Original Article

FREQUENCY OF CARDIOVASCULAR RISK FACTORS IN VOLUNTEERS ATTENDING A COMMUNITY-BASED HEALTH EDUCATION INTERVENTION

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ABSTRACT

INTRODUCTION. Cardiovascular diseases (CVD) are the main cause of death in Brazil.

OBJECTIVE. To evaluate the frequency of CVD risk factors in a population attending a community-based health education intervention.

METHODS. A retrospective analysis of 428 completed forms with clinical and demographic information of volunteers attending a public health event, held in May 2006. The chi-square test was used for comparisons between proportions and the Student *t* test for comparisons between groups. Associations between hypertension, diabetes mellitus (DM) and clinical variables were analyzed using a multivariate logistic regression model. Significance level was set at $p < 0.05$.

RESULTS. Mean age was 57±14 years, and women represented 58% of the total population. Most frequent cardiovascular risk factors included hypertension (39.5%), DM (15.4%) and dyslipidemia (25.8%); however, 8.4, 17.5 and 33.1% of the respondents, respectively, were unaware of these risk factors. Family history of CVD was reported by 41% of the respondents, and only 67% reported having any information about DM or dyslipidemia. Among obese individuals (BMI ≥ 30 kg/m^2, 27.3% of the population), systolic blood pressure (133±16 mmHg), diastolic blood pressure (84±11.5 mmHg) and casual glucose (124±52.5 mg/dL) were higher than those among non-obese individuals ($p < 0.05$). There was an association between obesity and dyslipidemia ($p = 0.04$). Age and BMI were independently associated with presence of hypertension and DM.

CONCLUSION. The high prevalence of modifiable risk factors in this study population suggests a need for public health interventions to promote education and primary prevention programs targeting, mainly, the elderly and overweight individuals.

KEYWORDS: Diabetes mellitus. Obesity. Hypertension. Cardiovascular disease. Risk factors. Community-based population.

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INTRODUCTION

Cardiovascular diseases are the main cause of death in Brazil, accounting for approximately 30% of all deaths across several age groups.[1] Furthermore, cardiovascular diseases are the major cause of financial burden on medical care provided by the Brazilian Public Health System (SUS).[2] According to a study carried out in the United States,[3] deaths resulting from cardiovascular disease are distributed as follows: coronary heart disease – 53%, stroke – 15%, and peripheral arterial disease – 5%.

The World Health Organization (WHO) classified risk factors according to two groups: related to the individual and related to the environment. The first group of risk factors is divided into: general factors (age, sex, educational level, genetic inheritance), lifestyle habits (smoking, inappropriate diet, sedentary lifestyle), and intermediate or biological factors (arterial hypertension, obesity, and hypercholesterolemia). The second group comprises socioeconomic status and cultural, environmental and urbanization aspects.[4]

Several studies have demonstrated the role of dyslipidemias (elevated LDL-cholesterol and low HDL-cholesterol), arterial hypertension, smoking, age, and diabetes mellitus (DM) as independent risk factors for atherosclerosis and consequent ischemic heart disease (IHD)[5] Concerning stroke, arterial hypertension is the most important independent risk factor. Controlled clinical trials have indicated a decrease in morbidity and mortality due to cardiovascular disease in individuals with therapeutic reduction in blood pressure levels.[6] In addition to hypertension, there are other factors that worsen the independent risk factors, known as predisposing risk factors, such as family history of IHD, obesity, sedentary lifestyle, ethnic characteristics, and psychosocial factors.

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The "Acute Myocardial Infarction Risk Factor Assessment in Brazil" (AFIRMAR) study reported the following independent risk factors for acute myocardial infarction (AMI): smoking greater than or equal to five cigarettes/day, plasma glucose greater than or equal to 126 mg/dL, waist/hip ratio greater than 0.94, family history of coronary atherosclerotic disease (CAD), LDL-cholesterol between 100 and 120 mg/dL or greater, hypertension or DM, alcohol intake up to two days/week and between three and seven days/week, family income between R$ 600.00 and R$ 1,200.00, and educational level.[7] The FRICAS (Risk Factors for Acute Myocardial Infarction in Brazil) study observed the same risk factors as those reported in the AFIRMAR study. However, risk factors such as positive family history, higher socioeconomic status, and saturated fat intake showed a significant positive association with risk of infarction.[8]

