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Risk factors associated with high blood pressure in older adults

Risk factors associated with arterial hypertension in older adults

Risk factors associated with high blood pressure in children

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SUMMARY

Demographic aging is the great challenge of the third millennium. These patients are affected by cardiovascular diseases, and within these, high blood pressure is one of the main health problems. With the objective of identifying risk factors associated with high blood pressure in older adults, a case-control analytical study was conducted in older adult patients belonging to the Dr. Graciliano Díaz Bartolo Teaching Polyclinic in Santiago

de Cuba, during the period from March 2020 to April 2021. The cases were hypertensive patients, older adults without a history of this disease (controls). The sample consisted of 28 cases and 56 controls. Data analysis was based on the estimation of the Odd Ratio (OR). In cases where a significant association was found, the attributable risk in percentage exposed (Rae) was estimated. The age between 60 and 69 years predominated (24.7%) and male sex (55.0%). Obesity (OR=21.53), hyperlipidemia (OR=15.31), smoking addiction (OR=5.73), sedentary lifestyle (OR=3.12) and consumption of polyunsaturated fats (OR=3.33) were the risk factors associated with high blood pressure, And when two or more of these factors are present, the risk of developing high blood pressure in this population group increased significantly (OR=3.1). The risk factors associated with high blood pressure identified in this population are closely related to each other and closely linked to poor lifestyle choices. If these factors are eliminated or controlled, the incidence of this disease is reduced.

Keywords: Aging; High Blood Pressure; Risk Factors Cardiovascular.

ABSTRACT

Demographic aging is the great challenge of the third millennium; these patients are affected by cardiovascular diseases, and within these, high blood pressure constitutes one of the main health problems. Identify risk factors associated with high blood pressure in older adults. A case-control analytical study was carried out in older adult patients belonging to the Dr. Graciliano Díaz Bartolo Teaching Polyclinic in Santiago de Cuba, during the period from March 2020 to April 2021. The cases were hypertensive patients, older adults without a history of said diseases (controls). The sample was made up of 28 cases and 56 controls. The data analysis was based on the estimation of the Odd Ratio (OR). In cases where a significant association was found, the attributable risk in percentage exposed (Are %) was estimated. Age between 60 and 69 years (44.8 %) and male sex (53.8), obesity (OR=21.53), hyperlipidemia (OR=15.31), smoking addiction

(OR=5.73), sedentary lifestyle (OR=3.12) and consumption of polyunsaturated fats (OR=3.33) were the risk factors that were associated with high blood pressure, and when two or more of them were associated The risk of suffering from high blood pressure in this population group increased significantly (OR=3.1). The risk factors associated with high blood pressure identified in this population are closely related to each other and are closely related to inadequate lifestyles. If these factors are eliminated or controlled, the incidence of this disease is reduced.

Key words: Aging; Hypertension; Cardiovascular Risk Factors.

SUMMARY

The demographic development is the great challenge of the third millennium. These patients are affected by cardiovascular diseases, among which high blood pressure constitutes one of the main health problems. With the objective of identifying the risk factors associated with arterial hypertension in patients, a case-control analytical study was carried out with patients belonging to the Dr. Graciliano Díaz Bartolo Teaching Polyclinic, in Santiago de Cuba, in the period from March 2020 to April 2021. The cases were the hypertensive patients, and the controls were idosos sem antecedents da doença. The sample was composed by 28 cases and 56 controls. Analyze two data based on an estimate of the Odds Ratio (OR). In cases with significant association, the percentage attributable risk is estimated (Rae %). There is a predominance of women aged 60 to 69 years (24.7%) and males (55.0%). Obesity (OR=21.53), hyperlipidemia (OR=15.31), or smoking (OR=5.73), or sedentary lifestyle (OR=3.12) and consumption of polyunsaturated fats (OR=3.33) are risk factors associated with high blood pressure. When two or more of these factors were present, the risk of developing hypertension increased significantly (OR=3.1). The risk factors identified in this population are closely related to each other and to inadequate lifestyles. If these factors are not eliminated or controlled, the incidence of damage can be reduced.

