



Prevalence of risk factors for the occurrence of strokes in the elderly

Prevalência de fatores de risco para a ocorrência de acidente vascular encefálico em idosos

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Abstract

Introduction: Stroke (CVA) is a multifactorial disease, where the combination of risk factors may be associated with and contribute to its development. **Objectives:** The objective of this study was to evaluate the prevalence of risk factors for stroke in the physically independent elderly in the city of Londrina, Brazil. **Materials and methods:** This study was composed of the elderly individuals participating in the EELO project (Age and Ageing Study, Londrina, State of Paraná, Brazil). In order to identify the risk factors for stroke, one used a structured questionnaire with information about socio-demographic and anthropometric

data as well as lifestyle variables, such as physical inactivity and smoking, presence of comorbidities, and laboratory tests for diagnosis of diabetes and dyslipidemia. **Results:** The study included 454 elderly with mean age of 69.7 years. There was a significant relationship between the number of risk factors and gender ($p = 0.01$), with higher prevalence among women. In separate analysis, the elderly between 60 and 69 years had a higher incidence of obesity ($p = 0.03$) and dyslipidemia ($p = 0.04$). Regarding gender, obesity ($p = 0.01$), smoking ($p = 0.0001$), vascular disease ($p = 0.0001$) and heart disease in the family ($p = 0.01$) higher incidence was shown in females, according to *Chi Square's* test. **Conclusions:** It is concluded that elderly people aged less than 70 years and older women were those with the highest number of risk factors for CVA. Therefore, it may be suggested the development of primary care programs in order to promote information on the prevention of these risk factors and thus reduce the occurrence of stroke.

Keywords: Stroke. Risk factors. Elderly. Primary prevention.

Resumo

Introdução: O Acidente Vascular Encefálico (AVE) é uma doença multifatorial, de modo que a combinação de fatores de risco pode contribuir para o seu desenvolvimento. **Objetivo:** O objetivo deste estudo foi avaliar a prevalência dos fatores de risco para o AVE na população idosa fisicamente independente do município de Londrina. **Materiais e métodos:** O estudo foi composto por idosos integrantes do projeto EELO (Estudo sobre o Envelhecimento e Longevidade – Londrina (PR), Brasil). Para identificação dos fatores de risco do AVE, utilizou-se um questionário estruturado com informações sobre dados sociodemográficos, dados antropométricos, variáveis de estilo de vida como sedentarismo e hábito de fumar, análise da presença de comorbidades e avaliação laboratorial para o diagnóstico de diabetes e dislipidemias. **Resultados:** Participaram deste estudo 454 idosos com idade média de 69,7 anos. Observou-se relação significativa entre o número de fatores de risco e o gênero ($p = 0,01$), com maior prevalência entre as mulheres. Em análise isolada, idosos entre 60 e 69 anos apresentaram maior incidência de obesidade ($p = 0,03$) e dislipidemias ($p = 0,04$). Em relação ao gênero, a obesidade ($p = 0,01$), tabagismo ($p = 0,0001$), doença vascular ($p = 0,0001$) e doença cardíaca na família ($p = 0,01$) apresentaram maior incidência no sexo feminino, segundo teste Qui Quadrado. **Conclusões:** Conclui-se que os idosos com idade menor que 70 anos e mulheres idosas foram os que apresentaram maior número de fatores de risco para o AVE. Desta forma sugere-se a elaboração de programas de atenção primária com o objetivo de promover informações sobre a prevenção destes fatores de risco e a redução da ocorrência do acidente vascular encefálico.

Palavras-chave: Acidente Vascular Encefálico. Fatores de risco. Idosos. Prevenção primária.

Introduction

In the last years, the aging of population ceased to be a characteristic restricted to the so-called developed countries, and it also became a reality in the developing countries such as Brazil, whose trend is to have one of the world's greatest populations composed by elderly individuals (1).

