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REVIEW

Risk factors for high blood pressure in adults

Factores de riesgo para la hipertensión arterial en adultos

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ABSTRACT

Hypertension is a lethal non-communicable disease. This disease has been linked to a series of risk factors that are usually present in most people who suffer from it, grouped into modifiable and non-modifiable factors. The study of these risk factors for hypertension in older people is the central focus of this work, which aimed to describe the risk factors for high blood pressure in adults by establishing a bibliographic reference that allows for consideration of the novelty of the topic. To achieve this objective, 12 bibliographies were consulted. It was concluded that the main risk factors for this disease in adults are those associated with lifestyle, sedentary habits, alcohol consumption, tobacco use, race, gender, age, diabetes mellitus, family history of hypertension, eating habits, obesity, marital status, employment status, area of origin, and lack of physical activity.

Keywords: Hypertension; Risk Factors; Modifiable; Non-Modifiable.

RESUMEN

La Hipertensión Arterial es una enfermedad no trasmisible letal. Esta enfermedad se ha relacionado con una serie de factores de riesgos que suelen estar presentes en la mayoría de las personas que la sufren agrupándose en modificables y no modificables. El estudio de estos factores de riesgo para la hipertensión en las personas mayores es eje central del presente trabajo, que persiguió como objetivo describir los factores de riesgo para la hipertensión arterial en adultos, mediante el establecimiento de un referente bibliográfico que permita contemplar lo novedoso del tema. Para el logro de este objetivo fueron consultadas 12 bibliografías. Se concluyó que los principales factores de riesgo que presenta esta enfermedad en los adultos son los asociados a estilos de vida, sedentarismo, consumo de alcohol, tabaco, raza, sexo, edad, diabetes mellitus, antecedentes familiares hipertensivos, hábitos alimenticios, obesidad, estado civil, situación laboral, la zona procedencia y la deficiente actividad física.

Palabras clave: Hipertensión Arterial; Factores De Riesgo; Modificables; No Modificables.

INTRODUCTION

Chronic diseases have become an alarming problem for humanity due to their high incidence and prevalence. Arterial hypertension (AHT) is one of the most common chronic diseases with significant personal, economic, and health implications.[1]

The history of blood pressure begins when someone abandoned the concept of the heart as the center of

emotions and conceived it as a blood pump. To arrive at the idea of hypertension, it was necessary to realize that blood pressure is a variable, like respiration, heart rate, or temperature, and that some people have a higher blood pressure than others, resulting in a greater risk of illness or death.[2]

It should be added that the heart pumps blood through a network of arteries, veins, and capillaries. The moving blood pushes against the walls of the arteries, and this force is measured by blood pressure. High blood pressure is caused by the narrowing of tiny arteries called arterioles, which regulate blood flow. As these arterioles narrow (or constrict), the heart has to work harder to pump blood through a smaller space, and the pressure inside the blood vessels increases.[3]

According to the World Health Organisation (WHO), High Blood Pressure (HBP) is a non-communicable, lethal, silent, and invisible disease that rarely causes symptoms in the early stages and has no known specific aetiological cause. However, it has overtaken infectious diseases as one of the leading causes of mortality in the world. It is a multifactorial disease associated with the lifestyles of the population, which contribute to the onset of this pathology, including the consumption of alcohol, tobacco, foods high in salt and fat, and sedentary lifestyles, among others.[3,4]

A risk factor can be defined as an attribute or characteristic that confers on the individual to variable degree of susceptibility to contracting a disease or health alteration.[5]

It is associated with multiple degenerative complications and is directly responsible for a high percentage of deaths. Worldwide, HTN affects 30-45 % of the general population, increasing with age. The age-adjusted prevalence of hypertension in the general adult population in different Latin American countries ranges from 26-42 %.[2]

Globally, an estimated 691 million people suffer from hypertension. Of the 15 million deaths caused by circulatory diseases, 7,2 million are due to coronary heart disease and 4,6 million to cerebral vascular disease, in which HTN is present. The prevalence of HTN is approximately 15-30 % worldwide; in North America, an estimated 50 million patients have HTN and HTN directly causes some 60 000 deaths per year. In South America, it is estimated that 23 % of adults have HTN, which, if uncontrolled, can lead to subsequent cardiac (e.g., myocardial infarction), renal (e.g., chronic kidney disease), and ocular and brain (e.g., stroke) pathologies.[4]