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Introduction

Demographic aging is the great challenge of the third millennium. The number of people in the world over the age of 60 increased in the 20th century from 400 million in the 1950s to 700 million in the 1990s. In the early years of the 21st century, more and more people are surpassing the chronological barriers that man has established as a stage of old age. It is estimated that for the five-year period 2025-2030 there will be around 200 million elderly people in the world, with a higher percentage in developed countries, although it will also affect underdeveloped countries. (1)

Cuba is a developing country; however, with health indicators similar to those of developed countries, at the end of 2022 the population of 60 years and over in the country increased by 79,976 more people than in the same period of the previous year, which represents an average annual growth rate of 33.3%. It is expected that by 2025 it will be the oldest country in the Latin American region, and by 2050 one of the oldest in the world. (2)

Although no exact limit can be established that indicates the beginning of old age, in most countries, including Cuba, population aging refers to the increase in the proportion of people over 60 years of age in relation to the total population. (2)

Growing old is not synonymous with being sick, but old age is the stage of life that causes the most limitations in human beings. During this stage, different capacities begin to be lost; both intellectual and physical, as well as the capacity to respond to the noxas and

harmful agents that affect the individual, which contribute to the fact that geriatric patients are frequently affected by chronic diseases and associated conditions, among them, cardiovascular diseases occupy an important place, and, within these, high blood pressure. (3)

In current concepts thehigh blood pressure (HBP) It is considered a syndrome of metabolic and structural abnormalities, of which one of the most important elements is the elevation of blood pressure, but it is not the only one, since there are other alterations that accompany it,It is not just a disease, it is also an established risk factor for other diseases. (4)

High blood pressure is a relevant public health problem in both developed and underdeveloped countries. It is estimated that 30 to 45% of the world's adult population suffers from it. (5)

In Cuba, approximately 28.0% of the rural population and 31.9% of the urban population are hypertensive. This disease – along with other heart conditions – has remained among the main causes of death for more than 10 years, with similar behavior in the different provinces, including Santiago de Cuba. (6)

In the area served by the Dr. Graciliano Díaz Bartolo Teaching Polyclinic in the city of Santiago de Cuba, province of the same name, it was found that 58.6% of older adults were diagnosed with hypertension at the end of 2021. Family Medical Office (CMF) No. 7 shows a similar situation: 31.5% of hypertensive patients are over 60 years of age, a figure that represents 67.7% of the older adults in the office.

The search for methods that contribute to the reduction of high blood pressure, and the study of the risk factors that influence its development have become vitally important. Among these factors, some are recognized as genetic in nature, the so-called non-modifiable, and others are psychosocial in nature, identified as modifiable. (7) Among the former, the following stand out: age, sex, race, family history of high blood pressure, personal history of predisposing conditions or associated states, among others; the latter

point out those behaviors that make the person more vulnerable to suffering from the disorder and that are generally related to inadequate lifestyles, such as incorrect eating habits, smoking, alcoholism, sedentary lifestyle and stress. (8)

In any case, whether they are non-modifiable or modifiable factors, they are subject to actions for their control or to eliminate or modify behaviors that threaten the health of the population, the identification of risk factors constitutes an extremely important task for their prevention, treatment and control, (9) and to improve the quality of life of this population group.

That is why the authors were motivated to carry out this research with the aim ofIdentify risk factors associated with high blood pressure in older adults.

Methods

A case-control analytical study was conducted in elderly patients belonging to Family Medical Office No. 7 of the Dr. Graciliano Díaz Bartolo Teaching Polyclinic in the city of Santiago de Cuba, during the period from March 2020 to April 2021.

Case definition: Hypertensive older adults in whom all study variables could be collected, with permanent residence in the community for the past 5 years and stable follow-up by the family physician for the past year.

Definition of control: living older adult, with no history of hypertension, with the same characteristics as the cases and who gave their informed consent to participate in the research.

The study universe consisted of 184 older adults of both sexes belonging to said clinic, Of these, the cases (56) and the controls (112) were selected, selected by simple random sampling.

The hypertensive patient was considered the dependent variable. It was classified as a dichotomous nominal qualitative variable. It was operationalized as follows (0 = NO; 1 = YES).

Relevant cardiovascular risk factors according to national and international experts and researchers were used as independent variables for the bivariate study.

Age expressed in completed years.

Sex: according to the biological sex of belonging, it was considered female (0) and male (1).