According to the current guidelines of the Brazilian Society of Cardiology, the major cardiovascular risk factors found among the general population in Brazil are as follows: smoking, arterial hypertension, DM, obesity, and dyslipidemias.[9] Increased body mass index (BMI) was also associated with high prevalence of hypertension, DM. and dyslipidemia.[10]

The treatment of independent risk factors can significantly reduce morbidity and mortality secondary to atherosclerosis.[11,12,13]

The INTERHEART study evaluated odds ratio by grouping risk factors together. When evaluated together, smoking, hypertension and DM increased odds ratio for AMI to 13.01 (99%CI 10.69-15.83) in relation to individuals without these cardiovascular risk factors, being responsible for 53% of the attributable risk. Therefore, theoretically, preventing these risk factors, as a primary prevention intervention, would reduce AMI cases by up to 53%.[14]

It is well-known that weight reduction and changes in lifestyle have beneficial effects on the main cardiovascular risk factors.[15-19] However, we still lack educational programs that effectively stimulate changes in lifestyle and dietary habits in Brazil, and we believe that the general population does not have full access to information about cardiovascular risk factors or to interventions for primary prevention of these diseases.

Within such a context, the objective of the present study was to evaluate the frequency of cardiovascular risk factors and access to information about these factors in a population of volunteers who attended a community-based health education intervention, including the influence of sex in the analysis.

Methods

This cross-sectional study retrospectively analyzed 428 standard record forms with a questionnaire about physical and demographic characteristics of volunteers who attended a community-based health education intervention, held in May 2006, in Botucatu, a small town in the countryside of the Sao Paulo state, southeastern Brazil. This annual event is organized and coordinated by the Heart League from Botucatu Medical School, which is fully advertised throughout the local media. All volunteers provided written informed consent, and the study was approved by the Institutional Research Ethics Committee (no. 053/08-CEP).

The participants were interviewed by previously trained medical students and were requested to provide information on personal and family history, living conditions, and habits. They were also asked about their knowledge of cardiovascular risk factors. None of the participants reported previous cardiovascular events.

After the interview, weight and height were measured using a standard electronic scale. Blood pressure was also measured, the participants in the sitting position and at rest for five minutes, using an aneroid sphygmomanometer. Glucose levels were checked using portable blood glucose monitors and test strips (Roche®, Accu-Chek Active System). For this purpose, blood drops were obtained via digital puncture using standard disposable apparatus.

The following values were considered normal: systolic blood pressure $\leq$ 140 mmHg; diastolic blood pressure $\leq$ 90 mmHg; casual glucose levels $\leq$ 200 mg/dL. Individuals were considered as hypertensive patients when they were using antihypertensive drugs or reported the disease and showed increased blood pressure during assessment. Individuals were considered as diabetic patients when they were using hypoglycemic drugs or reported the disease and showed increased glucose levels during assessment.[20,21] BMI (kg/m^2) was obtained as a result of the weight (W; kg) divided by the square of the height (H; m): BMI = W/H^2. Overweight/obesity was defined as values greater than or equal to 25 kg/m^2.

Statistical analysis

Continuous variables were expressed as mean $\pm$ standard deviation or median and interquartile range. Categorical variables were expressed as proportions. Comparisons between subgroups were performed using the Student *t* test, the Mann-Whitney test or the chi-square test. Clinical and demographic variables associated with hypertension and DM, in the univariate model, with a probability up to 0.20, were included in a multivariate logistic regression model. In all analyses significance level was set at $p < 0.05$.

