ORIGINAL ARTICLE

Characterization of coronary risk in hypertensive individuals

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ABSTRACT

Arterial hypertension is a chronic disease characterized by high levels of arterial blood pressure and is one of the main risk factors for the development of cardiovascular diseases, leading to increased rates of early morbidity and mortality in the hypertensive population. The aim of this study is to analyze the cardiovascular risk of hypertensive patients monitored by the Basic Health Unit in the city of Lagarto, Sergipe, to prevent negative outcomes. This quantitative research was carried out through a cross-sectional study with 28 participants. In interpreting the results using the Morise Score, 14.3% had a low probability, 67.9% had a moderate probability, and 17.8% had a high probability, totaling 85.7% of individuals with a probability of developing CAD between moderate and high. Based on the results, it can be stated that within the hypertensive population, older individuals with low functional capacity are the most prone to cardiovascular events.

Keywords: Hypertension, Risk factors, Cardiovascular diseases.

INTRODUCTION

Systemic arterial hypertension (SAH) is characterized by the elevation and maintenance of blood pressure levels above 140 mmHg for systolic blood pressure and/or 90 mmHg for diastolic blood pressure. In Brazil, the prevalence of arterial hypertension is estimated to be between 22% and 28%, with control rates varying between 10% and 35.5%[1]. According to Malachias[1], arterial hypertension is commonly associated with risk factors including obesity, sedentary lifestyle, alcohol consumption, high-calorie diets, gender, age, race, socioeconomic status, and heredity. According to Tormas, Santos, and Souza[2], the prevalence rate of risk factors is 93%, with heredity and sedentary lifestyle being particularly prominent.

In Brazil, arterial hypertension affects 24.8% of the population over 18 years old, with rates of 26.8% among women and 22.5% among men, according to Vigitel Brazil 2017[3]. This situation is alarming as Fuchs[4] states that hypertension increases the risk of diseases such as stroke, coronary artery disease, hypertensive cardiomyopathy, heart failure, aortic syndromes, aortic stenosis, and dementia.

In the context of complications caused by systemic arterial hypertension, coronary artery disease is characterized by functional or anatomical alterations that cause myocardial ischemia, which becomes more evident under conditions of increased oxygen demand. Moreover, the most common etiology of this condition is atherosclerosis, secondary to increased blood pressure due to the narrowing of the coronary vessels[5].

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Considering the care for this population, the Family Health Strategy proposes self-care activities for patients at lower risk, while Primary Health Care and specialized care focus on providing more intensive care to those at higher risk[6]. Therefore, this study aims to analyze the cardiovascular risk of hypertensive patients monitored by the Basic Health Unit in Lagarto, Sergipe. Given the seriousness of the functional impairment caused by coronary artery disease and considering that one of its main etiologies is systemic arterial hypertension, it is highly relevant to evaluate the degree of coronary risk in monitored hypertensive patients to identify situations with potential negative outcomes.

METHODOLOGY

This is a quantitative cross-sectional study conducted through data collection from medical records and interviews with hypertensive patients assisted by the Basic Health Unit Davi Marcos de Lima located in Lagarto, Sergipe. The research was approved by the Ethics Committee of the Federal University of Sergipe (CAAE: 15248819.4.0000.5546), and all participants signed the Informed Consent Form in accordance with Resolution 466/2012 of the National Health Council.

The sample consisted of 28 individuals, selected randomly and conveniently. The inclusion criteria were: patients diagnosed with Systemic Arterial Hypertension confirmed in medical records, chronological age above 18 years, ability to respond to the questions asked, and absence of neuromuscular impairment. Participants who did not meet these criteria were excluded from the study.

Data collection stages:

Stage 1: Participants were informed about the research, its objectives, benefits, and risks. They completed a questionnaire assessing risk factors such as gender and age, anginal symptoms, estrogenic status, comorbidities, and family history. Participants were then stratified according to the probability of developing coronary artery disease using the Morise Score, described by Morise, Haddad, and Beckner[7] (Table 1).

