# *Brazilian Journal of health Review*

## Mental disorders and blood pressure changes in young adults

## Transtornos mentais e mudanças na pressão de sangue em jovens adultos

**Nathalia Luiza de Souza Leite**
Graduanda em Farmácia
Instituição: Faculdade Independente do Nordeste
Endereço: Av. Luis Eduardo Magalhães, 1305 – Candeias Vitória da Conquista – BA
E-mail: nathyluiza97@hotmail.com

**Fernanda Santos Portela**
Graduada em Farmácia
Instituição: Faculdade Independente do Nordeste
Endereço: Av. Luis Eduardo Magalhães, 1305 – Candeias Vitória da Conquista – BA
E-mail: fernandaportela@yahoo.com.br

**Lucimara da Silva Meira**
Graduada em Farmácia
Instituição: Faculdade Independente do Nordeste
Endereço: Av. Luis Eduardo Magalhães, 1305 – Candeias Vitória da Conquista – BA
E-mail: m.meira02@gmail.com

**Lorrane Carvalho Santana**
Graduada em Farmácia
Instituição: Faculdade Independente do Nordeste
Endereço: Av. Luis Eduardo Magalhães, 1305 – Candeias Vitória da Conquista – BA
E-mail: lorranecarvalho4@gmail.com

**Eduardo Freitas Rêgo**
Graduando em Medicina
Instituição: Instituto Educacional Santo Agostinho – FASA
Endereço:  Av. Olívia Flores, 200 - Candeias, Vitória da Conquista - BA
E-mail: Eduardorego95@gmail.com

**Laura Virgínia Prazeres Cotrim**
Graduanda em Medicina
Instituição: Instituto Educacional Santo Agostinho – FASA
Endereço:  Av. Olívia Flores, 200 - Candeias, Vitória da Conquista - BA
E-mail: lauravpcotrim@gmail.com

**Caio Matheus da Rocha Couqueiro Monteiro de Oliveira**
Professor

# Brazilian Journal of health Review

Instituição: Faculdade Independente do Nordeste
Endereço: Av. Luis Eduardo Magalhães, 1305 – Candeias Vitória da Conquista – BA
E-mail: caiocouqueiro@fainor.com.br

**Iaggo Raphael David**
Mestrando em Ciências da Saúde – Professor/Pesquisador
Instituição: Instituto Educacional Santo Agostinho – FASA
Endereço: Av. Olívia Flores, 200 - Candeias, Vitória da Conquista - BA
E-mail: iaggoraphaell@gmail.com

**ABSTRACT**
**Background**: Currently, mental disorders are being considered a worldwide problem that has affected individuals on a global scale. The physiological aspects that comprise these pathologies can infer changes in blood pressure, increasing the risk for the development of arterial hypertension. **Objective**: The present study aims to evaluate the influence of mental disorders and environmental factors for the development of changes in blood pressure that can progress to arterial hypertension in young adults of both genders. **Materials and methods**: This is a quantitative, observational, transversal, descriptive and experimental research in a city in the interior of Bahia. The sample consisted of 258 individuals, being 174 females and 84 males. Mental disorders (anxiety, depression and stress), physical activity, smoking and drinking habits, body fat and sociodemographic variables were analyzed. The data were tabulated and processed in the Excel program and subsequently transferred to the statistical program SPSS® 25.0., and the 95% significance level was considered. Initially, the descriptive analysis of the data was performed, then, the linear regression test was used to analyze the relationship of the variables and for that purpose two adjustment models were created. Model 1 - blood pressure (dependent variable), the variables of mental disorders (stress, anxiety and depression) and age; and in Model 2 its was inserted - physical activity, body fat, social class, marital status, education, drinking, smoking and work. Both models were applied according to gender. **Results**: The sample consisted of 127 women and 57 men whose ages varied from 29.03 ($\pm$ 6.454) and 29.37 ($\pm$ 6.44) for women and men, respectively. Table 1 shows the characteristics of the sample, blood pressure levels ranged from 114.98 ($\pm$ 14.888) and 129.13 ($\pm$ 17.915) for women and men, respectively. Table 2 shows the results of the linear regression according to the models mentioned in the methodology for both genders, in adjustment model 1 and 2, $p \leq 0,000$ was found for both genders. **Final considerations:** The importance of studying factors of mental and environmental risks consists of analyzing their influence on the individual's blood pressure and other possible illnesses, since the individual is a set of complexities and the environment in which he is inserted influences to health.

