Prevalence of Cardiovascular Risk Factors in Adults Living in Luzerna, Santa Catarina, in 2006

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Summary

Objectives: To estimate the prevalence of cardiovascular risk factors in the adult population of Luzerna, in the state of Santa Catarina.

Methods: A cross-sectional study with adults of both genders aged 20 to 59 years (n = 411). The prevalence of hypertension, diabetes, dyslipidemia, obesity, increased waist circumference, and smoking was estimated. Study variables were checked for frequency distribution, and a chi-square test for association was performed.

Results: The response rate was 85.9%. The following prevalences were found: hypertension: 14.7%; diabetes: 2.3%; dyslipidemia: 18.7%; obesity: 15.6%; increased waist circumference: 24.1%; and smoking: 15.6%. A total of 52.4% of the subjects had none of the risk factors; 22.4% had one risk factor, and 13.6%, 6.8%, and 4.9% had two, three, and four or more associated risk factors, respectively.

Conclusion: The study sample showed low prevalence of hypertension and diabetes and less clustering of risk factors in the same individual, as compared with other data reported in the literature. (Arq Bras Cardiol 2007;88(5):289-293)

Key words: Hipertension; risk factors; obesity; hypercholesterolemia; smoking; diabetes mellitus.

Introduction

Cardiovascular diseases include coronary artery disease, stroke, peripheral artery disease, renal diseases, and congestive heart failure[1]. These conditions are the leading cause of mortality worldwide. Last year, they accounted for more than 30% of the deaths in Brazil[2-3].

Hypertension, diabetes mellitus, obesity, cigarette smoking, and dyslipidemia are major risk factors for cardiovascular diseases (CVD), and several studies have shown that they cluster in some individuals[1,4-12].

The prevalence of these risk factors depends on genetic and environmental factors, such as dietary and physical activity patterns. Prevalence estimates is a useful tool for planning and implementing public policies focused on reducing cardiovascular morbidity and mortality.

This study was designed to estimate cardiovascular risk factor prevalence in the adult population of Luzerna, state of Santa Catarina.

Methods

A cross-sectional, population-based study was conducted in Luzerna, a city located in the midwest region of Santa Catarina state with approximately 5972 inhabitants. Data were collected from January to March 2006. Study population included adults who were 20 years or older but younger than 60, living in the urban and rural areas of the municipality, comprising 3348 people (50.8% female and 49.2% male).

To estimate the prevalence of CVD risk factors, the following parameters were considered: unknown prevalence (50%), error of 5 percentage points, and 95% confidence interval. Sample size was calculated at 343 subjects. To allow for losses to follow-up or refusals to participate in the study, it was increased by 20%, resulting in a final sample of 411 subjects.

Sample selection included all individuals from 20 to 59 years of age, listed in alphabetical order, registered with the Programa Saúde da Família (Family Health Program), which covers 100% of the local population and is updated every month. The 411 subjects were selected from this list using systematic random sampling.

All participants were interviewed in their homes, using a structured questionnaire, where the following variables were determined: age, gender, skin color, marital status, schooling, personal and family income, current use of drugs, past or present history of smoking, and previous history of hypertension. At this time, blood pressures were taken at home using two standard aneroid sphygmomanometers, which were calibrated at the beginning of the study and after every group of 40 subjects had been measured. Blood pressure measurement followed the recommendations of the

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Manuscript received September 4, 2006; revised manuscript received April 12, 2007; accepted April 20, 2007.

Brazilian Guidelines for Hypertension[13]. Each subject's blood pressure was measured three times, and the mean of the last two readings was considered in this study. Subjects with previous history of hypertension and taking anti-hypertensive medication to control blood pressure, as well as those with systolic blood pressure (SBP) ≥ 140 mm Hg and/or diastolic blood pressure (DBP) ≥ 90 mm Hg at the time of the interview, were considered hypertensive, provided these values were confirmed in a second visit within two weeks[13].

In a second phase, study participants went to the Health Care Unit where anthropometric measurements were obtained and 10-mL blood samples were collected from the forearm for laboratory tests.

Waist circumference was measured with a tape measure halfway between the lower costal margin and the iliac crest. Body weight and height were measured with the subject wearing light cloths and standing barefoot using an electronic scale (Filizola Personal Line) calibrated by InMetro, with accuracy of 0.1 kg, maximum capacity of 150 kg, and minimum capacity of 2.5 kg. Body height was measured in centimeters rounded to the nearest 0.1 cm.