Stage 2: Participants were asked about smoking and physical activity using the International Physical Activity Questionnaire[8] (short version), which addresses the frequency and intensity of physical activities performed by individuals, classifying them as sedentary, irregularly active A, irregularly active B, active, or very active (Table 2).

Stage 3: The Sit and Rise Test, described by Lira and Araújo[9], was used to assess the physical fitness of the participants. This test required a flat, non-slippery surface. Participants were instructed to sit and rise from the floor without using support. Scores from 0 to 5 were assigned for each act (sitting and rising), with 5 indicating no support used, subtracting 1 point for each support used (hands or knees on the floor and/or hands on the knees), and 0.5 points subtracted for execution with imbalance.

Stage 4: Medical records of each participant were analyzed to identify comorbidities and to collect the most recent values of blood pressure and Body Mass Index (BMI), which were used in this study.

The data were tabulated in an Excel spreadsheet and analyzed using Bioestat 5.0 software, based on Pearson's correlation, with a significance level of 95% ($p < 0.05$). Categorical variables were expressed as percentages, and numerical variables were expressed as mean and standard deviation. The strength of each correlation was classified as insignificant, low, moderate, strong, or very strong based on Mukaka[10], as shown in Table 3.

Table 1. Morise Score Classification

Classification	Score
Low probability	0 to 8
Intermediate probability	9 to 15
High probability	16 to 24

Table 2. IPAQ questionnaire classification

Classification	Criteria
Very active	a) Vigorous: ≥ 5 days/week and ≥ 30 minutes per session or b) Vigorous: ≥ 3 days/week and ≥ 20 minutes per session + Moderate and/or Walking: ≥ 5 days/week and ≥ 30 minutes per session.
Active	Those who fulfilled: a) Vigorous: ≥ 3 days/week and ≥ 20 minutes per session or b) Moderate or Walking: ≥ 5 days/week and ≥ 30 minutes per session or c) Any combined activity: ≥ 5 days/week and ≥ 150 minutes/week (walking + moderate + vigorous).
Irregularly active A	Those who met at least one of the criteria for frequency or duration of activity: a) Frequency: 5 days/week or b) Duration: 150 min/week.

Irregularly active B	Those who did not meet any of the criteria for frequency or duration.
Sedentary	Those who did not perform any physical activity for at least 10 continuous minutes during the week

Table 3. Classification of correlation strength by Mukaka (2012)

Correlation strength	Values
Very strong	between 0.9 and 1 or -0.9 and – 1
Strong	between 0.7 and 0.9 or -0.7 or -0.9
Moderate	between 0.5 and 0.7 or -0.5 and -0.7
Weak	between 0.3 and 0.5 or -0.3 and -0.5
Insignificant	between 0 and 0.3 or 0 and -0.3

RESULTS

The sample consisted of 28 participants, of whom 21.4% were male, with a mean age of 65.3 (± 4.46), and 78.6% were female, with a mean age of 59.9 (± 11.59). Among these participants, 50% were in the age group considered at higher risk, defined as ≥ 55 years for men or ≥ 65 years for women. Systolic blood pressure (SBP) ranged from 100 mmHg to 160 mmHg, while diastolic blood pressure (DBP) varied from 60 mmHg to 90 mmHg. Body Mass Index (BMI) among the individuals ranged from 19.9 kg/m² to 41.9 kg/m², with a mean of 32.22 (± 6.27). Table 4 presents the general characterization of the sample according to the analyzed variables.

Table 4. General Characterization of the Sample

Variables	Total
Age	Mean (SD)
Male	65.33 (± 4.46)
Female	59.95 (± 11.59)
Sex	N %)
Male	6 (21.4)
Female	22 (78.6)
Smoking	N (%)
Smoker	4 (14.2)
Non-smoker	24 (85.8)
Morise Score	N (%)
Low	
Intermediate	4 (14.3)
High	19 (67.9)
Very high	5 (17.8)
IPAQ	N (%)
Sedentary	7 (25)
Irregularly Active B	2 (7.1)
Irregularly Active A	2 (7.1)
Active	10 (35.7)
Very Active	7 (25)