The current situation in Cuba regarding mortality from heart disease due to hypertension is not favorable. According to the latest Health Statistical Yearbook, the mortality rate for heart disease is 238,1, and for diseases of the arteries, arterioles, and capillary vessels, 24,9. In contrast, morbidity from hypertensive diseases ranks fifth in Cuba, with a rate of 42,7.[6]

Diseases such as coronary heart disease and diseases of the arteries, arterioles, and capillary vessels have occupied top places as causes of mortality in Villa Clara, which ranks fourth by province (238,5) for heart disease and fourth (218,2) for diseases of the arteries, arterioles and capillary vessels (31,4). Although the study is not designed to explain mortality, it is striking that most of the basic causes of death are related to hypertension target organ damage.[6]

Because hypertension debuts in most adult patients due to obesity, race, age, family history of hypertension, and diet, we decided to conduct this literature review to describe the risk factors for hypertension in adults. The novelty of the subject and its scarce bibliographic treatment constitute the primary motivations.

Objective: To describe the risk factors for arterial hypertension in adults.

DEVELOPMENT

In most patients, high blood pressure is symptomless and therefore goes unnoticed. Still, there are clinical manifestations such as headache, sweating, rapid pulse, shortness of breath, dizziness, visual disturbances, ear ringing, facial flushing, and eye spots like dark flying objects.[3]

Although the specific causes of high blood pressure are not yet known, it has been linked to several factors that tend to be present in most people with high blood pressure, such as a diet high in salt, fat, or cholesterol, in addition to chronic conditions (kidney and hormone problems, diabetes mellitus and high cholesterol), family history of the disease, lack of physical activity, old age (the older the person, the more likely they are to suffer from it), overweight, obesity, skin color, some contraceptive drugs, stress, and excessive smoking or alcohol consumption.[7]

According to the WHO World Report in 2018, the risk factors for high blood pressure are non-modifiable and modifiable.[4]

Non-modifiable Risk Factors

These are those that cannot be changed, either because of their biological, physical, or chemical origin, and are associated with diseases, leaving the individual susceptible to suffering from them; among them, we find:[4]

Genetics and High Blood Pressure[4]

Blood pressure is an inherited trait influenced by several biological pathways that can respond to

environmental stimuli, accounting for approximately 40 % of the changes in blood pressure present. The International Consortium for Blood Pressure Genome-Wide in 2010 identified 16 new loci, of which six contain genes that interact with blood pressure (GUCY1A3-GUCY1B3, NPR3 - C5orf23, ADM, FURIN - FES, GOSR2, GNAS - EDN3), the other ten identified loci provide new clues to blood pressure physiology; these multiple genes influence the blood pressure phenotype through gene-gene interactions.[4]

According to Mendelian genetics, HTN is monogenic, related to different pathologies such as Gordon syndrome (or pseudohypoaldosteronism type II: it is autosomal dominant; it is volume-dependent hypertension characterized by hyperkalemia and hyperchloremic acidosis, without glomerular insufficiency), being a form of hypertension caused by sodium and chloride hyperactivity, associated with the SCL12A3 gene, which makes an intronic deletion in the WNK1 gene. In Geller syndrome, an autosomal dominant form of hypertension that is exacerbated in pregnancy is linked to the NR3C2 gene; Cushing's syndrome and bilateral adrenal hyperplasia are associated with the PRKACA and ARMC5 gene, and in Gitelman and Bartter syndrome, it is linked to the SLC12A1 and KCNJ1 genes.[4]

Family History of Hypertension[4]

Recent studies suggest that the offspring of hypertensive parents have increased blood pressure readings. In a study conducted in Cairo, 110 individuals were selected and divided into two groups, the first with a positive family history of hypertension and the second group with no family history of hypertension, to study the relationship of increased aortic stiffness as an essential determinant of future increases in blood pressure (BP) and progression of hypertension, The results showed that there was a greater increase in aortic stiffness in normotensive individuals with a family history of hypertension than those without a family history of hypertension.[4]