Blood samples for total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), triglycerides and fasting glucose, obtained after a 12-hour fast, were collected into appropriate tubes and immediately sent for laboratory tests. Total cholesterol level was measured using the "CHOD-PAP" method, an enzymatic photometric test (DiaSyS); HDL-cholesterol level was measured using the HDL-C Immuno FS (DiaSyS); triglyceride level was measured by colorimetric enzymatic test using glycerol-3-phosphate-oxidase (DiaSyS); and plasma glucose was measured using the GOD-trinder method (Labtest). All tests were automated.

Low-density lipoprotein cholesterol (LDL-C) levels were determined according to the Friedewald formula, unless triglyceride level was ≥ 400 mg/dL. Subjects on lipid-lowering medication to control cholesterol or with either TC ≥ 240 mg/dL, LDL-C ≥ 160 mg/dL or HDL-C < 40 mg/dL were considered dyslipidemic. Those with history of diabetes mellitus and using oral glucose-lowering medication or insulin, as well as those with fasting glucose ≥ 126 mg/dL, were considered diabetic, provided it was confirmed by a repeat fasting glucose test on another occasion. Subjects were classified as obese when their body mass index (BMI) was ≥ 30 kg/m^2. Waist circumference was considered increased if greater than 88 cm in women and greater than 102 cm in men[14-16].

Data were collected by two nursing staff. In order to standardize data collection and minimize potential variations in data assessment, study variables were measured consecutively in 20 adult subjects, who were not included in this study, under the supervision of the principal investigator.

This project was approved by the Ethics Committee for Research Involving Human Subjects of the Universidade do Oeste de Santa Catarina (Unoesc) in accordance with the Helsinki Declaration. Only after signing an informed consent form were the participants included in the study.

Statistical analysis was performed using Stata 9.0 for Windows. A descriptive analysis was made, and study variables were checked for normal distribution. The chi-square test was used for associations between variables. P values < 0.05 were considered statistically significant. This study was funded entirely by the authors.

Results

The study's response rate was 85.9% (n = 353). Thirty-three subjects (8.0%) refused to participate; 22 (5.4%) could not be contacted for the interview; and three (0.7%) were unable to undergo the procedures (two pregnant women and one subject with mental disability).

A little more than half of the participants were women (50.7%), and mean sample age was 40.4 years (Table 1).

The prevalence of risk factors for cardiovascular complications is described in Table 2. There were significant differences between men and women regarding the presence of diabetes (p < 0.035), smoking (p = 0.043), and dyslipidemia (p = 0.002), prevalences being higher in men. Central obesity prevalence, in turn, measured by waist circumference, was higher in women than in men (p < 0.001).

Serum total and HDL-cholesterol levels are described in Table 3. No significant difference was found in total cholesterol between genders, but HDL-cholesterol was significantly higher in women than in men (p < 0.001). LDL-cholesterol was found to be higher than 160 mg/dL in 3.3% (95% CI: 2.3; 4.3) and between 130 an 160 mg/dL in 13.7% (95% CI: 11.9;15.5) of the sample; total and LDL-cholesterol did not differ significantly between genders.

Overall, 52.4% (95% CI 47.1–57.7) of the study population had none of the risk factors for cardiovascular disease analyzed. No significant difference was found when the presence of one or more risk factors was evaluated between men and women, except when five risk factors were considered simultaneously; and the number of men in this condition, as compared to women, was on the threshold of statistical significance (p = 0.056) (Table 4).

Discussion

This study sought to estimate the prevalence of cardiovascular risk factors in the adult population of a small town in southern Brazil.

The study's internal validity may be highlighted by its 85.9% response rate, as well as sample characteristics, which remained the same from the beginning to the end. Sample size and method of selection ensure the external validity regarding the extrapolation of the results to the population of the municipality studied. It should be emphasized, however, that care must be taken in extrapolating our findings to other populations, given the peculiarities of the population studied, which is predominantly white and with mean income and level of education higher than those described by IBGE (Brazilian Institute of Geography and Statistics) for the rest of the country[17].

The parameters used in this study meet the criteria established in the literature and also by the Brazilian Society of Cardiology and the World Health Organization[13,16].