Tobacco addiction: A person who smoked cigars or tobacco or who had been an ex-smoker for less than one year was considered, regardless of the number of cigarettes consumed per day, frequency, and length of the individual's addiction. This data was obtained from the survey. It was classified as a nominal dichotomous qualitative variable and categorized as follows: (0) non-smoker, (1) smoker.

History of non-communicable diseases: Patients were considered to have a history of diabetes mellitus, heart disease, hyperlipidemia, and obesity. Classifications were: (0) no, (1) yes.

Alcohol addiction: This was defined as a person who consumes alcohol three or more times per week, regardless of the quantity. This data was obtained from the survey. It was classified as a nominal dichotomous qualitative variable and categorized as follows: (0) non-alcoholic, (1) alcoholic.

Obesity: any patient with a body mass index ≥ 25 kg/m2 according to the nutritional assessment recorded in their individual medical history from the last consultation. It was classified as a nominal dichotomous qualitative variable. The measurement scale used was: (0) not obese, (1) obese.

Sedentary lifestyle: if the patient does not practice or practices insufficient physical exercise, mainly aerobic (running, cycling, jogging, swimming, walking), for less than 30 to 60 minutes a day, at a frequency of less than 3 times a week. (0) no, (1) yes.

Inadequate nutritional habits: This was considered if the person consumed excessive amounts of salt in their food (greater than or equal to 6 grams per day or one teaspoon of salt per person) and/or used raw salt, ingested saturated fats (animal fat), ingested flour (cold cuts, pizza), pasta (spaghetti, elbow macaroni) and/or sweets, with a frequency of 3 or more times per week; as well as ingesting fruits and vegetables less than three times per week. Since it was obtained from the survey conducted. It was classified as a nominal dichotomous qualitative variable and was operationalized as follows: (0) adequate nutritional habits, (1) inadequate nutritional habits.

Uncontrolled high blood pressure: This variable was classified as a nominal dichotomous qualitative variable. It was defined as an individual whose blood pressure readings, over a one-year period, were greater than 140/90 mmHg or higher than those consistent with their risk group. It was classified as a nominal dichotomous qualitative variable and operationalized as (0) no, (1) yes.

For all variables, the absolute and relative frequencies (percentages) of the different categories were determined. Pearson's nonparametric chi-square test was used to test the strength of the association between qualitative variables. Fisher's exact test was used for situations in which more than 20% of the cells had an expected frequency of less than five. A significance level of 5% was used. In cases where a significant association was found, The attributable risk in percentage exposed (Rae%) was also estimated to estimate the proportion of hypertensive elderly adults that would be avoided if the risk factor could be eliminated.

The study was approved by the Health Area Ethics Committee, and data confidentiality was maintained through coding of the variables, which were handled solely by the researchers.

Results

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In Table 1, the age between 60 and 69 years predominated, with 24.7% of the cases, and the male sex (55.0%) without relevant differences between the two study groups.

Table 1 Cases and controls by age group and sex.

Age groups (years)	Cases N=56				Controls N=102				Total N=158			
	Male		Female		Male		Female		Male		Female	Male
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
60–69	16	28.6	14	25.0	27	26.4	25	24.5	43	27.2	39	24.7
70–79	8	14.2	6	10.7	16	15.7	16	15.7	24	15.1	22	13.9
80–89	3	5.3	3	5.3	11	10.8	11	10.8	14	8.7	14	8.7
90 and over	3	5.3	3	5.3	3	2.9	3	2.9	6	3.8	6	3.8
Total	33	58.9	23	41.1	60	58.9	52	50.1	87	55.0	71	45.0

X= 72.6 years (60; 95)

Obesity (OR=21.53) and hyperlipidemia (OR=15.31) were causally associated with high blood pressure. According to the attributable risk in exposed individuals (AR), if older adults could regain their ideal weight and maintain normal blood lipid levels, the prevalence of the disease would decrease by 95% and 93% in the population exposed to these risks, respectively.

Diabetes mellitus and heart disease alone did not show a causal relationship with high blood pressure in this population, despite being observed in 32.1% and 25% of cases, respectively. (Table 2)

Table 2. Cases and controls according to history of predominant non-communicable diseases.