The number of elderly citizens aged 60 or older in Brazil increased from 3 million in 1960 to 14 million in 2002. This growth is a result of the gradual increase in longevity, together with the reduction in natality and mortality rates (2, 3). Projection

performed by the Brazilian Institute of Geography and Statistics (IBGE) pointed that until 2028, the Brazilian elderly population shall reach a total of over 38 million individuals aged older than 60 years old; that is, there will be an increase greater than double of today's elderly population (1). Possibly, this scenario is due to the improvement in technological and scientific advances, the better hygienic, sanitary and sanitation conditions, and mainly the health conditions in this country. The association of such conditions leads to an increase in life expectancy at birth, the decrease of mother-child mortality, and the increase in control survival, besides the

eradication or some diseases. The sum of all these factors favors population aging (4).

The aging process of individuals with declining age is related to psychological, physical and social changes as well as to the emergence of pathological conditions coming from inadequate life habits such as sedentarism, smoking, drinking, inadequate diet rich in fat or sugar, among others (3, 4).

The increase of the elderly population together with the increase in longevity has resulted in changes to the epidemiological picture of a population. The most prevalent infectious diseases in young individuals have been decreasing progressively, whereas chronic degenerative diseases have been increasing, becoming more and more incident in the elderly population. The increase in life expectancy has contributed to the appearing of chronic diseases as cancer, dementia, cerebrovascular diseases (CVDs), e.g. Cerebrovascular Accident (CVA), which may generate sequels that lead to losses in quality of life, reducing the elderly persons' capacity to perform basic daily-life activities (5).

CVA is a disease characterized by the acute beginning of a neurological deficit that persists for more than 24 hours, reflecting in focal involvement of the central nervous system as a result of an alteration in the cerebral blood flow. These lesions are provoked due to an ischemia or hemorrhage which results in impairment of the brain function. It is considered the vascular disease that most affects the central nervous system (4).

World prevalence of CVA in the general population is circa 0.5 to 0.7%. Incidence of CVA doubles in each decade after 55 years old, making it become an important and prominent issue among the elderly population (6). It is between the second and third most common death cause around the world after the acute myocardial infarction and neoplasms (4). Besides a high mortality rate, great part of survivors presents sequels with limitation of their intellectual, motor and sensory capacities, generating a high social cost and great impact to a society (6).

All these manifestations provoked by the CVA eventually modify these people's living with their families and within their communities. Such condition causes the individual's withdrawal from society and, in many cases, to social exclusion, which caused by himself may lead to severe depressive states (7).

In the last years, studies with more advanced and precise methods have identified the risk factors for

CVAs, aiming at primary prevention for the population. Furthermore, characterizing the determining factors of mortality and recurrence after an ischemic event has been the basis for secondary prevention strategies, once recurrence of CVA is an even greater threat to any survivor (8).

Risk factors may be grouped in not-modifiable, such as gender, race, family background, and genetics; modifiable, hypertension, smoking, obesity, diabetes mellitus, alcohol consumption, physical inactivity, dyslipidemia and stress; and environmental, as passive smoking and use of drugs such as oral contraceptives (9). One highlights the importance of the modifiable ones, because these are subject to intervention in people's everyday life (9).

Among the modifiable risk factors, it is worth stressing hypertension, which is considered the world's main risk factor in predicting ischemic stroke, being present in circa 70% CVD cases (4, 10). Smoking is another important factor, once it increases in circa 2 to 4 times the chances of a person to have a CVA (10). According to several studies, sedentarism is associated to the increased risk of CVA both in men and women (11). Obesity is a chronic disease which can be directly or indirectly related to other diseases, and it is one of the contributing factors for the development of cardiovascular, cerebrovascular and musculoskeletal diseases as well as neoplasms. Diabetes mellitus contributes to the development of cerebrovascular diseases such as CVA, once it accelerates the atherosclerotic process (10).

Besides contributing to morbidity and mortality, damages caused by CVA to the individual, his family and society, due to the limitation in performing his everyday-life activities and the high financial costs of hospitalization and rehabilitation, it becomes a relevant public health issue (12).

