijões. Verificou-se a maior frequência de fatores de riscos no sexo masculino, em indivíduos de menor idade e nível socioeconômico intermediário. Nesta população há urgência nas políticas públicas de planejamento municipal para mudar o atual cenário.*

Palavras-chave *Fatores de risco, Doenças crônicas, Inquéritos epidemiológicos*

Introduction

Concern about the influence of modern eating habits, physical inactivity and tobacco and alcohol use in the development of chronic non-communicable diseases (NCD) has increased in many countries. Epidemiological studies have confirmed the association between these major risk factors and the rise of NCDs[1-4]. Importantly, these diseases have been the leading causes of death in both developed and developing countries[5,6].

In the last two decades, the dietary pattern of the Brazilian population has been changing with the predominance of high saturated-fat, high-sugar and low-fiber foods. The Consumer Expenditure Survey (2008-2009) published alarming data on the excessive consumption of sugar and saturated fat, which was reported by 61% and 82% participants of the survey, respectively, and low fiber intake reported by 68% of the participants[7]. Besides these mentioned aspects, national estimates reveal that physical inactivity and alcohol and tobacco use have a high prevalence in the country[8-10].

To modify this scenario, the World Health Organization launched the Global Strategy on Diet, Physical Activity and Health to promote health through public health actions and preventive measures[11]. In Brazil, the Ministry of Health launched the Strategic Action Plan for the Fight of Chronic Non-communicable Diseases, 2011-2022, aiming at promoting the development and implementation of integrated public policies and evidence-based prevention and control of NCDs and their risk factors[12]. The recent update and publication of the Dietary Guidelines for the Brazilian Population, in 2014, complements the strategies to face the current health scenario[13].

The identification of factors associated with the risk or protection for the development of NCDs in a population is a requirement in order to assist in the planning of actions to improve public health[14], since the modifiable risk factors such as smoking, physical inactivity, unhealthy diet and the harmful use of alcohol are possible to be minimized by seeking healthy behaviors[8,15].

Therefore, the objective of this study was to describe the frequency of risk and protective behaviors for the development of NCDs in adults between 20 and 59 years of age, living in the urban area of the municipality of Viçosa, Minas Gerais, Brazil.

Materials and methods

This is a descriptive epidemiological, cross-sectional study conducted by the study group on health and nutrition of Viçosa (ESA/Viçosa), using a population-based household survey in the urban area of Viçosa - Minas Gerais. The population of the city according to the census of 2010 was 72.220 habitants, 93% in the urban area. Related to gender, there is a predominance of women, constituting 51.5% of the population. Regarding the age distribution, children correspond to 6.05% of the population, teenagers 16.18%, adults 60.13%, and 17.34% are elderly people. About the ethnic composition they are: white, Asian, Indians, black and brown, spread over 46.60%, 0.82%, 00.12%, 15.50% and 36.96%, respectively. The municipal human development index (MHDI) is 0.775, placing it in 11th place among all cities in the state and has an average per capita income of R$ 521.67[16]. Viçosa has unique characteristics compared to other cities with the same size because of the large number of college students residing in it. The study population consisted of adults aged between 20 and 59 years of age at the time of the survey, men and women living in the urban area of the municipality.

Data were collected between September 2012 and March 2014, involving a team of interviewers and supervisors previously trained to apply the questionnaire.

The sample size was calculated by the formula for prevalence estimates, considering the total number of individuals aged between 20 and 59 years living in the urban area of Viçosa, amounting to 43,431 people[16]. Prevalence was estimated at 50%, as a result of this study be part of a larger project consisting of other outcomes and associated factors, 95% confidence level, the sampling error of 4.1 percent and deff (design effect) 1.55. There was a 20% increase in losses and refusals. Calculations using the software Epi-Info 3.5.2[®17] showed a minimum sample size (n) of 1049 participants. Exclusion criteria included: pregnant women, postpartum women, individuals that were bedridden or unable to take measurements, individuals with cognitive/intellectual difficulty or found it difficult to respond to the questionnaire.

The Brazilian Institute of Geography and Statistics (IBGE) divides the city into 99 census sectors, among which 30 sectors were randomly selected to be included in the study. Within each sector, a new random draw was carried out to set

a starting point from which to choose the homes to be visited and include all eligible participants from each household.