Variables	Cases		Controls		X2	p	OR (95% CI)	Rae %
	No.	%	No.	%				
Obesity	19	67.9	5	8.9	28.94	0.000	21.53 (6.39–72.46)	95
Hyperlipidemia	13	46.4	3	5.4	17.84	0.000	15.31 (3.85–60.8)	93
Diabetes Mellitus	9	32.1	7	12.5	3.48	0.06		
Heart disease	7	25.0	5	8.9	2.72	0.09		

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RPNS-1853

In Table 3, smoking addiction (OR=5.73), consumption of polyunsaturated fats (OR=3.33) and sedentary lifestyle (OR=3.12) were the modifiable risk factors associated with hypertension in this population group. It can be inferred that if smoking is eliminated in this population, the disease will be reduced in 82% of cases; if physical activity is improved in these older adults, it will be reduced by 67%, in the same way that if their diet is based on the consumption of vegetable oils, the impact will be a 69% reduction in the disease in this population group.

Table 3. Cases and controls according to modifiable risk factors.

Variables	Cases		Controls		X2	p	OR (95% CI)	Rae %
	No.	%	No.	%				
Tobacco addiction	17	60.7	12	21.4	11.06	0.000	5.73 (2,1–15,3)	82%
Intake of polyunsaturated fats	16	51.1	16	28.6	5.30	0.02	3.33 (1,29–8,59)	69%
Sedentary lifestyle	20	71.4	31	55.4	5.38	0.03	3.12 (1,16–8,21)	68%
Ingestion of alcoholic beverages	4	14.3	9	16.1	0.01	0.91		
Excessive salt intake	5	17.9	12	21.4	0.01	0.92		

Table 4 summarizes the number of risk factors present in cases and controls. The presence of a single risk factor in the case mix did not show significant differences between the case and control groups; however, when two or more risk factors are present, the risk of developing high blood pressure in this population increases, 3.1 times higher in older adults with two risk factors and 3.54 times higher in those with three or more risk factors.

Table 4. Cases and controls according to the number of risk factors they present.

Variables	Cases	Controls	X2	p	OR	Rae %

	No.	%	No.	%			(IC)	
Older adults with a risk factor	16	57.1	24	42.9	1.00	0.31		
Older adults with two risk factors	20	71.4	25	44.6	4.36	0.03	3.1 (1,16–8,21)	67%
Older adults with three or more risk factors	13	46.4	11	19.6	5.51	0.02	3.54 (1,31–9,57)	71%

Table 5 shows, in decreasing order, the risk factors that should be addressed to reduce high blood pressure in the population over 60 years of age in this clinic. Among them, obesity (OR=21.53; Rae %= 95%) and hypercholesterolemia (OR=15.31; Rae %= 93%) stand out, closely related to poor eating habits (OR=3.33; Rae %= 69%) and little physical activity (OR=3.12; Rae %=68%) that this population group engages in, in addition to tobacco addiction (OR=5.73; Rae %=82%), an element that has been demonstrably harmful and so difficult to eradicate, which should be emphasized.

Table 5. Strength of association and impact of the risk factors analyzed.

Risk factors	OR	Rae %
Obesity/Overweight	21.53	95%
Hypercholesterolemia	15.31	93%
Smoking	5.73	82%
Intake of polyunsaturated fats	3.33	69%
Sedentary lifestyle	3.12	68%

Discussion

With the increase in life expectancy, the incidence and prevalence of diseases that appear in advanced ages has increased, among which hypertension occupies a primary place, several studies to determine its prevalence show that the age of individuals prone to suffer from it has been decreasing dramatically; many argue that the risk group is located

in young adults and even less, among children and adolescents, this is justified by the incidence of several factors related to the conditions imposed by the "modernization" of society; however, it cannot be ignored that age constitutes a risk factor for countless diseases given the regressive changes that occur in different systems, both by hormonal and metabolic decline, over time, it acts as a cumulative risk factor for the appearance of chronic non-communicable diseases, including HTA. (10)

It is generally accepted that the prevalence of hypertension is higher in men than in women; however, the sex-hypertension relationship can be modified by age, thus, women before 40 are more protected than men against cardiovascular diseases; the reason for this protection is debated and has been related to different factors, among which are the protective effect of estrogens, lower tobacco consumption than men and the decrease in total peripheral resistance; after 60 years of age they exhibit blood pressure figures similar to those of men. (11)

The association of obesity with cardiovascular disorders, including hypertension, is a widely demonstrated fact, and some studies even show that excess weight is associated with a greater prevalence of high blood pressure from a young age. (12)

Closely related to this is hyperlipidemia. González MI et al., (13) reports that 61.1% of their hypertensive elderly had high concentrations of lipids in the blood, and that 23% of them had a body mass index greater than 30 kg/m2.