Before the relevant aspects addressed by the physical, social and psychological disabilities caused by the event of a cerebrovascular accident, the present study presents itself with the main objective of evaluating the prevalence of risk factors for CVA in the physically-independent population in the city of Londrina.

Materials and methods

This work consists of an epidemiological study with a cross-sectional type design, descriptive and

observational. It was composed by a population of individuals of independent life, of both genders, aged 60 years old or over, in the city of Londrina, who are classified at levels 3 and 4 in the Functional Status proposed by Spirduso (13), all of them being individuals integrating the EELO project.

The EELO Project — Brazilian acronym for 'Study on Ageing and Longevity' — had a multidisciplinary approach with the aim at integrating health, socio-economic and psychosocial evaluations of the elderly. It was developed starting from a population of 43,610 elderly individuals registered in 38 Basic Health Units (UBS) in the urban area of Londrina, where the sample calculated for the study was 343 individuals, considering a confidence interval of 95%, considering a sampling error of 5%. The elderly were selected from the registers in the basic health units in a stratified random manner. In this way, 454 individuals were included.

The participants voluntarily accepted the invitations to this research and signed a consent, which was approved together with this research by the Committee to Ethics Research for Human Beings according to resolution 196/96 by the National Committee for Health under number 0070/09.

For the observation of prevalence variables to the risk factors in the occurrence of the cerebrovascular accident (CVA), the used protocol emphasized: a) socio-demographic information, particularly the name, gender, race, age, socio-economic status and level of education by means of a structured questionnaire; b) anthropometric data, particularly height and weight, to determine body mass index (BMI) and identification of the obesity factor by BMI classification; c) lifestyle variables such as sedentarism, checked through regular physical activity, present in the comorbidities questionnaire — classifying those who do not perform regular physical activity as sedentary; smoking (classified as: never smokers, current smokers, ex-smokers (14); d) Verification of the presence of comorbidities, as assessed through an instrument structured by the authors of the EELO project, in which the variables were reported by participants, among them, the presence of hypertension, diabetes mellitus, dyslipidemia, vascular disease, heart disease and heart disease in the family, e) laboratory tests for the diagnosis of diabetes (using the methodology of glycated hemoglobin – HPLC – High Performance Liquid Chromatography/Hemoglobin Testing System) and dyslipidemia (by checking the

dosages of total cholesterol, HDL – cholesterol and triglyceride using the automated enzymatic colorimetric method (Olympus AU400) and LDL – cholesterol by the Friedewald formula calculation).

The statistical analysis was performed using the Statistical Package for Social Sciences version 15.0. It was adopted a confidence interval of 95% and significance level of 5% ($p < 0.05$) to all the applied tests. The data were presented according to the absolute frequency (n) and relative frequency (%). One used the Chi-square test for the comparison between genders and age groups according to the factors for CVA separately. In addition, one used Spearman's correlation in order to evaluate the possible association between genders and prevalence of risk factors for CVA.

Results

Among the 454 participant individuals, 302 were women and 152 men. 241 of these were aged between 60 to 69 years old; 176 between 70 to 79 years old and 37 were aged 80 or older. Although it was observed greater prevalence of women in relation to men, both groups presented similar age (mean age of the women: 69.2 ± 6.25 versus mean age of the men: 70.8 ± 6.60), according to unpaired t test ($p = 0.75$). The study group was composed by 282 white individuals and 172 non-white ones. Regarding scholarship, 202 elderly persons were illiterate, 147 had studied until the incomplete 4th grade of the Brazilian elementary school, 52 elderly had finished elementary school, 16 had completed secondary school and only 19 had earned a college degree. As to the socio-economic class, the most frequent one in the population studied was the so-called Brazilian "C" class, composed by 282 people, followed by "D" and "E" classes with 93 individuals, and "A" class with 79 elderly persons.