A structured, standardized questionnaire was used to collect sociodemographic, and behavioral data. This study evaluates the frequency of risk and protective factors in adults living in Viçosa. Among the risk factors, the following variables were evaluated: smoking, physical inactivity, alcohol abuse, habitual consumption of whole milk and fat meats (red meat with visible fat and / or chicken with skin) and regular consumption of soft drink. Protective factors evaluated were: sufficient physical activity during leisure time (leisure) and regular consumption of beans, fruits and vegetables.

The sociodemographic variables were: age in completed years and categorized into ten-year periods (20-29, 30-39, 40-49 and 50-59 years), schooling in completed years of study and set to 0-3 4-7 and ≥ 8 years of study and socioeconomic status, according to the Brazilian Association of Research Companies[18] and classified into socioeconomic levels A and B, C and D and E. Behavioral variables included smoking data, physical activity level and abuse of alcohol.

The smoking data were categorized in two groups: smokers and ex-smokers; and non-smokers[19]. The physical activity level (PAL) was assessed using the International Physical Activity Questionnaire (IPAQ), long version, validated for the Brazilian population[20]. This instrument is divided into four domains (physical activity at work; physical activity as a means of transportation; physical activity at home and physical activity for recreation, sport, exercise and leisure). In this study only the fourth domain (physical activity recreation, sport, exercise and leisure) was used to identify the PAL, which was calculated by adding the time spent on moderate physical activities more twice the time with vigorous activities. We used the cutoff point 150 minutes / week ("reach the recommendation" ≥ 150 minutes / week; "does not reach the recommendation" <150 minutes / week)[21]. The abuse of alcohol was considered present if there was ingestion of more than five drinks on a single occasion in the last thirty days for men, and more than four drinks for women. The standard dose set on half a bottle or a can of beer, a glass of wine or a shot of spirits[22].

The characteristics related to the eating habits of the participants were based on a structured questionnaire consisting of direct questions relating to food consumption, proposed by the Risk and Protective Factors Surveillance System for Chronic Diseases by Telephone Interviews (VIGITEL)[23]. Thus, the consumption of fruits, vegetables, beans and soft drinks was considered regular when respondents reported consumption of these foods more than five times a week. The habit of consuming whole milk and meat with visible fat (red meat with visible fat and / or chicken with skin) was also investigated.

Quality control was conducted by the random application of questions in the questionnaire in 10% of the sample through telephone contact and double entry of the questionnaire by previously trained typists. After checking the data consistency, analyses were performed using the statistical software STATA 13.1, taking into account the sample design effect using the svy tab commands. Sample weights considering the variables sex, age and education were calculated to equalize differences in socio-demographic composition of the sample in relation to the composition of the adult population of the city, according to the census distribution of 2010[16]. The proportions and respective intervals with 95% confidence level were calculated for the risk and protective factors for chronic diseases of the overall sample and stratified according to the variables: gender, age and socioeconomic status. The statistical significance was verified with the ² test, considering p <0.05.

The project was approved by the Ethics Committee of the Federal University of Viçosa, protocol number 008/12. Free consent signatures were requested and the survey participants were informed previously to data collection.

Results

The response rate was 95.64%, getting the full 1226 eligible adults that were interviewed. With respect to sociodemographic characteristics, the sample was predominantly composed of women, corresponding to 50.8%. Most of the subjects were in the age group 20-29 years, with 8 or more years of schooling and middle socioeconomic status (class C) (Table 1).

Regarding behavioral characteristics, 65.4% were non-smokers, 39.3% reported abusive alcohol consumption and 78.5% did not achieve the minimum recommendation for physical activity during leisure. As for eating habits, 59.0% of respondents reported regular consumption of whole milk, 55.4% commonly consumed meats with excess fat and 27.8% of the individuals men-

Table 1. Demographic, socioeconomic, behavioral and food consumption characteristics of the population, Viçosa, MG, 2012-2014.

Variable	Relative Frequency* (%)	Confidence interval (95% CI)
Sex		
Male	49.2	(45.7 - 52.7)
Female	50.8	(47.3 - 54.3)
Age (years)		
20 – 29	32.8	(24.3 - 42.5)
30 – 39	25.3	(21.1 - 29.9)
40 – 49	22.9	(18.3 - 28.3)
50 – 59	19.0	(15.1 - 23.7)
Education (years)		
0 – 3	12.3	(7.3 – 19.7)
4 – 7	16.0	(11.8 – 21.4)
>=8	71.7	(61.1 – 80.3)
Socioeconomic level (ABEP)		
High (A and B)	24.5	(19.0 - 31.1)
Middle (C)	64.7	(59.9 - 69.2)
Low (D and E)	10.8	(7.3 - 15.6)
Smoking		
Non-smoker	65.4	(59.9 - 70.6)
Smoker and ex-smoker	34.6	(29.3 - 40.1)
Physical activity at leisure		
Do not reach the recommendation	78.5	(71.3 - 84.3)
Reach the recommendation	21.5	(15.7 - 28.6)
Abusive consumption of alcohol[a]	39.3	(35.4 - 43.4)
Habit of consuming whole milk	59.0	(54.7- 63.1)
Habit of consuming meat without removal of visible fat	55.4	(50.3 - 60.3)
Regular consumption of soft drinks[b]	27.8	(23.8 - 32.3)
Regular consumption of beans[c]	86.2	(83.2 - 88.8)
Regular consumption of fruits and vegetables[d]	73.0	(67.3 - 77.9)