Results

Out of the 428 study participants, 247 were women (57.7%). The main clinical variables are described in Table 1. There was no significant difference between men and women, except for diastolic blood pressure, which was higher among men (84$\pm$11.2 mmHg vs. 81$\pm$11.8 mmHg, $p = 0.009$). Family history of cardiovascular disease was reported by 41% of the individuals (28% women and 13% men, $p < 0.001$), and 7% of them reported having no information about this risk factor. Smoking was reported by 11.9% of the participants, with no difference between men and women. Among the individuals who denied current smoking, 67.3% never smoked (44.9% men and 22.3% women) and 32.7% were previous tobacco users (18.7% men and 14.1% women). These differences were statistically significant ($p < 0.001$). Frequency of hypertension (total: 39.5%, men: 16.8%, and women: 22.7%; $p = 0.81$) and DM (total: 15.4%, men: 6.1%, and women: 10.7%; $p = 0.70$) was comparable between men and women. Most individuals included in this study (total: 67%, men: 24.4%, and women: 42.6%; $p = 0.001$)

Table 1 – Clinical variables observed in the total population and comparison between men and women

Variable	Total population (n = 428)	Women (n = 247)	Men (n = 181)	p
Age (years)	57 ± 14.2	56 ± 15	58 ± 14	0.143
BMI (kg/m2)	27.8 ± 5.1	28.2 ± 5.6	27.5 ± 4.3	0.187
Systolic blood pressure (mmHg)	130 ± 18.0	129 ± 18.7	132 ± 16.7	0.077
Diastolic blood pressure (mmHg)	82 ± 11.5	81 ± 11.8	84 ± 11.2	0.009
Casual glucose (mg/dL)	116 ± 45	116 ± 45	115 ± 44	0.899

BMI: body mass index.

Table 2 – Logistic regression model to explain presence of hypertension

Factors		p	or	95%CI
Intercept	-5.04	<0.001		
Age (years)	0.05	<0.001	1.05	(1.03 – 1.07)
Female	0.03	0.894	1.31	(0.66 – 1.62)
BMI (kg/m2)	0.08	<0.001	1.09	(1.04 – 1.14)
Negative FH	-0.72	0.004	0.49	(0.30 – 0.79)
Negative smoking	-0.09	0.807	0.92	(0.46 – 1.83)
No information access	-0.29	0.239	0.75	(0.46 – 1.21)

95%CI: 95% confidence interval; BMI: body mass index; FH: family history of hypertension.

reported having access to information about cardiovascular risk factors. However, taking into consideration hypertension, DM and dyslipidemia as risk factors, we observed an increasing percentage of individuals who were unaware of the presence or absence of the disease (8.4%, 17.5%, and 33.1%, respectively; $p < 0.001$).

The risk factors independently and positively associated with the diagnosis of hypertension are described in Table 2, including age (OR: 1.05; 95%CI 1.03-1.07; $p < 0.001$) and BMI (OR: 1.09; 95%CI 1.04-1.14; $p < 0.001$). Negative family history of hypertension was a protective factor, associated with absence of disease (OR: 0.49; 95%CI 0.30-0.79; $p = 0.004$).

The variables associated with presence of DM (Table 3) were age (OR: 1.05; 95%CI 1.02-1.08; $p < 0.001$) and BMI (OR: 1.15; 95%CI 1.08-1.22; $p < 0.001$). Negative family history of the disease was a protective factor (OR: 0.16; 95%CI 0.07-0.35; $p < 0.001$). Curiously, in this population, lack of information about cardiovascular risk factors was associated with decreased chance for DM (OR: 0.22; 95%CI 0.09-0.52; $p = 0.001$).

No significant associations were found between clinical or demographic variables and dyslipidemia.

Discussion

The objective of the present study was to evaluate the frequency of cardiovascular risk factors, in a specific population, which was not selected to represent the general population and was composed of volunteers who spontaneously attended a community-based health education intervention held in our town. We found that, in the analysis of the individuals, gender was not a risk factor for occurrence of DM or hypertension.

In this population, we observed a high frequency of risk factors for AMI events, as previously indicated in the FRICAS study.[8] It is important to highlight that, although mean blood pressure values were below normal ranges, almost half of the study population was classified as hypertensive individuals. This frequency is higher than that reported in population-based studies[22-24] and is probably related to the fact that our sample represented the population of a specific area. That is, during a public event, people with a previously diagnosed disease may be more attracted to participate in the study, resulting in potential sample bias.