**Keywords:** Major Depressive Disorder, Stress, Anxiety, Chronic diseases, Arterial hypertension.

**RESUMO**
**Antecedentes:** Atualmente, os transtornos mentais estão sendo considerados um problema mundial que afetou indivíduos em escala global. Os aspectos fisiológicos que compõem essas patologias podem inferir alterações na pressão arterial, aumentando o risco para o desenvolvimento de hipertensão arterial. **Objetivo**: O presente estudo tem como objetivo avaliar a influência de transtornos mentais e fatores ambientais no desenvolvimento de

alterações na pressão arterial que podem progredir para hipertensão arterial em adultos jovens de ambos os sexos. **Materiais e métodos**: Trata-se de uma pesquisa quantitativa, observacional, transversal, descritiva e experimental em uma cidade do interior da Bahia. A amostra foi composta por 258 indivíduos, sendo 174 do sexo feminino e 84 do masculino. Foram analisados distúrbios mentais (ansiedade, depressão e estresse), atividade física, hábitos de fumar e beber, gordura corporal e variáveis sociodemográficas. Os dados foram tabulados e processados no programa Excel e posteriormente transferidos para o programa estatístico SPSS® 25.0., Sendo considerado o nível de significância de 95%. Inicialmente, foi realizada a análise descritiva dos dados; em seguida, foi utilizado o teste de regressão linear para analisar a relação das variáveis e, para esse efeito, foram criados dois modelos de ajuste. Modelo 1 - pressão arterial (variável dependente), variáveis de transtornos mentais (estresse, ansiedade e depressão) e idade; e no Modelo 2 foi inserido - atividade física, gordura corporal, classe social, estado civil, educação, bebida, fumo e trabalho. Ambos os modelos foram aplicados de acordo com o sexo. **Resultados:** A amostra foi composta por 127 mulheres e 57 homens, com idades variando de 29,03 (± 6,454) e 29,37 (± 6,44) para mulheres e homens, respectivamente. A tabela 1 mostra as características da amostra; os níveis pressóricos variaram de 114,98 (± 14,888) e 129,13 (± 17,915) para mulheres e homens, respectivamente. A Tabela 2 mostra os resultados da regressão linear de acordo com os modelos mencionados na metodologia para ambos os sexos, nos modelos de ajuste 1 e 2, foi encontrado p≤0,000 para ambos os sexos. **Considerações finais:** A importância de estudar fatores de riscos mentais e ambientais consiste em analisar sua influência na pressão arterial do indivíduo e em outras possíveis doenças, uma vez que o indivíduo é um conjunto de complexidades e o ambiente em que está inserido influencia a saúde.

**Palavras-chave:** Transtorno Depressivo Maior, Estresse, Ansiedade, Doenças crônicas. Hipertensão arterial.

## 1 INTRODUCTION

In the past, men and women had a large energy expenditure in their work activities combined with healthier eating habits. Because of industrialization, life habits began to change, providing better socioeconomic power, but also a high burden of chronic diseases, such as systemic arterial hypertension (SAH) (BEANEY, SCHUTTE, et al., 2018, OPARIL, ACELAJADO, et al., 2018). Currently, mental disorders are being considered as a worldwide problem that has affected adults, the Global Disease Burden Study 2015 (GBD 2015) estimated that lived with disability were mental disorders, with major depressive disorder in second and anxiety disorders in ninth (GUSTAVSON, KNUDSEN, et al., 2018). The physiological aspects that comprise these pathologies can infer changes in blood pressure, increasing the risk for the development of arterial hypertension (MUCCI, GIORGI, et al., 2016).

This increase in blood pressure has been associated with an elevated risk for the development of diseases such as hypertension and various cardiovascular accidents, including stroke, heart failure (HF), acute myocardial infarction (AMI), which have

generated disabilities, limitations and premature death (BUNDY, HE, 2016, DEPALMA, HIMMELFARB, et al., 2018). The disease can be asymptomatic, especially in its early stages, and the symptoms are associated with chronic and / or severe cases (ZHANG, DENG, et al., 2017).

As it is a multifactorial disease, several determinants can infer causality for the development of SAH and gender is one of them (RECKELHOFF, 2018, SHIN, SHIN, et al., 2012), with the hormonal and immune systems responsible for these differences. Even though in young adulthood there are no significant differences between both, women tend to have lower risks of developing chronic diseases than men (NISHIO, MARUYAMA, et al., 2017), and after menopause the risks become equal. or increase for women (DI GIOSIA, GIORGINI, et al., 2018, RECKELHOFF, 2018). Another reason why this difference is evident is that women have a longer life expectancy than men, which suggests an increased risk of developing chronic diseases (DI GIOSIA, GIORGINI, et al., 2018, LI, FU, et al., 2018).