Hypertension prevalence varies widely in different studies. According to the Health Ministry, 10% to 20% of the Brazilian adult population is hypertensive[18]. Higher rates were found in studies conducted in Bambuí, state of Minas Gerais, and Cavunge, state of Bahia, where the incidence of hypertension was 24.8% and 36.5%, respectively[8,10]. In other population-based studies, hypertension prevalence ranges from 22,3% to 44,0%[13]. The prevalence found in this study was lower than that of the above-mentioned studies. This may be attributed to the sample characteristics, which was predominantly white, unlike that of the study conducted in Bahia, and did not include subjects ≥ 60 years, as was the case in the study conducted in Bambuí. In addition, the difference in age range among the several cities compared may have contributed to the differences found. Dietary and physical activity habits, typical of a small town, may also account for these differences, but were not evaluated in the present study and warrant further investigation.

As far as lipid levels are concerned, dyslipidemia prevalence was similar to that reported by other studies, and the presence of this risk factor was significantly higher in the male than in the female gender. Women were found to have higher HDL-cholesterol levels than men. Dyslipidemia incidence among populations varies in the literature. Studies evaluating the presence of TC ≥ 240 mg/dL yielded figures ranging from 13% to 24.2%, which approach those found in this study[10,19].

The prevalence of obesity shown in this study was similar to that reported for the population of Pelotas, in Rio Grande do Sul (21.0%), as well as for the entire state of Rio Grande do Sul (18.6%)[20,21]. According to IBGE data, in 2002, 8.9% of the Brazilian population and 10.1% of the population living in the south of the country was obese, and the total number of people with BMI greater than 24 was 40.6% for the Brazilian population as a whole and 46.2% of the population of the south. A Brazilian study performed in 15 state capitals and the Federal District found self-reported prevalences of

Table 1 - Study sample characteristics, according to socioeconomic and demographic variables, in the city of Luzerna, state of Santa Catarina, 2006

Variables	n	%	Mean (SD)	Minimum	Maximum
Gender	-	-	-	-	-
Male	174	49.3	-	-	-
Female	179	50.7	-	-	-
Race	-	-	-	-	-
White	256	72.5	-	-	-
Non-white	97	27.5	-	-	-
Age (years)	-	-	40.4 (11.4)	20.0	59.0
20 – 29	82	23.2	-	-	-
30 – 39	81	22.9	-	-	-
40 – 49	96	27.2	-	-	-
50 – 59	94	26.7	-	-	-
Schooling	-	-	-	-	-
Only read and write	349	98.9	-	-	-
Illiterate	1	0.3	-	-	-
Only sign their names	3	0.8	-	-	-
Years of schooling	-	-	8.3 (4.3)	0.0	20.0
0 – 4	117	33.1	-	-	-
5 – 8	73	20.7	-	-	-
9 – 11	106	30.0	-	-	-
> 12	57	16.2	-	-	-
Income	-	-	1768.90 (1402.8)*	120.00*	12,180.00*
< 1.0 MW †	12	3.4	-	-	-
1.1 – 3.0 MW	89	25.2	-	-	-
3.1 – 6.0 MW	130	36.8	-	-	-
6.1 – 10.0 MW	80	22.7	-	-	-
10.0 – MW	42	11.9	-	-	-

** Figures expressed in Reals; † MW = Minimum wage of R$ 300.00 from January to February in 2006.*

Table 2 - Risk factors (prevalence and standard error) for cardiovascular diseases and statistical significance level between genders (p) in the adult population of Luzerna, state of Santa Catarina, in 2006

Risk Factors	Total sample (n = 353)	Male (n = 174)	Female (n = 179)	p
Hypertension	14.7 +1.9	14.9 + 2.7	14.5 + 2.6	= 0.912
Diabetes	2.3 +0.8	4.0 + 1.5	0.6 + 0.6	= 0.035
Smoking	15.6 +1.9	19.5 + 3.0	11.7 + 2.4	= 0.043
Dyslipidemia	18.7 +2.1	25.3 + 3.3	12.3 + 2.4	= 0.002
Obesity	15.6 +1.9	14.9 + 2.7	16.2 + 2.8	= 0.744
Central obesity	24.1 + 2.3	16.1 + 2.8	31.8 + 3.9	< 0.001

Table 3 - Lipid parameters (number and percentage) and statistical significance level between genders (*p*) in the adult population of Luzerna, state of Santa Catarina, in 2006 Catarina, in 2006