* Frequency weighted by sex, age and education. [a] More than five (men) or more than four (women) doses at least one occasion in the last 30 days. [b] Consumption of soft drinks in 5 or more days per week. [c] Consumption of bean in 5 or more days a week. [d] Consumption of fruits and vegetables in 5 or more days a week.

tioned the regular consumption of soft drinks. The consumption of bean for five or more days a week was reported by 86.25% of the sample and of fruits and vegetables by 73%.

Tables 2, 3 and 4 show the proportions and the respective intervals with 95% confidence for the risk and protection factors for NCDs in this population, according to sex, age and socioeconomic status. Among the behavioral and socio demographic factors studied, smoking and ex-smoking were more common in males, slightly higher in individuals aged between 20 and 29, with differences between ages and higher in individuals of socioeconomic class C. The difficulty in reaching the minimum recommendation of physical activity was predominant in females and more frequently in individuals aged between 20 and 29 and socioeconomic class C, with statistical differences detected between socioeconomic levels.

Abusive consumption of alcohol was more frequently related to male participants (54.4%), with differences between the sexes, predominant in individuals aged between 20 and 29, with differences between age and socioeconomic class C.

In relation to characteristics of food consumption, men showed more behaviors considered risk factors than women, with more frequent habitual consumption of whole milk, 51.7%, meat with visible fat, 58.2%, with significant differences between sexes (p < 0.001) and consumption of soft drinks for five or more days a week,

Table 2. Distribution of risk and protective factors for chronic diseases in the population, according to sex, Viçosa, MG, 2012-2014.

Risk and protection factors	Relative frequency* (95% CI)		p-value**
	Men	**Women**	
Smoking			0.09
Non-smoker	45.9 (41.9 – 50.0)	54.1 (50.0 – 58.1)	
Smoker and ex-smoker	55.4 (46.0 - 64.4)	44.5 (35.5 - 53.9)	
Physical activity at leisure			0.07
Do not reach the recommendation	46.1 (41.7 - 50.5)	53.9 (49.5 - 58.3)	
Reach the recommendation	66.7 **(59.8 - 72.9)**	33.3 **(27.0 - 40.2)**	
Abusive consumption of alcohol[a]	54.4 **(48.9 - 60.1)**	24.6 **(21.6 - 28.0)**	**0.00**
Habit of consuming whole milk	51.7 (46.6 - 56.8)	48.3 (43.2 - 53.4)	0.13
Habit of consuming meat without removal of visible fat	58.2 **(52.6 - 63.5)**	41.8 **(36.5 - 47.4)**	**0.00**
Regular consumption of soft drinks[b]	56.2 **(50.8 - 61.4)**	43.8 **(38.6 - 49.1)**	**0.00**
Regular consumption of beans[c]	50.4 (46.5 - 54.2)	49.6 (45.7 - 53.5)	**0.04**
Regular consumption of fruits and vegetables[d]	47.3 (42.4 - 52.2)	52.7 (47.8 - 57.5)	0.07

* Frequency weighted by sex, age and education. ** Chi-square test (p < 0.05). [a] More than five (men) or more than four (women) doses at least one occasion in the last 30 days. [b] Consumption of soft drinks in 5 or more days per week. [c] Consumption of bean 5 or more days a week. [d] Consumption of fruits and vegetables 5 or more days a week.

Table 3. Distribution of risk and protective factors for chronic diseases in the population, by age group, Viçosa, MG, 2012-2014.