One hundred eighty-seven of the assessed elderly were overweight, followed by type-I obesity, which was represented by 132 individuals, and type-II obesity by 6 individuals. 113 women were overweight, in contrast to 74 men. Among the elderly women, 104 had type-I obesity in contrast to 28 men; and 4 women and 2 men presented type-II obesity. Analyzing the age group of the participants, it was observed that the elderly aged between 60 to 69 years old presented greater incidence of overweight, represented by 93

elderly persons; followed by type-I obesity with 84 individuals, and type-II obesity with 6 individuals, when compared to the elderly aged over 80 years old. The distribution presented a significant statistical difference in relation to gender ($p = 0.01$) and age group ($p = 0.03$), as assessed with the Chi-square.

Hypertension was present in 289 of the assessed elderly, being diagnosed in 200 women and 89 men. As to the risk factor for the presence of diabetes mellitus, it occurred in 308 assessed individuals, being 202 cases found in women and 106 found in men. The findings of the study stress to presence of hypertension and diabetes mellitus with greater incidence among women and the elderly aged between 60 and 69 years old. Such risk factors do not show statistically significant distribution in relation to gender ($p = 0.10$) and age group ($p = 0.80$) for hypertension and, regarding gender ($p = 0.54$) and age group ($p = 0.93$) for diabetes, according to the Chi-square test.

Presence of vascular disease was observed in 196 of the elderly, being present in 151 women and in 45 men. For the Chi-square test, such difference was significant in relation to gender ($p = 0.0001$); yet, the same did not occur in relation to the age group ($p = 0.016$).

Frequency to cardiac disease occurred in 106 of the assessed elderly to which 70 were women and 36 were men. According to the Chi-square test, the values found were not significant with regards to gender ($p = 0.90$) and age group ($p = 0.37$). It was observed that the presence of any sort of heart disease was greater in women and in the elderly aged 60 to 69, which corresponds to 53 participants.

Family background of cardiac diseases was present in 179 of the assessed persons, being 131 reported by women and 48 by men. This difference was also statistically significant in relation to gender ($p = 0.01$); yet, there was no significance in relation to age group ($p = 0.52$), as assessed with the Chi-square test.

Smoking was present in 273 of the participants. Among these ones, 216 were men against 57 men, with greater frequency for the elderly aged between 60 to 69 years old. This relation presented a statistically significant difference in relation to gender ($p = 0.0001$) and not significant regarding the age group ($p = 0.12$).

Sedentarism was observed in 209 of the participants, being present in 141 women and 68 men. With regards to the age group, sedentarism presented greater frequency among the elderly aged 60 to 69,

being present in 112 elderly citizens. Although such risk factor had occurred with greater frequency among women, its distribution had no significance regarding gender ($p = 0.69$), as well as with regards to age group ($p = 0.37$), as assessed with Chi-square test.

The presence of any sort of dyslipidemia was found in 269 elderly, in which 179 occurred among women and 90 among men. The elderly aged 60 to 69 presented greater incidence of dyslipidemia when compared to the elderly aged 80 or older. Although dyslipidemia was more frequent among women, this difference was not statistically significant regarding gender ($p = 0.99$); nevertheless, the greater incidence among the younger elderly was considered significant with regards to the age group ($p = 0.04$), as assessed with the Chi-square test.

The most frequent risk factor found in this study was diabetes with 67.8%, followed by hypertension with 63.7%, smoking with 60.1, dyslipidemias with 59.3, sedentarism with 46%, vascular disease with 43.2%, cardiac disease in the family with 39.4%, type-I obesity with 29.1% and, the less frequent presence of cardiac disease with 23.3%.

Before the evaluation of distribution to the number of risk factors regarding gender and age group, 292 (64.3%) of the elderly presented five or more of these factors. Among the women, 68.2% found themselves in this group against 56.6% men. Nevertheless, the statistical analysis stressed the difference only with regards to gender ($p = 0.01$), as assessed with the Chi-square test.

Discussion

CVA is a multi-factor disease, to which the combination of factors may or may not be associated and contribute to its development (4, 8).