With these findings, it becomes evident the need for the application of means of risk identification to develop arterial hypertension (HOSSEINI, YOUSEFIFARD, et al., 2015) in both genders in isolation, since the hormonal and immunological variations are prominent with the advancing age (HU, HUANG, et al., 2017, RECKELHOFF, 2018). Such particularities must be taken into account, as well as the higher life expectancy of the female gender, which can expose women to more pathogenic elements, taking into account social, behavioral patterns and exposure to risk factors, as well as physiological aging itself ( DOUMAS, PAPADEMETRIOU, et al., 2013).

The present study aims to evaluate the influence of mental disorders and environmental factors for the development of changes in blood pressure that can progress to hypertension in young adults of both genders living in the city of Vitória da Conquista, Bahia.

## 2 METHODOLOGY

### 2.1 LOCATION AND SAMPLE

This is a quantitative, observational, transversal, descriptive and experimental research in a municipality in the interior of Bahia (latitude: 14º 51 '58 "S; longitude: 40º 50' 22" W). Data were collected between August 2016 and February 2018, using the stratified random approach method. The participants were informed about the methods to be used for

collection, according to Resolution 466/12 (National Health Council), which consists of international research documents involving human beings. It is noteworthy that the project was approved by the Research Ethics Committee (Opinion nº 128818/2016).

The sample consisted of 258 individuals, being 174 females and 84 males. The inclusion criteria were: age between 20 and 40 years, not having serious mental problems, not having been diagnosed with hypertension, or other chronic pathology that is important for the development of hypertension such as diabetes, at the baseline and having answered the pertinent and necessary questions for the composition of the study. After the inclusion and exclusion criteria were met, the sample consisted of 184 individuals, 127 women and 57 men.

## 2.2 MATERIALS AND METHODS

For hemodynamic values, blood pressure was measured, measured using a digital device, in a sitting position, preferably on the left arm, being calculated from the average of the second and third measurements and hypertension was defined as systolic blood pressure $\geq 140$ mmHg or diastolic blood pressure of at least 90 mmHg (or both) (BEANEY, SCHUTTE, et al., 2018, CORREIRA, GUIMARÃES, et al., 2019, DORADO, SANTOS, et al., 2019). BP $\geq 140 / 90$mmHg, according to the guidelines of the Brazilian Society of Cardiology (SOCIEDADE BRASILEIRA DE CARDIOLOGIA, 2016).

Beck's inventories for anxiety and depression and Lipp's for stress were used to analyze mental health. The BAI (Beck Anxiety Inventory) is a self-report scale, consisting of 21 items, which measures the intensity of anxiety and contains descriptive statements of anxiety symptoms. The items must be evaluated by the subject with reference to himself, on a 4-point scale, according to the Manual of the Portuguese version of the Beck Scales, which reflect levels of increasing severity of each symptom such as: 1) "Absolutely not"; 2) "Slightly: it didn't bother me much"; 3) "Moderately: It was very unpleasant, but I could take it"; 4) "Severely: I could hardly bear it". For this study, the responses were grouped into "with anxiety" and "without anxiety" (CORREIRA, GUIMARÃES, et al., 2019, SANTANA, SOUSA, et al., 2019)

The BDI (Beck Depression Inventory) is a self-report scale of 21 items, each with four alternatives, implying increasing degrees of severity of depression, with scores from 0 to 3. The items were selected based on observations and reports of symptoms and more frequent attitudes in psychiatric patients with depressive disorders, and were not chosen to

reflect any theory of depression, in particular. Its classification being as follows Minimum 0-11, Light 12-19, Moderate 20-35, Severe 36-63. However, they were grouped into "with depression" and "without depression". Recalling that BDI evaluates depressive symptoms and not the diagnosis of depression (SANTANA, SOUSA, et al., 2019).

The Lipp Stress Symptom Inventory for Adults (ISSL) aims to identify stress symptoms in an objective way, the symptoms presented by the patient, evaluating the types of symptoms (somatic or psychological) and the stage that is. And their classification is as follows: no marked response - no stress; 1 to 3 marked responses - mild stress; 4 to 8 responses marked high stress; above 8 responses marked very high stress. The responses were grouped into "with stress" and "without stress" (SANTANA, SOUSA, et al., 2019).