Although in the present study diabetes mellitus did not show a causal relationship with arterial hypertension, thisIt is considered an important atherogenic potential and constitutes one of the risk factors most related to metabolic and cardiovascular diseases, including hypertension. (14)

Other modifiable risk factors are described, including smoking, a sedentary lifestyle, and poor eating habits, primarily related to the intake of polyunsaturated fats and excessive salt intake.

It is known that smoking is an important cause of heart and cerebrovascular diseases, it is considered an important atherogenic factor, as it contains substances that directly and indirectly damage the vessel wall, important effect in the development of atherosclerosis, and in the production of thromboembolic events, the nicotine present in cigarettes is able to raise blood pressure and increase cardiac output, increase free fatty acids in the serum and the secretion of cortisol, so its effect actually reaches all the apparatus and systems of the human body. (15)

Regarding the consumption of polyunsaturated fats, in addition to frequently leading to obesity, a risk factor that increases morbidity and mortality by causing metabolic disorders: glucose intolerance, dyslipidemia, arteriosclerosis, the increasing concentrations of total cholesterol and LDL cholesterol lead inexorably to hyperlipidemia and this is directly associated with increased risk of cardiovascular diseases. (16)

The relationship between disease and physical exercise is a well-defined and well-known aspect; however, it is a fact that there is still much to be done so that it can be properly executed, despite all the proven benefits of physical exercise, and in this case it is worth noting its relationship with aging and functional capacity, (17) sedentary lifestyle remains worrying, the facilities provided by modern life lead people to adopt less active lifestyles, leading today's man to a progressive distancing from physical activity. (18)

The iExcessive salt intake and iconsumption of alcoholic beverages, did not show a causal relationship with high blood pressure in this population. However, There is unequivocal evidence that the YoExcessive salt intake is involved in the genesis of hypertension. In the Intersalt study, it was found that a decrease in sodium intake from 159 mmol/day to 100 mmol/day produced a reduction in systolic pressure of 3.5 mmHg, and that there is a positive and significant association between sodium intake and the slope of elevation of systolic pressure with age. (19)

There are also studies that associate ingestion of alcoholic beverages with hypertension, regardless of whether the alcohol-hypertension relationship is discussed.Therefore,

regardless of our results, we are in favor of emphasizing the dietary reduction of sodium chloride and the consumption of alcoholic beverages in the diet of the elderly, and especially of hypertensive patients. (16)

As a disease of multifactorial origin, most of the risk factors associated with high blood pressure are closely related to each other, the presence of several risk conditions makes individuals more susceptible to suffering from the disease, Any type of strategy to follow for the prevention, treatment and control of HBP must take into account this aspect, the fundamental objective lies in improving the quality of life of the individual through changes and maintenance of a healthy lifestyle, prevention turns out to be the most effective and least expensive measure against this disease. (20)

Aging is a dynamic process of matter over time, which cannot be interrupted or delayed. What we can do is live it in the best possible way. It should be considered that all patients with risk factors for hypertension are candidates for lifestyle modification. The stereotypical idea of the elderly as someone stubbornly set in their ways and incapable of changing their lifestyle must be eliminated through conceptual and individualized counseling based on prevention and health promotion, with a multisectoral approach. Health professionals must strive daily to provide a healthier life for all these people.

The research has limitations such as a small sample size, and psychosocial and environmental variables, and their combination, were not taken into account for the patients. However, it constitutes the first study of its kind in this area of health, which analyzes not only established risk factors but also population-based impact statistics.

Conclusions

The modifiable risk factors associated with high blood pressure identified in this population were obesity, hyperlipidemia, smoking, sedentary lifestyle, and polyunsaturated fat consumption. These factors are closely related to one another and

closely related to poor lifestyle choices. If these factors are eliminated or controlled, the incidence of this disease is reduced.

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Conflict of interest

The authors declare no conflict of interest.

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