Race[4]

In 1960, the Charleston Heart Study and other cohort studies showed a higher prevalence of hypertension among black participants than among white participants. Recently, the National Health and Nutrition Examination Survey (NHANES) has reviewed data from 1999 to 2010 showing a higher prevalence of hypertension among black adults than among white American and Mexican American adults, with the following results: black men 39,6 %, white men 29,8 %, black women 3,1 %, white women 26,9 % and Mexican American women 27,7 %.[4]

Between 2011 and 2014 (NHANES), an oversampling was conducted with Asian and Hispanic participants, presenting reliable estimates of the prevalence of hypertension among non-Hispanic Asian adults of 24,9 % and Hispanic adults of 25,9 %, which was similar to and lower than the prevalence among non-Hispanic white adults of 28,0 %. These studies are pioneering in addressing differences in hypertension prevalence in Hispanic and Asian population subgroups.[4]

Racial-ethnic studies conducted in urban settings make essential contributions to the heterogeneity of hypertension prevalence data among ethnic subgroups, as reported in the Hispanic Community Health Study/ Study of Latinos, sampling 16,415 urban US Hispanic adults in the Bronx, with a prevalence of hypertension in Dominican citizens at 29,5 %, Puerto Ricans at 28,5 %, Dominicans at 28,0 %, Puerto Ricans at 28,0 %, and Hispanics at 28,0 %. 5 %, Puerto Ricans 28,6 %, and Central Americans 26,6 %, with a lower prevalence among Mexican Americans at 13,3 %.[4]

A multi-ethnic study of atherosclerosis also found a lower prevalence of hypertension in the Mexican-American population than among other Hispanic subgroups. Studies among major racial and minority ethnic subgroups from 1960 to 2014, described above, confirm the prevalence of hypertension in ethnic subgroups with a strong black influence relative to Asian and Hispanic subgroups. This confirms that blacks are twice as likely to develop hypertension as whites and have a worse prognosis.[4]

Age[4]

The most critical risk factor associated with hypertension is age over 45 years. It is almost unanimously agreed that blood pressure increases with age, especially systolic blood pressure. It has been found that, except in some relatively isolated societies, the average blood pressure increases progressively as the individual ages. Primary HTN occurs more commonly in older people, hence the importance of incorporating lifestyle modifications in individuals from an early age.[4]

Gender[4]

Premenopausal women have lower BP levels and a lower prevalence of HTN. ETS is a stronger CRF in women than men, especially after menopause. Some authors suggest that cut-off values for BP in healthy women would be lower than the standard cut-off values for the definition of HTN in adults. During a woman's life cycle, especially after puberty, endogenous factors (polycystic ovary syndrome, pregnancy, and menopause) and exogenous factors (use of certain hormonal contraceptives) may favor the development, maintenance,

and/or aggravation of HTN. Women are generally more overweight and obese, experience hormonal changes at all stages of their lives, and tend to use tobacco and alcohol more frequently today than in the past.[4]

Diabetes mellitus[8]

Both prehypertensive and hypertensive patients have an increased risk of developing type 2 diabetes mellitus, attributed to an increased likelihood of insulin resistance. The relationship between hypertension (HTN) and DM2 places the diabetic patient at twice the risk of cardiovascular events as a non-diabetic.[8]

Modifiable Risk Factors

Are those acquired habits of daily life that are susceptible to improvement with pharmacology or lifestyle changes.[4]

Eating Habits[4]

Eating habits are habits acquired throughout life that influence dietary intake. Healthy eating habits require a balanced, varied, and sufficient diet and physical exercise. A varied diet should include foods from all food groups of adequate quality and quantity to meet the energy and nutritional needs of maintaining a healthy body and mind.[4]

For various reasons, not all people adopt a pattern of eating habits that will provide quality of life. When there is an imbalance in both the quantity and quality of dietary intake and infrequent physical exercise, life-threatening disorders occur in the body. These nutritional deficiencies become a risk factor in developing diseases such as high blood pressure and cardiovascular risks. Significant alterations in eating and living habits also lead to weight gain and obesity. The same is true for high salt intake and consumption of saturated fats, which are dietary practices that significantly increase blood pressure.[4]