The other variables used in the statistical analysis were: physical activity, education, work, socioeconomic level, marital status, alcoholism, smoking habits, which were collected through a specific and structured questionnaire, while the level of physical activity was collected through the International questionnaire. Physical Activity Questionnaire (IPAQ) (DAVID, SILVA, et al., 2018). The IPAQ was developed to facilitate the monitoring of physical activity based on a global standard, widely used in epidemiological research because it is easy to apply and low cost, validated in more than 12 countries, including Brazil, and also with widely accepted reliability. They were asked to answer the questionnaire based on the self-report of activities developed throughout the week and the answers were given in days and hours. With the results obtained, the subjects were classified as "Active", "Not active" (DAVID, SILVA, et al., 2018).

Body fat was measured using of a bioimpedance scale. To perform it, it was required: fasting for at least 4 hours, not practicing physical activities for 12 hours, presenting with alcohol abstinence for 24 hours, preferably not using diuretics for 7 days and women should perform the analysis between the 7th and 21st day of the menstrual cycle. It is evident that the scale used has a variability of 0.1 kg and a maximum weight of 150 kg (ABESO, MANCINI, 2016).

## 2.3 STATISTICAL ANALYSIS

The data were tabulated and processed in the Excel program and subsequently transferred to the statistical program SPSS® 25.0., And the 95% significance level was considered. Initially, the descriptive analysis of the data was performed, then, the linear regression test was used to analyze the relationship of the variables and for that purpose,

# Brazilian Journal of health Review

two adjustment models were created. Model 1 - blood pressure (dependent variable), the variables of mental disorders (stress, anxiety and depression) and age; and in Model 2 it was inserted - physical activity, body fat, social class, marital status, education, drinking, smoking and work. Both models were applied according to gender.

## 3 RESULTS

The sample was constituted by 127 women and 57 men whose age varied from 29,03 (±6,454) and 29,37 (±6,44), respectively. Table 1 presents the sample characteristics, the blood pressure levels varied from 114,98 (±14,888) and 129,13 (±17,915) to women and men, respectively. The study observed that women had lower arterial pressure than men. Referring mental disorders, the study verified that 70,8% of women and 57,04% of men suffer with high stress levels, followed by anxiety, with 29,9% of women and 17,5% of men with such levels heightened. Depression levels were three times more prevalent in women than those measured in men, being 23,6% of women and only 7% of men presenting depressive symptoms.

Alcohol consumption was recurrent in both genders, given that in the sample 70,2% of men and 56,7% of women had the alcoholic habit. The smoking habit was perceived in 3,2% of women and 56,7% of men. Visceral fat tissue had significant results when it comes to alter the arterial pressure to both genders, being the $p \leq 0,030$ and $p \leq 0,004$ to men and women, respectively. Big part of women obtained normal body fat levels (99,2%) and only 31,6% of men had it. The marital status also showed significance but only to males, with $p \leq 0,020$.

Table 1. Sample characteristics and variables used to composse regression models

| Variables | | Women (127) | | Men (57) | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Age | | 29,03 ± 6,454 | | 29,37 ± 6,44 | |
| Sistolic arterial pressure | | 114,98 ± 14,888 | | 129,13 ± 17,915 | |
| Physical activity | Active | 121 | 94,5 | 54 | 94,7 |
| | Non Active | 6 | 5,5 | 3 | 5,3 |
| Work | Yes | 70 | 55,1 | 44 | 77,2 |
| | No | 57 | 44,9 | 13 | 22,8 |
| Marital Status | Single | 83 | 66,0 | 41 | 71,9 |
| | Married | 44 | 34,0 | 16 | 28,1 |
| Schooling | Incomplete Fund. | 7 | 5,5 | 4 | 7,1 |
| | Complete Fund. | 2 | 1,6 | 1 | 1,8 |
| | Incomplete Med. | 6 | 4,7 | 5 | 8,9 |
| | Complete Med | 30 | 23,6 | 9 | 16,1 |
| | Incomplete Sup. | 56 | 44,1 | 19 | 33,9 |
| | Complete Sup. | 26 | 20,5 | 18 | 32,1 |
| Social class | B | 4 | 3,1 | 5 | 8,8 |
| | C | 36 | 28,3 | 18 | 31,6 |