Risk and protection factors	Relative frequency* (95% CI)				p-value**
	Age				
	(20 - 29 years)	**(30 – 39 years)**	**(40 – 49 years)**	**(50 - 59 years)**	
Smoking					0.00
Non-smoker	38.4 **(29.4 - 48.2)**	27.6 **(21.8 - 34.1)**	20.1 **(15.8 - 25.1)**	13.9 **(10.2 - 18.6)**	
Smoker and ex-smoker	22.1 (14.5 - 32.3)	20.8 (16.0 - 26.5)	28.2 (21.4 - 36.2)	28.7 (22.2 - 36.2)	
Physical activity at leisure					**0.00**
Do not reach the recommendation	26.1 (18.1 - 36.0)	25.2 (20.2 - 31.0)	25.4 (19.4 - 32.4)	23.3 (18.5 - 28.8)	
Reach the recommendation	46.8 **(37.0 - 56.9)**	26.2 **(20.4 - 32.8)**	13.9 **(8.6 - 21.5)**	13.1 (7.2 - 22.3)	
Abusive consumption of alcohol[a]	41.0 **(29.6 - 53.3)**	29.4 (21.9 - 38.0)	17.7 (10.9 - 27.5)	11.9 (6.9 - 19.6)	**0.00**
Habit of consuming whole milk	34.9 **(25.9 - 44.9)**	26.2 (21.6 - 31.2)	22.0 (16.3 - 29.1)	16.9 (12.9 - 21.6)	0.16
Habit of consuming meat without removal of visible fat	31.6 (22.2 - 42.9)	28.2 **(22.9 - 34.1)**	23.5 (17.5 - 30.6)	16.7 **(11.9 - 22.7)**	0.18
Regular consumption of soft drinks[b]	47.2 **(36.6 - 58.1)**	27.2 **(19.3 - 37.0)**	18.5 **(12.5 - 26.3)**	7.1 **(4.6 - 10.4)**	**0.00**
Regular consumption of beans[c]	32.2 **(23.8 - 41.9)**	26.0 (21.6 - 30.9)	22.7 **(17.6 - 28.7)**	19.1 (14.8 - 24.0)	0.62
Regular consumption of fruits and vegetables[d]	34.5 **(26.1 - 43.9)**	24.2 (20.3 - 28.6)	21.9 (17.2 - 27.5)	19.4 (15.3 - 24.1)	0.27

* Frequency weighted by sex, age and education. ** Chi-square test (p < 0.05). [a] More than five (men) or more than four (women) doses at least one occasion in the last 30 days. [b] Consumption of soft drinks in 5 or more days per week. [c] Consumption of bean 5 or more days a week. [d] Consumption of fruits and vegetables 5 or more days a week.

56.2%, with significant differences between sexes (p < 0.001). The regular consumption of beans was higher for males, with significant differences between the sexes. All consumption variables were observed with higher frequency in individuals aged between 20 and 29 years and middle socioeconomic status. The habitual consumption of milk and regular consumption of soft drink showed significant differences between the age groups.

Table 4 Distribution of risk and protective factors for chronic diseases in the population, according to the socioeconomic level, Viçosa, MG, 2012-2014.

Risk and protection factors	Relative frequency* (95% CI)			p-value**
	High socioeconomic status (A and B)	Middle socioeconomic status (C)	Low socioeconomic status (D and E)	
Smoking				0.63
Non-smoker	25.5 (**19.8 - 32.0**)	64.7 (**59.1 - 70.0**)	9.8 (**6.2 - 15.1**)	
Smoker and ex-smoker	22.8 (**15.8 - 31.6**)	64.6 (**56.2 - 72.1**)	12.5 (6.0 - 24.4)	
Physical activity at leisure				**0.00**
Do not reach the recommendation	19.7 (14.4 - 25.7)	66.6 (**61.8 - 71.0**)	13.7 (9.2 - 20.5)	
Reach the recommendation	34.7 (**27.6 - 42.5**)	61.1 (**52.0 - 69.4**)	4.2 (**2.1 - 8.2**)	
Abusive consumption of alcohol[a]	27.6 (**20.8 - 35.5**)	64.4 (**56.1 - 72.0**)	7.9 (**4.4 - 14.0**)	0.16
Habit of consuming whole milk	23.1(**17.8 - 29.4**)	67.3 (**62.3 - 72.0**)	9.5 (**5.8 - 15.1**)	0.15
Habit of consuming meat without removal of visible fat	23.5 (**17.8 - 30.4**)	69.0 (**62.7 - 74.7**)	7.5 (**3.6 - 14.8**)	0.06
Regular consumption of soft drinks[b]	24.2 (**17.4 - 32.5**)	68.1 (**60.8 - 74.6**)	7.7 (**4.0 - 14.5**)	0.37
Regular consumption of beans[c]	24.1 (**18.5 - 30.8**)	64.4 (**59.2 - 69.2**)	11.5 (**7.6 - 17.0**)	0.24
Regular consumption of fruits and vegetables[d]	29.5 (**23.4 - 36.4**)	61.5 (**56.4 - 66.5**)	9.0 (**5.7 - 13.9**)	**0.00**

