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HYPERTENSION IS MULTIFACTORIAL!

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ABSTRACT

Background: Hypertension has been, worldwide, considered a multifactorial disease. This study aims to prove the multifactorial of hypertension and suggest a new line of research on improving stratification scores for risk identification for high blood pressure. **Methods:** This is a quantitative, an observational cross-sectional, descriptive and experimental. Statistical analysis was performed multivariate linear regression, the variables were adjusted step by step estimated using logistic regression to allow potential imbalance between blood pressure and the selected variable was considered the level of significance of $p < 0.05$. Following the creation of seven models of adjustments to arrive at the eighth and final model. **Results:** Finding a result was to prove statistically that hypertension is a multifactorial disease, checking that all variables alone do not reach significance only in the constant array with $p \leq 0,000$. **Conclusions:** Creating arrays and risk profiles search assign different approaches of HA and not only drug therapy vision, noting that the creation of these profiles can open different avenues for prevention. Substantiating that the best way of applying the prevention and treatment of hypertension is based on changes in behavioral habits and life.

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INTRODUCTION

The increase in blood pressure (BP) is one of the main avoidable risk factors for cardiovascular disease, mortality and disability (Beaney *et al.* 2017), and presents itself as difficulties in global public health, it is estimated that 26% is the overall prevalence of people with hypertension at the turn of the century (Hjerkind, 2017). It is estimated that with the aging population increases the severity of morbidity mortality caused by increased pressure, raising the risk for cardiovascular disease and decreased the healthy years of life (Beaney *et al.*, 2017). Hypertension has been, worldwide, considered a multifactorial disease, and one of its modifiable risk factors and nonmodifiable age, inadequate levels of PA Oparil, 2018), physical activity (Bakker, 2018), alcohol consumption, socioeconomic status (education, income and occupation) (Tompkins, 2015) and marital status (Roy, 2017).

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(However, this multifactorial is based on the fact that several studies find individual variables contributing to the increased hemodynamic levels, however there are no studies that prove scientifically or better statistically in humans to multifactorial in hypertension, and most studies suggest that multiple pathways and risk factors can influence the development and aggravation of hypertension (Lu, 2017 and Mafutha, 2017). The need for identification of risk factors is evidenced by the amount of knowledge published in several journals, however, risk factors have been studied individually (Loprinzi, 2016 and Zhao, 2018). Highlighting the potential association with the prevention or progression of the disease, which would be necessary to identify arrays of factors that can predict this risk, in which factors do not happen isolation. Given what has been exposed this study aims to prove the multifactorial of hypertension and suggest a new line of research on improving stratification scores for risk identification to the onset of hypertension.

MATERIALS AND METHODS

This is a quantitative, an observational cross-sectional, descriptive and experimental in a city the interior of Bahia (Latitude: 14 51 '58 "S, Longitude: 40 ° 50' 22" W). The same is a subproject entitled "Epidemiological profile of Chronic Diseases in the Municipality of Vitória da Conquista / BA". Data were collected between the months of August 2016 and February 2018, using the stratified random approach method. Participants were informed about the methods to be used to collect, according to Resolution 466/12 (National Health Council), which is in international documents of research involving humans. It is noteworthy that the project was approved by the Ethics Committee of the Faculty Northeast Independent (Opinion No. 1,859,545), was used articles of selection criteria published in the last three years to the body text of the composition, in order to maintain the present information, as well as the use of journals published in Qualis Capes A1 / A2 and B1 / B2 International magazine and have higher impact factor in Thompson 3 points, to maintain the quality of information.