| | | | | | |
|---|---|---|---|---|---|
| | D | | 68 | 53,5 | 28 | 49,1 |
| | E | | 19 | 15,0 | 6 | 10,5 |
| Alcoholic habit | Yes | | 72 | 56,7 | 40 | 70,2 |
| | No | | 55 | 43,3 | 17 | 29,8 |
| Smoking habit | Yes | | 4 | 3,2 | 4 | 7,0 |
| | No | | 122 | 96,8 | 53 | 93,0 |
| Gordura Visceral | Normal | | 126 | 99,2 | 18 | 31,6 |
| | High | | 1 | 0,8 | 19 | 33,3 |
| | Very high | | - | - | 20 | 35,1 |
| Estresse | Normal | | 37 | 29,1 | 24 | 42,1 |
| | High | | 90 | 70,9 | 33 | 57,09 |
| Depressão | Depression | | 30 | 23,6 | 4 | 7,0 |
| | No depression | | 97 | 76,4 | 53 | 93,0 |
| Ansiedade | No Anxiety | | 89 | 70,1 | 47 | 82,5 |
| | With Anxiety | | 38 | 29,9 | 10 | 17,5 |

Own research, 2018.

Table 2 presents results of linear regression according to the referred models in methodology of both genders. Analyzing model 1 to men, the study verified significance level of $p \leq 0,000$, which represent strong relation between variables in which $R^2$ was equivalent of 0,160, stating 16% of pressure variations. In the adjust model, the significance remained equivalent, with $p \leq 0,000$, demonstrating that the variables are strongly related to variations in arterial pressure. The $R^2$ was 0,301, representing that 30% of variations in arterial pressure is justified by this group of factors. In individual analysis, only the visceral fat had significance with $p \leq 0,030$.

Tabela 2. Linear regression and evaluation between genders.

| | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|
| | Model * | | Model ** | | Model * | | Model ** | |
| | $R^2$ | Sig. | $R^2$ | Sig | $R^2$ | Sig. | $R^2$ | Sig |
| Constant | 0,160 | 0,000 | 0,301 | 0,000 | 0,133 | 0,000 | 0,161 | 0,000 |
| Depression level* | | 0,649 | | 0,727 | | 0,416 | | 0,388 |
| Anxiety level* | | 0,570 | | 0,255 | | 0,577 | | 0,562 |
| Stress level* | | 0,644 | | 0,302 | | 0,968 | | 0,943 |
| Age* | | 0,478 | | 0,761 | | 0,607 | | 0,875 |
| Visceral fat** | | | | 0,030 | | | | 0,004 |
| Alcoholic habit** | | | | 0,912 | | | | 0,867 |
| Smoking habit** | | | | 0,235 | | | | 0,678 |
| Physical activity** | | | | 0,900 | | | | 0,741 |
| Work** | | | | 0,255 | | | | 0,614 |
| Marital state** | | | | 0,020 | | | | 0,097 |
| Schooling** | | | | 0,656 | | | | 0,521 |

*Model 1 – arterial pressure (variable dependent), the mental disorder variables (stress, anxiety and depression) and age. **Model 2 – Model 1 plus physical activity, body fat, social class, marital status, schooling, alcoholic habit, smoking habit and work. Sig – significance. Constant – arterial pressure as dependent variable and value of the linear regression pool. Font: own research, 2018.

Still on table 2, the linear regression including female gender obtained strong significance with p ≤ 0,000, both in models 1 and 2, demonstrating that both analyses are efficient to predict variations in arterial pressure. In model 1 was verified that $R^2$ was 0,133, which represents 13,3% of the reasons for arterial pressure variations in this adjust model. In model 2, however, the $R^2$ was 0,161, demonstrating that 16,1% of alterations could be explained by the risk factors grouped in the model.

## 4 DISCUSSION

In the article published by David et. Al. (2018), they found association in a pool of p≤0,000 to physical activity, occupation, marital state, schooling, age, social class and alcohol consumption to a sample of men and women with age varying from 20 to 46. In this study, were utilized the same variables and added mental disorders and body fat, individually applying between genders and a strong association to both groups was verified. There is evidence, therefore, that arterial pressure could be influenced by several environmental factors and also by psychological ones (DORADO, SANTOS, et al., 2019).