Sedentary behaviour[4]

Sedentary lifestyles are associated with an increased risk of morbidity or worsening of HTN and should not be considered simply the lower end of physical inactivity; excessive television viewing, driving, computer use, or playing video games also increase the risk of hypertension. A Singapore study of 3305 Chinese adults indicated that the longer the television viewing time, the higher the systolic blood pressure, LDL cholesterol, total cholesterol, and triglycerides, which may be related to reduced energy expenditure. The time participants spent in front of a TV screen was associated with higher calorie intake, cholesterol, and lower fiber intake.[4]

Obesity[9]

Longitudinal studies have shown that weight gain significantly increases blood pressure, while weight loss in obese patients reduces blood pressure. The pathogenic mechanisms are unclear, but it has been postulated that obesity may explain this association by generating insulin resistance, with consequent hyperinsulinemia. Insulin reduces renal sodium excretion and may expand extracellular volume and volemia, increasing cardiac output and peripheral resistance, the main regulatory components of blood pressure.[9]

In addition, hyperinsulinemia increases sympathetic tone and alters intracellular ions (Na and Ca retention and alkalosis), which increases vascular reactivity and cell proliferation. All of the above favors hypertension, but some arguments dispute the role of hyperinsulinemia, such as some animal experiments and the absence of hypertension in patients with insulinomas. Nevertheless, it is an undisputed fact that one of the most effective measures to improve hypertension in an obese individual is weight reduction. Moreover, in patients on very restrictive hypocaloric diets, the occurrence of orthostatic hypotension should be monitored.[9]

Physical inactivity is detrimental to overall health, as it leads to the immobilization of cholesterol and free fatty acids and, consequently, their accumulation in the body, leading to dyslipidemia and promoting atherosclerosis.[10]

In the AusDiab studies in Australian adults, sitting time watching television was associated with higher diastolic blood pressure in women and beneficially on systolic blood pressure in men, possibly due to an adaptation of the men in the study to the hemodynamic responses of the sessions during the article. EPIC-Norfolk cohort studies reported that indicators of sedentary lifestyle are associated with markers of cardiovascular disease risk, such as HTN, independent of total physical activity.[9]

Stress[4]

The World Health Organisation (WHO) has recognized the potential importance of stress in cardiovascular disease and has stressed the difficulty of quantifying its influence on the development of cardiovascular disease.[4]

Although there is no evidence that stress plays a decisive role in the etiology of hypertension, it is recognized to a greater or lesser extent that stress plays a role in the pathogenesis of this disease. Some research shows a relationship between stressful situations and elevated blood pressure (BP). For example, people living in

densely populated urban areas with low socio-economic status, high mortality, and high rates of marital separation, among others, had higher blood pressure than those living in low-stress areas. The relationship between high blood pressure and stress has been demonstrated in high-responsibility work environments, job layoffs, or periods of unemployment, as well as in urbanization or catastrophic processes, which require constant surveillance by health agencies.[4]

In Cuba, the national program against hypertension has included lifestyle changes in patients with a clinical history who present psychosocial and environmental risk factors. Non-pharmacological treatment and lifestyle modifications include transcendental meditation, yoga, music therapy, Chuschltz autogenic training, and systematic physical exercise to aid relaxation. Despite this suggestion in practice, many specialists do not attach importance to stress as a risk factor in hypertension. They are unaware of its influence on the genesis and development of hypertensive disorders. As a multifactorial phenomenon, stress is an adaptive response of the organism to cope with environmental demands for which the individual has or believes they have limited resources. When these responses are very intense, frequent, or long-lasting, stress can lead to health complications and trigger the onset of a disorder, making the clinical picture complex or perpetuating its symptoms. In this regard, several authors and numerous studies have linked stress to essential hypertension.[4]

Smoking[11]