Target Population: Sample included 737 hypertensive and normotensive, with 521 females and 216 males, the difference of the superiority of the number of women can be explained by population imbalance, because Brazil is a country where the female population is higher than the male (IBGE, 2010) and the fact that women tend to be more careful about the health status than men (Dastan, 2018), also demonstrating better control of blood pressure (Choi, 2014), and more often to use health systems (Adewuya, 2018). The age range comprising from 20 to 45 years, this choice was due to better hormonal stability and decreased interference of age on the results, since under 20 there is a hormonal variation (Mao, 2016), and the strip 45 is where it starts transition from declines in hormone levels as well as their physiological effects (Bruno, 2018) and thus repercussions that could interfere the results of our study, particularly in menopausal women (Di Giosia, 2018). Increasing age is associated with increased risk for hypertension (Hameczyk, 2018), being explained by aging and physiological changes, mainly in arteries such as endothelial dysfunction, decreased production of nitric oxide and arterial stiffening (Bruno, 2018). The class follows the bottom of the pyramid of reference that most of the world's population is below the poverty line, which also runs counter to the reality seen in Brazil, however the survey covers all social classes, not interfering in statistical analysis also been found to lower classes tend to eat foods with higher sodium content (Mazloomi Mahmoodabad, 2016), suggesting that this class also have higher blood levels (Leng, 2015). As well as the education follows the same line of social class, in which the poorest people have less access to education, with a positive and inverse association with higher blood pressure levels, suggesting that the higher the lower education level PA (Liu, 2017 and Zhang, 2017). The work, since industrialization that health and disease profile has changed, mainly due to the increased time sitting and changing working hours not consistent with the circadian cycle (Manohar, 2017), a high load of working hours (Boucher, 2017), decreasing time remains in energy expenditure, factors that may increase the risk for chronic diseases such as hypertension (Lindsay, 2016). The marital status, evidence has shown that once being married was a factor in reducing mortality and being single increased the risk (Kutob, 2017). The relationship has been proven effective in promoting good decisions and less

exposure to risk factors (Sbarra, 2015). Conversely early marriage may have increased the number of divorces and has been more present in the presence of factors such as socioeconomic status and low education (Aboulghar, 2016), increasing the number of singles. Alcohol abuse, the literature shows that excessive consumption of alcohol is harmful and an important predictor for the development of hypertension (Collart, 2015), but moderate consumption is demonstrating positive effects in relation to blood pressure control (Roerecke, 2017). The detrimental effect of alcohol consumption can be explained physiologically due to increased sympathetic activity, stimulation of the renin-angiotensin-aldosterone system, endothelial dysfunction and increased generation of reactive oxygen species (ROS) in the vascular bed, ethanol also increases release of pro-inflammatory cytokines (Simplicio, 2017). Being physically or physically inactive active, it has been classified in accordance with the recommendations of the World Health Organization (WHO) that it takes 50 minutes of physical activity of moderate intensity during the week or do at least 75 minutes of physical activity vigorous intensity during the week, or an equivalent combination of moderate and vigorous activity (States, 2018), being checked by the International Physical activity Questionnaire (IPAQ) (Sousa, 2017). The physical activities has showing evidence of a better hemodynamic control, physiologically explained by the release of adrenergic hormones equilibrium, better venous return and decrease the risk for hypertension (Carpio-Rivera, 2016).

Table 1. Sample Description after adjustment of the inclusion and exclusion criteria

Variables		n	n%
Gender	Male	84	32.6
	Female	174	67.4
blood pressure	normotensive	218	84.5
	Hypertensive	40	15.5
IPAQ	Active	245	95
	Inactive	13	5
works	Yes	168	65.1
	No	90	34.9
Alcoholism	Yes	150	58.1
	No	108	41.9
Status	Marital	171	66.27
	Married	97	33.73
Education	Fund. Completed	23	8.9
	Fund. Full	6	2.3
	Med.Incomplete	16	6.2
	Med. Full	56	21.7
	Sup.Incomplete.	93	36
Social class	Supp Full	62	24
	No	2	0.8
	B	15	5.8
	C	72	27.9
	D	131	50.8
	E	40	15.5

Source search NEPEdc 2018

Criteria for Inclusion and Exclusion: Hypertension Diagnosis - Blood pressure was measured through three measurements, insitting position, preferably the left arm, which is calculated from the average of the second and third readings, and hypertension was defined as systolic blood pressure of at least 140 mmHg or diastolic blood pressure at least 90 mmHg (or both) (Beaney, 2018). $BP \geq 140 / 90$ mmHg configured as hypertension according to the guidelines of the Society of Cardiology (Sociedade Brasileira de Cardiologia, 2016), was however used also, international guidelines of the American College of Cardiology and American Heart Association (Lloyd-Jones, 2016), wherein classify 140 / 90mmHg as level 2 Hypertension.