The idealization to utilize the psychological factors in verifying possible variations in arterial pressure is given by the fact that mental disorders are at rise in prevalence and have become a public health issue, also given the fact that start mechanisms in anxiety, depression and stress symptoms can interfere directly in blood pressure. (CORREIRA, GUIMARÃES, et al., 2019, DAVID, GUIMARÃES, et al., 2019, SANTANA, SOUSA, et al., 2019).

Model 1 in linear regression demonstrated that both to men and women the results were significant (R2 0,160 p≤0,000 and R2 0,133 p≤0,000 to men and women, respectively), stating that 16% and 13,3% of blood pressure variation can be explained by model 1, in which the mental disorders were factors of relevance. According to Ana Carolina (2015), depression and anxiety could cause hypertension and cardiovascular complications by the sympathetic nervous system alterations (CAROLINA, AGUIRRE, 2015), what would maintain a constant alert state and an elevated cortisol and adrenalin systemic release, causing vascular changes (PUZSEROVA, BERNATOVA, 2016). It was also verified that mental disorders such as depression and anxiety are significantly related to the emergence of cardiac diseases, as well as the elevation of its severity.

The stress levels of the sample were elevated to both genders but the women's levels were much higher than the men's (70,9% and 57,09%, respectively). Isolated, however, the

stress was not significant, but it contributes to the pool of factors that relates mental disorders and blood pressure variations.

Mental stress can cause abnormal activation of the sympathetic nervous system, triggering hormonal cascades that interfere in blood pressure, heighten the coagulation activity and platelet activation, factors that also could be triggers of vascular events. Thus, the work related stress could be a risk factor to predict the emergence of vascular pathologies, such as arterial hypertension (MUCCI, GIORGI, et. al., 2016). However, the present study did not verify individual values of significance related to mental disorders, demonstrating that although they can interfere significantly in the vascular system, other risk factor are needed to initiate a pathologic process.

When adjusted to model 2, the statistical inference power was still significant ($R^2$ 0,301 p≤0,000 and $R^2$ 0,161 p≤0,000 to men and women, respectively), given that 30,1% and 16,1% of the factors were explained by the tested variables. The study evidences that mental disorders, body composition and environmental factors are indicators to alterations in blood pressure, have a strong relation between each other and must be altered at long range to avoid the emergence of the referred pathologies (SOCIEDADE BRASILEIRA DE CARDIOLOGIA, 2016).

Particularly, the chronic exposition to stress factor triggers a vicious cycle that consists in alterations of emotional factors. Those alterations allegedly heighten the chronic availability of future stressor triggers, and, finally, culminating in chronic altered affective states and perceived stress (MUCCI, GIORGI, et al., 2016). Other habits like alcoholism and smoking, when associated with this stress, can worsen the clinical condition, once it is known that the chronic exposition to them are harmful to the vascular health.

Visceral fat was a strong point to the risk in alterations to the arterial pressure with p≤0,030 to men and p≤0,004 to women, given that it can provoke the release of pro inflammatory cytokines as interleukin 6 (IL-6), tumor necrosis factor (TNF) and adipokines that are able to reduce the NO levels in the vascular system and provoke reactivity, heightening its constriction (ANCHUELO, MARTÍNEZ-LARRAD, *et al.*, 2019, UCHASOVA, GRUZDEVA, *et al.*, 2018). It is, also, a well referred factor to cardiovascular sickening and arterial hypertension in the scientific literature (BYAMBASUKH, EISENGA, *et al.*, 2019, DAVID, GUIMARÃES, *et al.*, 2019, PICHÉ, POIRIER, *et al.*, 2018, RAPHAEL DAVID, LEMOS SILVA, *et al.*, 2018).

By these matters, several factors interfere in the alteration of blood pressure. However, it is seen that many of them does not contribute in a significant form individually to this alteration. The importance of studying mental and environmental risk factors to the analysis of the pathologic process emerges, once that the individual is a pool of complexities and the environment in which he is inserted influence directly in his health.

Several studies have shown that isolated factors are able to cause arterial hypertension, but it is known that its environment influences the individual and this has to be taken in consideration to analyze the sickening process or alterations in the physiology. Today, it is known that psychological disorders are at rise in prevalence and its influence in the vascular health is direct and it is important include them in the analysis of systemic arterial changes.

The present study has limitations, such as the lack of data referring to sedentary behavior, once it has a great impact on vascular health and mental disorders. The study also did not evaluate the nutrition habits and sleep quality of the sample, important factors to the variations in blood pressure. The results, however, present that the variation in arterial pressure and the possibility of arterial hypertension must be analyzed holistically and not only with individual factors.