Thus, for a determined population, knowledge of the prevalence of such risk factors is important, whether in an isolated or combined form. In a representative share of a city's population, such information shall contribute to elaborate or remodel national guidelines which are intended to meet, in a specific manner, the characteristics of a determined population, in addition to contribute to the establishment of health primary and secondary prevention programs (15).

CVA may occur in any age group, but the risk of occurrence increases with age and doubles in each

decade after 55 years old. Age is considered the main isolated risk factor, and it is the most intense in its development, once 30% of cases occur before 65 years old and 70% happen among people aged 65 or older (6). In the present study, it was observed that the age group of greater prevalence in participants was between 60 and 69 years old, representing 53.1%. The mean age of women was 69.2 ± 6.25 versus 70.8 ± 6.60 to men.

Studies show that CVA occurs more frequently among men, at a proportion of approximately 60% to 39% of the stricken women (16). Our research accounted a greater participation of women in relation to men, and it presented a significant relation with regards to distribution of the number to risk factors in relation to women.

The most frequent risk factor in this study was diabetes mellitus with 67.8%. Although it was not significant regarding gender and age group, it was mainly prominent in the women group. According to literature, it is not considered the main risk factor for CVA. Yet, chances of persons with diabetes to develop CVA is four times more, when compared to non-diabetics, making it stand among the main risk factors (10, 17). Pires et al. (10) referred that, in his study, 19.9% of the assessed population presented diabetes mellitus without any significant difference between gender and age group (10, 17).

In research performed with 262 patients with a clinical diagnosis of CVA, it was shown that hypertension is actually the main risk factor for CVA, and it was present in circa 87.8% cases with no difference regarding genders and age groups (10). In our study, hypertension did not present significance in relation to gender and age group either. It was also present in 63.7% elderly persons, fact that stresses the importance of primary prevention programs for hypertension targeting all sorts of population, either by changing lifestyles or with the prescription of adequate drugs (5).

The prevalence of smoking in the general population is 22%. Such factor increases about two to four times the risk of CVA, besides constituting an important risk factor for hypertension (10). A study demonstrated that 46.9% of the elderly participants with CVA reported to be smokers, with a greater significance among men, regardless the age group (10). In our research, smokers corresponded to 60.1% of the population, and it was observed a greater significant frequency among women. Yet, this relation was

not significant regarding the age of the participants. Men, otherwise, stand out among former smokers, representing 51.3%.

Dyslipidemias are also regarded as one of the main risk factors in the development of vascular diseases, mainly among diabetics, who presented an elevated incidence of hypertension (18). Presence of total cholesterol above values considered normal is present in 56.6% of the population (15). In a study on the nutritional status and prevalence of dyslipidemia in the elderly, it was verified a greater prevalence of dyslipidemia among the obese elderly and women. These ones have a greater chance to develop any sort of chronic disease (19). In their studies with 262 elderly individuals, Pires et al. (10) verified that 15.6% of the people affected by CVA presented some sort of dyslipidemia without difference when compared on gender or age group. In our research, presence of dyslipidemia was found in 59.3% of the elderly, presenting significant distribution as to the age group, in which the majority of the affected population ranged from 60 to 69 years old and represented 63.5% of the analyzed sample.

Sedentarism is associated to the increased risk of CVA both for men and for women (3). Moderate levels of any sort of physical activity may reduce the risk of developing CVA for individuals at any age (20). In this research, the presence of sedentarism represented 46% of people, being highlighted among women and the elderly aged between 60 and 69 years old. With this group, one observes the necessity to publicize the benefits brought by physical activities to all population, mainly among the elderly, who may add other factors which facilitate the development of CVA.

Several authors stress that hypertension, obesity, smoking, sedentarism and diabetes mellitus are considered important factors in the development of cerebrovascular diseases (6, 10, 20). In our study, 43.2% of the participants presented any sort of vascular disease, and this factor was significantly prominent among women, though it presented no relation to age group. But this fact may be related to the expressive composition of elderly women assessed.