Models	Variables	p-value	Comments
Model 1	Blood pressure, waist circumference, occupation, physical activity, marital status, education.	Being highly significant with $p \leq 0.000$	Factors associated proving the multifactorial of hypertension, each variable there was no significance isolation but together.
Model 2	Model 1 + age and social class.	Kept significance was $p \leq 0.000$	Factors associated proving hypertension multifactorial, each variable were not significant individually but together.
Model 3	Model 2 + gender	maintained significance with $p \leq 0.000$	Factors associated proving the multifactorial of hypertension, but the genre has provedbe an isolated variable in influencing PA.
Model 4	Model 2 + Smoking	Changes in significance with $p \leq 0.001$	Noting that smoking exerted a protective factor, decreasing the value of the association. The factors associated proving the multifactorial of hypertension, each variable there was no significance isolation but together.
Model 5	Model 4 + Alcoholism	Association remained significant with $p \leq 0.001$.	Factors associated proving the multifactorial of hypertension, each variable was not significant isolation but together.
Model 6	Model 5 - Smoking	And the association back to firmer values associated with $p \leq 0.000$	Showing that smoking could cause a protective influence on our mother, so it was removed. The factors associated proving the multifactorial of hypertension, each variable there was no significance isolation but together.
Model7	Model 6 - DC	and back to the association stronger association with values of $p \leq 0.000$	Taken waist circumference, because it be improved by physical activity is also part of the matrix, which may cause a confounding effect.
Model 8	Physical activity, occupation, marital status, education, age, social class, alcohol consumption.	The significance level keeps on $p \leq 0,000$	Proving the choice of the matrix, and the variables are able, together, lead to hypertension. For all the variables separately showed no significance.

Model 1: Blood pressure, waist circumference, occupation, physical activity, marital status, education;

Model 2: Blood pressure, waist circumference, occupation, physical activity, marital status, education, age and social class;

Model 3: Blood pressure, waist circumference, occupation, physical activity, marital status, education, age and social class, gender;

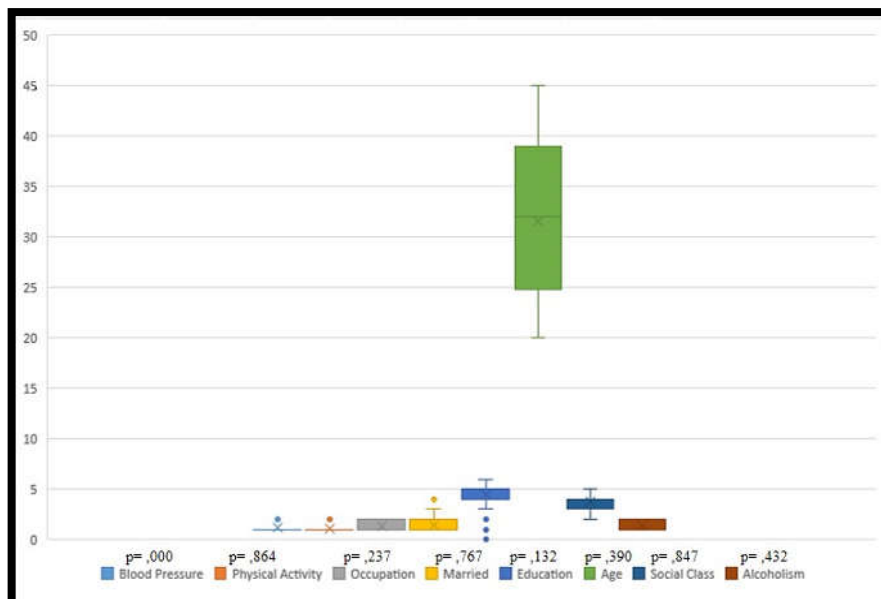
Model 4: Blood pressure, waist circumference, occupation, physical activity, marital status, education, age and social class, smoking;