## REFERENCES

ABESO, A. B. para E. da O., MANCINI, M. C. "Diretrizes brasileiras de obesidade 2016", VI Diretrizes Brasileiras de Obesidade, p. 7–186, 2016. DOI: 10.1590/S1415-52732000000100003. .

ANCHUELO, A. C., MARTÍNEZ-LARRAD, M. T., SERRANO-GARCÍA, Í., et al. "Body fat anthropometric indexes: Which of those identify better high cardiovascular risk subjects? A comparative study in Spanish population", PLoS ONE, v. 14, n. 5, p. 1–13, 2019. DOI: 10.1371/journal.pone.0216877. .

BEANEY, T., SCHUTTE, A. E., TOMASZEWSKI, M., et al. "May Measurement Month 2017: an analysis of blood pressure screening results worldwide", The Lancet Global Health, n. 18, p. 1–8, 2018. DOI: 10.1016/S2214-109X(18)30259-6. .

BUNDY, J. D., HE, J. "Hypertension and Related Cardiovascular Disease Burden in China", Annals of Global Health, v. 82, n. 2, p. 227–233, 2016. DOI: 10.1016/j.aogh.2016.02.002.

BYAMBASUKH, O., EISENGA, M. F., GANSEVOORT, R. T., et al. "Body fat estimates from bioelectrical impedance equations in cardiovascular risk assessment: The PREVEND cohort study", European Journal of Preventive Cardiology, v. 26, n. 9, p. 905–916, 2019. DOI: 10.1177/2047487319833283.

CAROLINA, A., AGUIRRE, C. "Depressão , ansiedade e hipertensão : qual a correlação ? Como melhorar o tratamento ?", Revista Brasileira de Hipertensão, v. 22, n. 1, p. 18–20, 2015. .

CORREIRA, T. A., GUIMARÃES, L. A., DIAS, Í. S., et al. "THE PRESENCE OF MENTAL DISORDERS IN HYPERTENSIONS WHAT OR NOT THE USE OF THE MEDICINE FOR CONTROL OF BLOOD PRESSURE", International Journal of Current Research, v. 11, n. 06, p. 4294–4297, 2019. DOI: https://doi.org/10.24941/ijcr.35451.06.2019. Disponível em: https://doi.org/10.24941/ijcr.35451.06.2019.

DAVID, I. R., GUIMARÃES, L. A., COSTA, M. M. L., et al. "the Framingham Heart Study-Hypertension: Systematic Review", International Journal of Development Research, v. 09, n. 10, p. 30665–30669, 2019. Disponível em: http://www.journalijdr.com.

DAVID, I. R., SILVA, M. L., SILVA, D. S., et al. "HYPERTENSION IS MULTIFACTORIAL!", International Journal of Development Research, v. 08, n. 10, p. 23490–23495, 2018.

DEPALMA, S. M., HIMMELFARB, C. D., MACLAUGHLIN, E. J., et al. "Hypertension guideline update", Journal of the American Academy of Physician Assistants, p. 1, maio 2018. DOI: 10.1097/01.JAA.0000533656.93911.38. .

DI GIOSIA, P., GIORGINI, P., STAMERRA, C. A., et al. "Gender Differences in Epidemiology, Pathophysiology, and Treatment of Hypertension", Current Atherosclerosis Reports, v. 20, n. 3, 2018. DOI: 10.1007/s11883-018-0716-z. .

DORADO, A. S., SANTOS, V. N., SANTOS, A. K. F., et al. "Epidemiological Profile of the Hypertensions", International Journal of Advanced Engineering Research and Science, v. 6, n. 5, p. 618–623, 2019. DOI: 10.22161/ijaers.6.5.78. .

DOUMAS, M., PAPADEMETRIOU, V., FASELIS, C., et al. "Gender differences in hypertension: Myths and reality", Current Hypertension Reports, v. 15, n. 4, p. 321–330, 2013. DOI: 10.1007/s11906-013-0359-y. .

GUBBELS BUPP, M. R. "Sex, the aging immune system, and chronic disease", Cellular Immunology, v. 294, n. 2, p. 102–110, 2015. DOI: 10.1016/j.cellimm.2015.02.002. .

GUSTAVSON, K., KNUDSEN, A. K., NESVÅG, R., et al. "Prevalence and stability of mental disorders among young adults: Findings from a longitudinal study", BMC Psychiatry, v. 18, n. 1, p. 1–15, 2018. DOI: 10.1186/s12888-018-1647-5. .