Based on the Morise Score, 14.3% of participants exhibited a low probability, 67.9% had a moderate probability, and 17.8% had a high probability of developing coronary artery disease (CAD), resulting in 85.7% of individuals having a likelihood of CAD ranging from moderate to high. Anginal symptoms were reported by 26.1% of participants, with 33.3% characterized as typical angina and 66.6% as atypical angina. Among the factors considered in this tool, non-modifiable factors were prominent in this population, with age being the highest risk factor (50%) and heredity (46.4%). Regarding modifiable factors, besides arterial hypertension, which was common among all participants, obesity was prevalent (85.71%), and diabetes was present in 35.7% of cases.

Graph 1: Percentage of Risk Factors

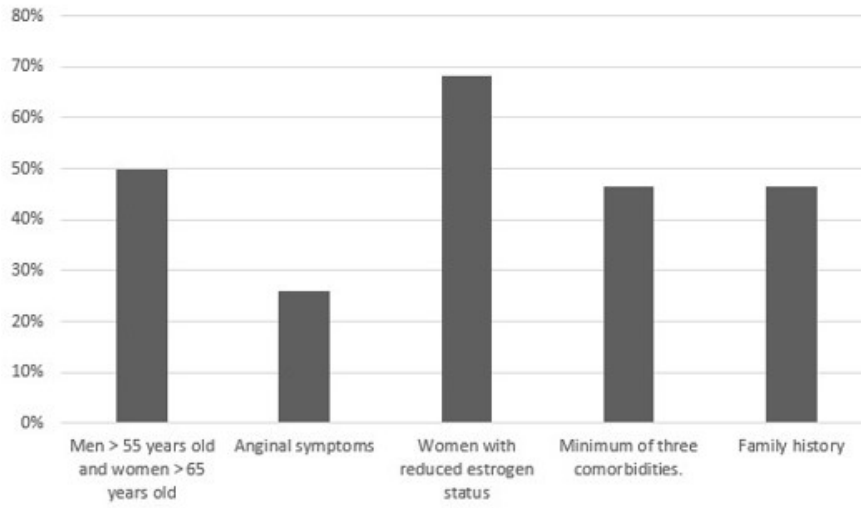

Table 5 presents the mean and standard deviation of the values obtained from the Sit-to-Stand Test for each action, as well as the total sum for each individual. Notably, male participants achieved higher functional capacity values, with an average sum of 7.5 (± 0.5) compared to 4.8 (± 2.87) for female participants.

Table 5. Scores Obtained in the Sit-to-Stand Test

Variables	Mean (SD)
TSL – Final*	
Male	7.5 (± 0.5)
Female	4.8 (± 2.87)
TSL – Sit	
Male	3.8 (± 0.45)
Female	2.7 (± 1.56)
TSL – Stand	
Male	3.6 (± 0.55)
Female	2.25 (± 1.55)

**The mean value of TSL - Final considers the average of the scores achieved in each action (sit and stand) by each participant, ranging from 0 to 10.*

Table 6 presents the correlations among the variables considered, revealing a strong direct correlation between the probability of developing coronary artery disease, as measured by the Morise score, and an increase in age. Additionally, a moderate correlation was observed between the probability of developing coronary artery disease, a decrease in physical fitness, and a higher level of physical activity in individuals with better physical fitness.

Table 6. Correlations Among the Analyzed Variables

Correlations	R	Strength of Correlation
Escore Morise x Idade	0.8	Strong
Escore Morise x TSL	-0.54	Moderate
Escore Morise x IPAQ	-0.38	Low
IPAQ x Idade	-0.28	Insignificant
IPAQ x TSL	0.57	Moderate
TSL x Idade	-0.41	Low

*based on Mukaka[10].