Model 5: Blood pressure, waist circumference, occupation, physical activity, marital status, education, age and social class, smoking, drinking;

Model 6: Blood pressure, waist circumference, occupation, physical activity, marital status, education, age and social class, alcohol consumption;

Model 7: Blood pressure, occupation, physical activity, marital status, education, age and social class, alcohol consumption;

Model 8: Physical activity, occupation, marital status, education, age, social class, alcohol consumption.



It used two international guidelines and national, the intention that the work has a higher reproducibility and not just at national level, entering a consensus among the three guidelines. People who used drugs for blood pressure control were excluded. Age - sample consisted of individuals aged 20 to 45 years, and ages were excluded either that which escaped the rule. So that there were biases related previously justified hormonal issues. Participants who did not want to provide all the information necessary for matrix composition were excluded, namely: physical activity; job; marital status; education; social class; alcoholism; measurement of blood pressure. After adjustment of the inclusion and exclusion criteria, Our sample consisted of 258 individuals, 174 women

and 84 men. From these definitions previously said, the characteristics of our sample are detailed in Table 1.

Statistical analysis

Statistical analysis was performed multivariate linear regression, the variables were adjusted estimated using logistic regression step by step to allow the potential imbalance between blood pressure and the selected variables, it was considered the level of significance of $p < 0.05$, statistical program used was SPSS 25. Model creation adjustments to the variables was necessary to test the association between variables. Independent variables: waist circumference, physical activity, occupation, marital status, education,

smoking, alcohol consumption, gender. Dependent variable: blood pressure. Figure 1 shows the association matrix, with all the variables have been selected and the p-value for each variable values, demonstrating that alone no variable achieved significance for the development of hypertension, but the set of factors showed a significant constant ($p \leq 0,000$), proving that hypertension is a multifactorial disease and that most of the factors are risk capable of being modified, especially with the changing lifestyle habits.

DISCUSSION

The importance of this study is demonstrated by the magnitude and breadth of the findings involving a disease that affects about 3.5 million adults have not ideal blood pressure and is believed that one in four adults have hypertension, and non-optimal blood pressure levels has been considered as a global risk for mortality (Zhao, 2018), from all causes talking about 9.4 million death and 212 million years of healthy life lost (Zhang, 2017). It is estimated that the proportion of the global population of hypertensive adults increase to 29%, with estimated 1.56 billion hypertensive in the world by 2025 (Zhang, 2017). The HA multifactorial proven this article (Figure 1), raises the level of research on the verification of risk factors for chronic diseases. However, most of the articles published in international journals has shown that THERE is a disease of multifactorial nature, yet they have analyzed the risk factors in isolation, seeking risk associations with simple statistical analysis and individual (Bakker, 2018; Loprinzi, 2016; Liu, 2017; Carpio-Rivera, 2016; Zhang, 2016).

Stating that the intervention should be at general and not specifically on individual risk factors, as in the case of the factors that can be modified, which has been individually studied, such as physical activity, alcohol consumption, socioeconomic status, marital status (Choi, 2017; Di Giosia, 2018; Egan, 2017 and Colafella, 2018). Substantiating that the best way of applying the prevention and treatment of hypertension is based on changes in behavioral habits and life. However, the first line treatment for hypertension is based on reduction of their comorbidities using medications (Ayan, 2018). Creating arrays and risk profiles search assign different approaches of HA and not only drug therapy vision, noting that the creation of these profiles can open different pathways to prevention, such as the development of scores of risk for development of hypertension blood as well as the multidisciplinary intervention to be reduced all risk factors and not just mediation, exclusive of isolated risk factors.

Thanks

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