Among the behavioral factors, tobacco consumption stands out as a problem that accounts for 30 % of the world's population and is a frequent factor in this and other pathologies: the increase of catecholamines that increase heart rate, peripheral vasoconstriction and blood pressure, one of the components of tobacco is the nicotine that stimulates the production of various neurotransmitters including epinephrine, norepinephrine, dopamine, acetylcholine and vasopressin that act on central and peripheral receptors, thus increasing conduction and contraction of vascular and cardiac muscle fibers. Carbon monoxide is a waste product of cigarettes that increases carboxyhemoglobin levels, decreasing oxygen supply to tissues and enhancing the effects of nicotine; studies show that in the first 5 minutes after smoking a cigarette, blood pressure transiently rises by 5 to 10 mmHg more than its baseline while heart rate increases by 10 to 15 beats per minute, this effect persists for at least 30 minutes, However, if a person uses tobacco chronically, the effects described above will be prolonged, leading to a persistent increase in blood pressure. The intensity of the toxic effects will depend on the number of cigarettes smoked per day, as well as the length of the habit, and if smoking is stopped within a year, the risk of death decreases by half. Another study reveals that for every 10 cigarettes smoked per day, cardiovascular risk increases by 18 % in men and 31 % in women. In addition, research has shown that in people exposed to tobacco smoke, it causes alterations in platelet and endothelial function, causing oxidative stress, inflammation, and changes in heart rate.[11]

Alcoholism[11]

Regarding alcohol consumption, America accounts for 40 %; in the study entitled 'Relationship between alcohol consumption pattern and risk of hypertension,' it was found that those who consumed more than two drinks per day showed a significantly higher risk for hypertension compared to those who never had drunk in their life, also defined that the risk of hypertension was similar in the different types of drinks, in addition, the WHO mentions that the consumer can be classified into: occasional drinker as a person who drinks alcoholic beverages only in social situations, alcoholic as a person who consumes alcoholic beverages more than once a week and becomes uncontrollably intoxicated, and abstainer as a person who never has drunk alcoholic beverages.[11]

Marital status[11]

Marital status is a factor that has been included in studies to see its influence on health. Jeffrey Berger, through his multi-center study at NYU Langone, came to the following conclusions: married people had a 5 % lower risk of cardiovascular disease compared to single people, the most likely to suffer from any cardiovascular disease were widowed and divorced people with 3 % and 5 % respectively, and married people under the age of 50 were 12 % less likely to get sick compared to single people, confirming that this factor has a direct relationship with cardiovascular disease.[11]

Educational level[11]

A low level of education hurts behavioral risk factors, which is justified by the fact that people with a higher level of education have a better quality of life as they understand more about the disease.[11]

Work activity[11]

Work activity which the Cornell Worksite Study showed that work pressure triples the risk of hypertension and that this is independent of other risk factors; another study on this factor concluded that job instability

and job-related discomfort are indirect predictors of stress due to psychological strain; in other words, workers subjected to the stressor job instability are more likely to experience high levels of stress, so it is necessary to define stable work as a person who performs a continuous work activity and has a stable income, while the casual worker works for periods influencing their income.[11]

Economic level[11]

The economic level also influences hypertension since being poor brings a chronically stressful life, social isolation, anxiety, and depression, thus increasing the risk of suffering from this disease. To measure this level, there are indicators related to the basic structural needs of the person, including housing, education, health, public infrastructure, etc. One study considered housing and its characteristics as the indicator that reflected the patient's economic status.[11]

Area of origin[11,12]

Another factor studied about hypertension is the area of origin, which is divided into urban, rural, and marginal urban areas, each of which has its lifestyle, with the rural area characterized by its crops and animal husbandry, as well as its distance from the city, while the urban area is characterized by inadequate eating habits, stress and insufficient physical activity, which leads to the acquisition of cardiovascular diseases. Finally, we have the urban-marginal zone, characterized by an austere diet due to its poverty because it is located on the outskirts of the city center: the number of inhabitants, the size of the population settlement, the availability of basic services, and the economically active population, the statistics shown by INEI in 2016 refers that in Piura the urban population represented 78 % while the rural area represented 22 %.[11,12]

CONCLUSIONS

A comprehensive evaluation of the above information leads to the conclusion that the main risk factors for hypertension in adults are associated with lifestyle, sedentary lifestyle, alcohol consumption, smoking, race, sex, age, diabetes mellitus, family history of hypertension, dietary habits, obesity, marital status, employment status, area of origin and poor physical activity

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CONFLICT OF INTEREST

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