Lipids	Values (mg/dl)	Male n=174	Female n=179	Total sample (n = 353)	p
Total cholesterol	<200	115 (66.1%)	125 (69.8%)	240 (68.0%)	0.459
	200 – 239	41 (23.6%)	42 (23.5%)	83 (23.5%)	
	> 240	18 (10.3%)	12 (6.7%)	30 (8.5%)	
High-density cholesterol	< 40	22 (12.6%)	3 (1.7%)	25 (7.1%)	< 0.001
	> 60	58 (33.3%)	104 (58.1%)	162 (45.9%)	

Table 4 – Clustering of risk factors (prevalence and standard error) for cardiovascular diseases and statistical significance level between genders (p) in the adult population of Luzerna, state of Santa Catarina, in 2006

Number of risk factors	Total sample (n = 353)	Male (n = 174)	Female (n = 179)	p
None	52.4 + 2.7	51.1 + 3.8	53.6 + 3.7	0.641
1	22.4 + 2.2	24.7 + 3.3	21.2 + 3.0	0.436
2	13.6 + 1.8	12.2 + 2.5	13.2 + 2.5	0.831
3	6.8 + 1.3	4.6 + 1.6	7.8 + 2.0	0.150
4	3.1 + 0.9	3.2 + 1.3	2.6 + 1.2	0.723
5	1.8 + 0.7	3.2 + 1.3	0.6 + 0.6	0.056
6	-	-	-	-

obesity ranging from 8.2% to 12,9% and of overweight, from 23.0% to 33.5%. These rates are similar to those found in this study[17,22].

In regard to cigarette smoking, a statistically significant difference was found between men and women, with 66.7% more men smoking than women, a characteristic of areas with predominantly rural population. An estimated 20% of the Brazilian population older than 15 smoke, with marked variations across the country, from 12.9% in Aracajú, state of Sergipe, to 25.2% in Porto Alegre, state of Rio Grande do Sul. Overall, cigarette smoking tends to be less prevalent in less densely populated and less industrialized cities. According to the World Health Organization, between 15% and 29.9% of the Brazilian population older than 18 years smokes, rates that are consistent with those found in this study[3,22,23].

The lower prevalence of diabetes mellitus (DM) found in our study, compared to that reported in the literature, may be associated with the lower prevalence of hypertension in that population, since they often occur together. Ethnic factors, dietary habits and level of physical activity may also be implicated and warrant further studies. It is noteworthy that, in this study, the diagnosis of DM was based on two high fasting blood glucose levels, which represents a stricter diagnostic criterion. In the literature, DM prevalence ranges from 4% to 12%; however, it must be emphasized that these studies were performed in specific populations[8-10,24]. In a nationwide study performed in 15 state capitals and the Federal District, DM prevalence ranged from 5.2% to 9.4%[22]. According to the WHO, in 2000, less than 5% of the Brazilian adult population was diabetic[3].

The presence of central obesity, defined by waist circumference, was found to be significantly higher in women than in men. In a study with hypertensive subjects performed in Brusque, state of Santa Catarina, the prevalence of central obesity was 67.0% in women and 35.4% in men[11]. It must be remembered that this study focused on a specific

population (hypertensives), while our research included the general population of a municipality. In a study involving approximately 15,000 adult Americans, 24.5% of the men and 40.4% of the women had increased waist circumference. In another study conducted in Canada with about 8000 people, these figures were 14.4% and 18.8% for women and men, respectively[25]. The prevalence of this risk factor varies greatly in different populations, which may be attributed to hereditary causes, as well as to lifestyles.

More than half of our sample had none of the cardiovascular risk factors (CVRF) examined in this study, and most of those who had presented one or two factors. Other data reported in the literature, such as those from Bambuí, show higher prevalence of CVRF. This may be explained by the fact that, unlike this study, they included subjects older than 60, who tend to have more associated risk factors[8].

The prevalence of risk factors for cardiovascular diseases, therefore, varies significantly among different populations. It is paramount that these prevalences be known, so public health policies can be implemented locally. Our study was conducted in a small town in southern Brazil and, therefore, care must be exercised when extrapolating its results to other populations.

Potential Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Sources of Funding

There were no external funding sources for this study.

Study Association

This article is part of the thesis of master submitted by João Rogério Nunes Filho, from Universidade do Oeste de Santa Catarina - UNOESC.

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