Table 3 – Logistic regression model to explain presence of diabetes mellitus

Factors		p	or	95%CI
Intercept	-7.96	<0.001		
Age (years)	0.05	<0.001	1.05	(1.02 – 1.08)
Female	0.085	0.795	1.09	(0.57 – 2.07)
BMI (kg/m2)	0.14	<0.001	1.15	(1.08 – 1.22)
Negative FH	-1.83	<0.001	0.16	(0.07 – 0.35)
Negative smoking	-0.10	0.845	1.11	(0.40 – 3.04)
No information access	-1.526	0.001	0.22	(0.09 – 0.52)

95%CI: 95% confidence interval; BMI: body mass index; FH: family history of diabetes mellitus.

Although such argument can also be applied to other factors, we would like to draw attention to the high frequency of overweight/obese individuals. For instance, Nunes Filho et al.[25] reported prevalence of only 15.6% of obesity in a study carried out between January and March 2006, in the city of Luzema, southern Brazil. Furthermore, in that study, the authors observed significant differences between men and women regarding presence of diabetes ($p < 0.035$), smoking ($p = 0.043$), and dyslipidemia ($p = 0.002$), with higher prevalence among men, in contrast with our findings.

Another interesting finding was the fact that one third of the individuals denied having access to information about cardiovascular risk factors, indicating that the population lacks knowledge related to this aspect. Possibly, when there is no diagnosis of a disease associated with higher cardiovascular risk, people are less likely to search for specific information. Therefore, it seems appropriate to speculate that these individuals might not attend health care facilities or, when doing so, might not do it appropriately. Another interesting aspect is the higher percentage of women reporting access to information about risk factors. Although we have not found studies approaching this specific aspect, it seems appropriate to suggest that campaigns to educate the population and prevent cardiovascular diseases take into consideration that women might be more aware and sensitive to these issues.

It was particularly relevant that a significantly higher proportion of individuals was unaware of their health status regarding presence of dyslipidemia, when compared to hypertension. This result suggests that health education campaigns, medical care or even the general media were more efficient about explaining the importance of the diagnosis and prevention of hypertension than that of dyslipidemia. In Brazil, data on the prevalence of dyslipidemia are scarce, but there is some evidence suggesting that the prevalence is high, comparable to those reported in studies conducted in the United States, stressing the need for actions that might improve this condition.[26] In the present study, lack of lipid profile measurements and individuals' lack of information about this condition prevented an analysis of the association between clinical and demographic variables and this cardiovascular risk factor.

The results obtained clearly indicated that, in this study population, older age and higher BMI increased the chance of hypertension and DM. These diseases are important elements of the metabolic syndrome (MS). MS is a disorder represented as a combination of cardiovascular risk factors related to central obesity and insulin resistance. This syndrome is associated with cardiovascular disease, causing a 1.5-fold increase in general mortality rates and a 2.5-fold increase in cardiovascular mortality rates.

In a recent study,[27] a combined analysis of risk factors, using information easily obtained (such as blood pressure and hypertension treatment, socioeconomic status, smoking, BMI, and family history of DM), proved to predict cardiovascular events as accurately as laboratory tests. These results indicate that the introduction of preventive interventions might be a more efficient and low-cost action.

Another recent study on cardiovascular risk factors, carried out in the United Kingdom, included more than 17,000 civil servants from different socioeconomic groups. Blood pressure was measured on a single occasion, similar to our study, in addition to the measurement of fasting glucose and total cholesterol levels. The frequency of death due to IHD was observed for a 15-year period. The authors suggested that a prevention program that effectively reduced blood pressure, total cholesterol, fasting glucose in diabetic people, in addition to cessation of smoking in smokers, could prevent deaths due to myocardial infarction. They also argued that these interventions could reduce by 69% the difference in mortality rates dependent on socioeconomic

status. This study underscores the importance of effective primary prevention interventions.[15]

In conclusion, our results indicate a high prevalence of modifiable cardiovascular risk factors in this study population and some degree of misinformation about how to prevent such factors, suggesting a need for public health interventions to promote education and primary prevention programs targeting, mainly, the elderly and overweight individuals.

Study limitations: In addition to the limitation previously mentioned regarding the inclusion criteria, single measurements of blood pressure and casual glucose levels were not sufficient to define a diagnosis of hypertension or diabetes mellitus, respectively. However, these measurements were considered only when the individuals classified as having these diseases reported history or confirmed the use of specific drug therapy.

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