* Frequency weighted by sex, age and education. ** Chi-square test (p < 0.05). [a] More than five (men) or more than four (women) doses at least one occasion in the last 30 days. [b] Consumption of soft drinks in 5 or more days per week. [c] Consumption of bean 5 or more days a week. [d] Consumption of fruits and vegetables 5 or more days a week.

Discussion

Chronic non-communicable diseases have an important role in the current health profile of the population. In Brazil, there is an increase in the prevalence of these diseases, causing many complaints. There are important national and international population studies on the relationship between demographic, socioeconomic and behavioral aspects and the rates of risk factors for NCDs[24-26]. However, though there are population-based studies that aim to determine the prevalence of risk and protective factors for NCDs in small cities[27], they are scarce. In addition, as previously mentioned, this survey was conducted in a university town and may have peculiar results due to the profile of the population.

The descriptive analysis of the participants' lifestyles in this study shows that this population has a high risk of developing NCDs because of the high prevalence of abusive consumption of alcohol, habit of consuming whole milk and eating meat with visible fat, regular consumption of soft drinks and predominant physical inactivity. Such behaviors are typical of college students, especially those who live without living parents, as in our sample.

The nationwide telephone surveys carried out in Brazil have shown a tendency to reduction in the use of cigarettes[10,23,28]. The prevalence of smoking in this study was described as inferior to some population-based surveys[9,29], however, higher than the most recent data published by VIGITEL[10]. In addition, the highest frequency of smoking was demonstrated in men, in younger individuals and in the middle socioeconomic class. These findings point out the importance of evaluating the effectiveness of awareness campaigns and regulatory and restrictive measures adopted in the municipality, since the tobacco constitutes the most important risk factor for NCDs[29].

Although the *Global Strategy on Diet, Physical Activity and Health*[11] recommends that individuals engage in adequate levels of physical activity throughout their lives, in Brazil, the frequency of physical activity during leisure shown by VIGITEL data in 2013[10] is only 33.8%. This may result in increased risk of overweight and cardiovascular diseases in a population[4]. Similar to reports of other Brazilian studies[3,30,31], we found high rates of physical inactivity and that men are more active than women, hence, the latter group should receive greater attention, to

fight inactivity. The low frequency of physically active individuals is also in agreement with the findings of Rombaldi et al.[32].

Alcohol consumption has been demonstrated across diverse populations[33], and the frequency of Brazilians that report abusive alcohol consumption is 16.4%[10]. Cibeira et al.[34] found association between alcohol consumption and sociodemographic factors in a sample of women from Porto Alegre, RS. The authors reported that 30% of the group stated to consume alcoholic beverages on a regular basis, and the better-educated and higher income were associated with consumption of higher amounts of alcohol.

In this study, we investigated the reported alcohol consumption in the last 30 days, from this point, we found that 39.3% of adults residents in Viçosa, who were interviewed in the survey, reported abusive alcohol consumption, showing that the expectations and goals for reducing alcohol prevalence outlined in the Action Plan of the Ministry of Health[12] have not been achieved in the municipality. One possible explanation for this scenario is the demographic profile of the city's population, which is made up of a high number of young university students. Another important result was the highest alcohol consumption among men. VIGITEL[10] reported in its latest publication that alcohol abuse is greater in younger individuals (18-34 years), corroborating our findings. Heavy alcohol consumption was investigated by Alexandre et al.[1]; Moura et al.[3]; Laranjeira et al.[33] and, similarly, men reported greater consumption than women.

In a study to identify sociodemographic and behavioral factors related to adult eating habits in the city of Goiania, GO, Alexandre et al.[1], showed that regular consumption of whole milk was similar for both sexes, corroborating what was detected in this study. Data of the last VIGITEL reports[10,23] indicated higher frequencies of whole milk consumption in the male population. It is noteworthy that these frequencies are considered high in view of the benefits obtained with healthier food choices such as skim milk[35], as the habitual consumption of animal products such as whole milk is considered an important risk factor for the development of cardiovascular diseases and certain types of cancer[36]. This study also found more frequent consumption of whole milk in the younger group, who also reported middle economic level.