The presence of heart diseases in patients who developed CVA reaches 36% of the cases, especially among the elderly aged 80 or older (15). In a study on the frequency of the main risk factors for CVA, presence of any sort of heart disease represented 27%, with similar incidence among men (28.3%) and women (25.8%), though the same did not happen

for the age group (10). Although not presenting significance with regards to gender or age group, the presence of any sort of heart disease was present in 23.3% of the individuals, result which was close to the ones found in other pieces of research. Furthermore, 39.4% of the participants had a heart-disease history in the family.

Obesity is considered a chronic disease which may be directly or indirectly related to other diseases. It is one of the contributing elements to the development of cardiovascular and cerebrovascular diseases (11).

In the last decade, the excess in body weight has shown a great increase, included among the elderly, for whom the prevalence is greater in the elderly women. The obesity peak occurs between 45 and 64 years old for both genders (11, 21) The presence of type-I obesity in this study was 29.1%, presenting a significant distribution in relation to gender and age group, because it was prominent among women and in the elderly aged between 60 and 69 years old, in accordance to what was found in literature. It was also observed a significant incidence of elderly persons overweight, with great prominence among women. One must stress the importance of public policies of primary attention in health, once obesity is a disease besides being a risk factor for CVA (6, 11).

Pereira et al. (6), in their study on the prevalence of cerebrovascular accidents in the elderly in the city of Vassouras, have found a high percentage among the elderly with CVA and lower schooling, calling attention to the illiteracy level of 23% and the representative percentage of 46% of elderly who had not completed the 4th grade in the elementary school. Such aspect may be related to the fact that this share of the population has less information on prevention, including the knowledge of health habits and behaviors for a lower risk of developing a CVA (22). In our study, illiteracy level was equally elevated, representing 48.5%, followed by 32.4% of elderly who had not reached the 4th grade in the elementary school. The socio-economic classification of greatest prevalence in this population was the "C" class with 62.1%. Although these data presented no significant distribution among the number of risk factors in relation to schooling and socio-economic classification, they demonstrate the importance of public policies on prevention targeting this population.

Studies show that, in 1999, the number of deaths from CVA in the world was 5.54 million and 2/3 of these occurred in developing countries. In addition,

according to projections, the number of deaths from CVA shall increase to 6.3 million in 2015 and 7.8 million in 2030, if no intervention is made (6). In Brazil, CVA corresponded to a little more than 80% of admissions to hospitals under the Brazilian Unified Health System (Brazil's publicly funded health care system) in the year 2000 (23).

In addition to the high hospitalization costs and the elevated mortality rate inherent to this illness, most of those who survive present sequels such as the limitation of physical and intellectual activities. They also have a certain degree of dependency, especially in the first year after the CVA (6, 23). Approximately 40% of survivors are not able return to their work and need some sort of assistance in performing their daily-life activities, which leads to the loss of their autonomy (24, 25).

All previously mentioned issues express the severity of CVA and the sequels arising from it. That reinforces the importance of creating urgent measures for the prevention and control of the risk factors for the cerebrovascular diseases. Such measures can be taken by health basic-care teams with the objective to promote population education on the importance to maintain healthy habits, thus making it possible for people to grow older with a better quality of life and lower risk of developing chronic diseases, as the cerebrovascular accident (6, 8, 23).

Conclusion

Considering the present study, it can be concluded that the most prevalent risk factor in the assessed population was diabetes mellitus, followed by hypertension and smoking. Furthermore, it is also concluded that the elderly aged between 60 and 69 years old — especially women — were the ones who presented a greater number of risk factors for the occurrence of cerebrovascular accident, therefore they need more specialized monitoring in health care.

The risk factors evaluated in this study were considered factors that can be modified, once they are related to healthy life habits, fact that makes them subject to prevention. Therefore, one suggests the development of primary attention programs aimed at the population, with the objective to promote education and information on these risk factors so that the occurrence or cerebrovascular accidents are progressively reduced.

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