HERT, M. De, DETRAUX, J., VANCAMPFORT, D. "The intriguing relationship between coronary heart disease and mental disorders", Translational research, p. 31–40, 2018. .

HOSSEINI, M., YOUSEFIFARD, M., BAIKPOUR, M., et al. "Twenty-year dynamics of hypertension in Iranian adults: Age, period, and cohort analysis", Journal of the American Society of Hypertension, v. 9, n. 12, p. 925–934, 2015. DOI: 10.1016/j.jash.2015.09.005. .
HU, L., HUANG, X., YOU, C., et al. "Prevalence and risk factors of prehypertension and hypertension in Southern China", PLoS ONE, v. 12, n. 1, p. 1–15, 2017. DOI: 10.1371/journal.pone.0170238. .

LI, Z., FU, C., YANG, F., et al. "Prevalence and risk factors of hypertension for the middle-aged population in China — results from the China Health and Retirement Longitudinal Study (CHARLS)", Clinical and Experimental Hypertension, v. 00, n. 00, p. 1–7, 2018. DOI: 10.1080/10641963.2018.1445751. .

MUCCI, N., GIORGI, G., CERATTI, S. D. P., et al. "Anxiety, stress-related factors, and blood pressure in young adults", Frontiers in Psychology, v. 7, n. October, p. 1–10, 2016. DOI: 10.3389/fpsyg.2016.01682. .

NISHIO, S., MARUYAMA, Y., SUGANO, N., et al. "Gender interaction of uric acid in the development of hypertension", Clinical and Experimental Hypertension, v. 00, n. 00, p. 1–6, 2017. DOI: 10.1080/10641963.2017.1392556. .

OPARIL, S., ACELAJADO, M. C., BAKRIS, G. L., et al. "Hypertension", Nature Reviews Disease Primers, v. 4, 2018. DOI: 10.1038/nrdp.2018.14. .

PICHÉ, M. E., POIRIER, P., LEMIEUX, I., et al. "Overview of Epidemiology and Contribution of Obesity and Body Fat Distribution to Cardiovascular Disease: An Update", Progress in Cardiovascular Diseases, v. 61, n. 2, p. 103–113, 2018. DOI: 10.1016/j.pcad.2018.06.004. Disponível em: https://doi.org/10.1016/j.pcad.2018.06.004.

PUZSEROVA, A., BERNATOVA, I. "Blood pressure regulation in stress: Focus on nitric oxide-dependent mechanisms", Physiological Research, v. 65, p. S309–S342, 2016. DOI: 10.33549/physiolres.933442. .

RAPHAEL DAVID, I., LEMOS SILVA, M., SOARES SILVA, D., et al. "IDENTIFYING CARDIOVASCULAR RISK IN ADULTS AND ELDERLY USING THE", 2018. DOI: 10.24941/ijcr. Disponível em: https://doi.org/10.24941/ijcr.

RECKELHOFF, J. F. "Gender differences in hypertension", Current Opinion in Nephrology and Hypertension, v. 27, n. 3, p. 176–181, 2018. DOI: 10.1097/MNH.0000000000000404.

SANTANA, A. R. A. A., SOUSA, B. R., LOPES, A. O. S., et al. "Prevalence of Mental Disorder in Adults and Elderly", International Journal of Advanced Engineering Research and Science, v. 6, n. 5, p. 240–245, 2019. DOI: 10.22161/ijaers.6.5.31. .

SHIN, H. Y., SHIN, M. H., RHEE, J. A. "Gender differences in the association between self-rated health and hypertension in a Korean adult population", BMC Public Health, v. 12, n. 1, p. 135, 2012. DOI: 10.1186/1471-2458-12-135. .

SOCIEDADE BRASILEIRA DE CARDIOLOGIA. "7a Diretriz Brasileira De Hipertensão Arterial", v. 107, 2016. .

UCHASOVA, E., GRUZDEVA, O., BARBARASH, O., et al. "Localization of fat depots and cardiovascular risk", Lipids in Health and Disease, 2018. DOI: 10.1186/s12944-018-0856-8. .

# Brazilian Journal of health Review

ZHANG, H., DENG, M., XU, H., et al. "Pre- and undiagnosed-hypertension in urban Chinese adults: A population-based cross-sectional study", Journal of Human Hypertension, v. 31, n. 4, p. 263–269, 2017. DOI: 10.1038/jhh.2016.73. .