Rombaldi et al.[32] presented data from a population-based study conducted in the city of Pelotas, RS, where 32.7% of the assessed adults reported regular consumption of fatty meats. International population-based studies also reported the habitual fat consumption of 33.7%[37] and between 34 and 36%[38]. We found higher percentages than those reported, however, they were consistent, when evaluating the distribution of fat consumption by gender, since men usually consume more fatty foods than women[39]. The proportion in the usual intake of meat with visible fat was higher in individuals of the middle economic class.

In relation to soft drink consumption, it has been found that the frequency of consumption investigated in this study was similar to that found by Longo et al.[9] in a population-based study in Lages, SC. In addition, the increased consumption of soft drinks reported by young men is consistent with studies that had the same focus[9,10,32]. We also found that the individuals belonging to socioeconomic level C reported the highest consumption of these products. According to data of the Household Budget Survey (POF 2002-2003), there was a 400% increase in the soft drink participation in household food purchases by Brazilians, which is higher in lower income classes[40]. Brazilian studies have shown that this scenario is repeated with college students[41,42].

Information collected by the World Health Survey[43] shows that the frequency of daily consumption of fruits and vegetables among the Brazilian adult population is around 41% and 30%, respectively, with a higher consumption found in the higher socioeconomic groups. According to data from the Household Budget Survey and VIGITEL[7,23] low consumption of fruits and vegetables have become a recurring phenomenon in Brazil and in Latin-American countries[44].

Several epidemiological studies have shown that consumption of fruits and vegetables may be associated with lower incidence and mortality related to chronic non-communicable diseases[45,46]. In this study, the prevalence in the regular consumption of beans, fruits and vegetables were higher than the findings published by VIGITEL[10], however, there was consistency regarding the higher frequency of consumption of these foods among women than men. Similarly, Alexandre et al.[1] showed that women tend to consume more often foods that are considered protective. It is worth noting that this study found the highest frequency of regular consumption of fruits and vegetables and beans among individuals of lower age, unlike the reports by the World Health Survey[43] In Brazil, the latest research that investigated the regular bean consumption, found that

the prevalence of consumption is higher among young adults and low educational levels[10].

A baseline study conducted in Anchieta, Brazil, to determine the prevalence of risk and protective factors for NCDs through a household survey detected a high prevalence in the consumption of meat with visible fat, low prevalence of physical activity during leisure time and consumption of five servings of fruits and vegetables on five or more days of the week[27]. These results show that the observed risk factors indicate similar favorable conditions for the rise of NCDs in the group investigated by this study, requiring an intervention by the municipality to modify these factors which are preventable. A comparison with the study of Sousa et al.[42] on students from the State University of Santa Cruz, BA, shows similar scenarios between the populations, which is characterized by inadequate consumption of fruits and vegetables, lower levels of physical activity at leisure and excessive alcohol consumption and smoking.

The implementation of small cities in universities promotes the economic, cultural and urban education development, the part of the population, however, can modify the different determinants of risk and protection for chronic diseases. Therefore, the adoption of integrated and sustainable actions to reduce the prevalence of risk factors associated with chronic diseases is critical to the development of effective strategies to promote the health of the population.

As a limiting factor of this study, there is the possible occurrence of recall bias on respondents' answers relating to months prior to the application of the questionnaire, which can underestimate the prevalence of some factors evaluated, as the prevalence of abusive consumption of alcohol. It is noteworthy that the use of eating markers recommended by the VIGITEL may appear different when comparing with the publication of the Food Guide for the Brazilian population, which recommended the preferential consumption of food raw or minimally processed as healthy consumption markers. However, consumer indicators discussed in this work have satisfactory validity and reliability, tested in previous studies[47,48], showing they can be used.

Conclusion

The prevalence of consumption of fruits, vegetables and beans was high, however, there was a prevalence of risk factors for the development of chronic diseases, including high prevalence of abusive consumption of alcohol, habit of consuming whole milk and eating meat with visible fat, regular consumption of soft drinks and physical inactivity. It is of utmost importance to disseminate these findings to health professionals and the general public, aiming at better planning of programs for the prevention and reduction of such diseases in this municipality.

Collaborations

DCG Silva, W Segheto, FA Coelho, VG Reis, SHO Morais contributed to the data collection and analyses of this study, wrote the initial draft of the manuscript and assembled the final version. MC Pessoa contributed to study design and data analyses. GZ Longo was the supervisor of this study, contributed to study design, developed analyses and data analyses.

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