DISCUSSION

Regarding the level of physical activity, using the IPAQ tool—which considers activities performed for at least 10 continuous minutes at a time—it is noteworthy that despite being hypertensive, the vast majority of participants engage in some form of physical activity. This finding aligns with a study by Turi, Codogno, Fernandes, and Monteiro, which investigated a group of 963 users of the Unified Health System in Bauru-SP, revealing that 76.8% of them were hypertensive. Among these hypertensive individuals, 73.8% were physically active, though 65.4% had been sedentary throughout their lives. This raises questions about whether the population in this study began regular physical activity after being diagnosed with systemic arterial hypertension or if the physical activity performed prior to the diagnosis is overestimated by practitioners, either in duration and/or intensity, and therefore does not exert a protective effect.

On the other hand, a study conducted with 220 individuals with arterial hypertension in Salvador-BA demonstrated a predominance of sedentary or insufficiently active behavior in the analyzed physical activity indicators. It can be inferred from this that environmental factors may play a role in adherence to physical activity among patients, as the absence of parks or recreational areas may discourage the population from adopting a more active lifestyle.

Regarding the cardiovascular risk calculated by the Morise score, the data from this research contrasts with a study conducted with 45 hypertensive individuals attended by a Family Health Basic Unit, which found 84.4% of individuals with a high cardiovascular risk. Another study involving 57 hypertensive patients followed at a medical specialties center observed

that 94.7% had a high cardiovascular risk. A high proportion of these individuals were women with reduced estrogen status (postmenopause without hormonal therapy or ovarian removal). According to Silva, a decrease in estrogen levels leads to changes in the lipid profile and vascular walls, resulting in increased cardiovascular risk, which is further aggravated by comorbidities and aging.

The results observed in the Sit and Rise Test are similar to those found by Laqui, Trevisan, Sanches, Rêgo, Paiano, and Radovanovic, who reported higher capacity values for hypertensive men compared to hypertensive women, both assisted by the Family Health Strategy. It is also worth noting that the values achieved by women in this test indicate a need for intervention, as another study showed that individuals with a final score between 3.5 and 5.5 have a threefold higher risk of all-cause mortality compared to those with a score between 8 and 10.

Regarding the correlations explored in this study, it was found that in a population over 50 years old, cardiovascular health is more related to an individual's physical fitness than their level of physical activity. Furthermore, age was identified as a determinant in the Framingham score, another tool for calculating cardiovascular risk. Meanwhile, Massa, Duarte, and Chiavegatto Filho highlighted the relationship between aging and the progressive increase in the prevalence of cardiovascular diseases in the studied population.

These findings are significant, considering that Cosentino, Costantino, and Paneni concluded that aging leads to dysregulation in pathways related to insulin signaling, inflammation, oxidative stress, and autophagy, which anticipates pathological changes in the vessels and heart. Boccardi and Mecocci noted that the aging process leads to an increase in the circumference and calcium deposition in the four cardiac valves, as well as increased calcium deposition in the arteries, accompanied by a reduction in elastin, which results in vessel stiffness. Additionally, there is a decline in ventricular compliance and a decrease in the number of pacemaker cells in myocardial tissue.

The challenges encountered included a lack of data and outdated patient records, indicating a lack of continuous monitoring, which could have allowed for the use of another cardiovascular risk assessment score to compare with the Morise Score. This issue also limited the collection of patients' Body Mass Index data, which could have been used for categorization. Other records were also not found by UBS staff, thereby limiting the research sample. Data collection had to be prematurely interrupted due to the quarantine imposed by Brazilian health authorities to contain the spread of COVID-19, which restricted access to potential new participants, as they were part of the high-risk group for the disease.

CONCLUSION

The results of this study indicate that 60.7% of participants are active or very active, and only a small portion of the interviewees identified as smokers. This population presents a significant probability of developing coronary artery disease (CAD),

with 85.7% categorized as having moderate to high risk. Reduced estrogen status and obesity were the most prevalent risk factors in this population, as covered by the Morise Score. The practice of physical activity showed low relevance for reducing cardiovascular risk, but the functional capacity of individuals was highly relevant for reducing this risk.

From the correlations investigated, it can be concluded that within this population, older individuals and those with low functional capacity are the most prone to cardiovascular events. Therefore, guidance and monitoring programs should be included in the management of this population to potentially reduce negative outcomes.

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