

EVALUATION OF BLOOD PRESSURE IN AFRICAN AND CAUCASIAN RACE INDIVIDUALS

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Abstract: Introduction: High Blood Pressure is the world's leading cause of cardiovascular disease and death, and it is estimated that 1.13 billion people are hypertensive, and two thirds live in low-income countries, with the highest prevalence in Africa. A 10mmHg reduction in systolic blood pressure reduces the risk of serious cardiovascular events by 20%, so it is imperative to study racial differences and disparities in cardiac medicine, as these are considerable. **Objective:** To evaluate the blood pressure profile of African and Caucasian individuals. **Methods:** The sample includes a total of 122 individuals, collected between October 2011 and January 2012. All individuals were submitted to an individual questionnaire and at least two blood pressure assessments. Individuals of African and Caucasian races, of both genders, sedentary, without heavy drinking habits, non-smokers, non-obese, with similar sociodemographic conditions, without any type of associated pathology, aged between 19 and 35 years and who agreed to participate in the study by signing an informed consent form. **Results:** With this study, we found that African individuals had mean blood pressure values of 119.43/83.36mmHg, while Caucasian individuals had mean blood pressure values of 114.18/72.05 mmHg ($p=0.009$ in systolic $p < 0.001$ in diastolic). Blood pressure in males was also higher, 121.33/79.5mmHg compared to females 112.42/75.97mmHg ($p < 0.001$ in systolic and $p=0.030$ in diastolic). **Conclusion:** We verified that there are differences in the tensional profile between the individuals of the two racial groups, being within the normality values, despite having found statistical differences. **Key words:** Blood Pressure [D062186]; African Race [D044383]; Caucasian Race [D044465]

INTRODUCTION

High Blood Pressure (BP) is the world's leading cause of cardiovascular disease (CVD) and death, accounting for 7.5 million deaths per year. Worldwide, it is estimated that 1.13 billion people have hypertension, and two thirds live in low-income countries, with the highest prevalence in Africa.(Akalu et al. 2022). which leads to the occurrence of target organ damage(Hicks et al. 2005)to date there are few data available regarding the confounders of racial/ethnic disparities in the intensity of hypertension treatment. **Methods:** We reviewed the medical records of 1,205 patients who had a minimum of two hypertension-related outpatient visits to 12 general internal medicine clinics during 7/1/01-6/30/02. Using logistic regression, we determined the odds of having therapy intensified by patient race/ethnicity after adjustment for clinical characteristics. **Results:** Blacks (81.9%. There are, however, a number of factors that are associated with this increase in blood pressure, such as socioeconomic status, stress, marital status, racism, integration aspects(Spruill et al. 2009), behavioral, psychological and biological factors(Kington and Smith 1997).

The prevalence of hypertension (HT) is variable, being 46% in Caucasians, 54.7% in Africans and 38.5% in Hispanics, thus race becomes an important factor for BP(Huang 2022).

Most of the work in this area is being carried out in the United States of America, due to the ethnic and racial diversity that offers more study opportunities.(Jones and Hall 2006). In 2000, the Healthy People 2010 awareness campaign and the US National Institute of Health presented a strategic plan aimed at reducing existing disparities in the health sector. morbidity among racial groups(Thomas et al. 2005).

Also in the US, through individual

questionnaires, it was found that there was a significant dichotomy regarding the risk of hypertension, in which individuals of African origin have a greater genetic predisposition to hypertension.(Cooper et al. 2005).

Assessing and quantifying risk factors for CVD is essential in ethnically and racially diverse populations(Kurian and Cardarelli 2007), since a 10mmHg reduction in systolic BP reduces the risk of serious cardiovascular events by 20%, coronary heart disease by 17%, stroke by 27%, HF by 28%, and all-cause mortality by 13%(Akalu et al. 2022). As such, the challenges to understanding the science of racial differences and disparities in cardiac medicine are considerable.(Jones and Hall 2006).

For several years, studies in this area were hampered by a lack of interest and funding. (Jones et al. 2000). This type of investigation has been hampered by the small base of technical and scientific knowledge, since most of the studies were observational. Studies that explore racial differences are difficult to design(Jones and Hall 2006).

It is intended that the present study will verify whether there are differences in blood pressure between African and Caucasian individuals, and if they exist, be able to identify them.

MATERIALS AND METHODS

In order to verify whether there are differences in BP between races and genders, a cross-sectional prospective, relational descriptive study was carried out, collected from inhabitants of the city of Castelo Branco, in Portugal, and included a total of 122 individuals of two races (Caucasian and African). The study took place between September 2010 and June 2012 and all individuals were submitted to an individual questionnaire and two or three manual blood pressure assessments, depending on the case.

In the sample of this study, individuals of African and Caucasian races, of both genders, sedentary, without alcohol habits, non-smokers, non-obese, with similar sociodemographic conditions, without any type of associated pathology, aged between 19 and 35 years old and who agreed to participate in the study by signing an informed consent, its collection took place between October 2011 and January 2012, in different places made available for this purpose. The sample collection technique used was non-probabilistic for convenience.

In order to understand which individuals met all the inclusion criteria, an individual questionnaire was carried out, asking about age, gender, height, weight, race, smoking and drinking habits, if there was a diagnosis any pathology, what physical activity was practiced and if there was a pathological family history.

Each individual was subjected to two blood pressure assessments, expressed in millimeters of mercury (mmHg), measured using the auscultatory method, using an aneroid sphygmomanometer, tested and duly calibrated, with a cuff compatible with the individuals' arm circumference. BP values were measured after the individual survey was carried out, allowing individuals to rest for a while, remaining seated with their arms resting on the table.(Frese, Fick, and Sadowsky 2011). The BP assessments were carried out with an interval of 5 minutes between them, and the average value of systolic blood pressure and diastolic blood pressure, resulting from the two assessments, was recorded. the first two(Whelton et al. 2018).

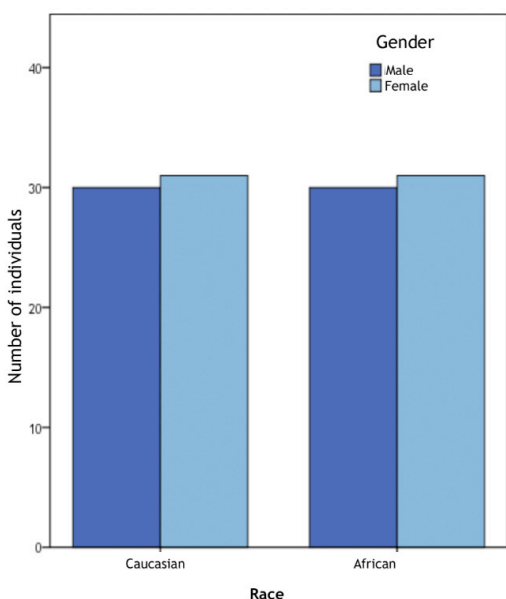
All data collected was used only for academic purposes, with full confidentiality and anonymity of each individual being guaranteed, as well as respecting all ethical and deontological standards.

POPULATION AND SAMPLE

To check which individuals met the inclusion criteria in the study, an individual questionnaire and informed consent were applied.

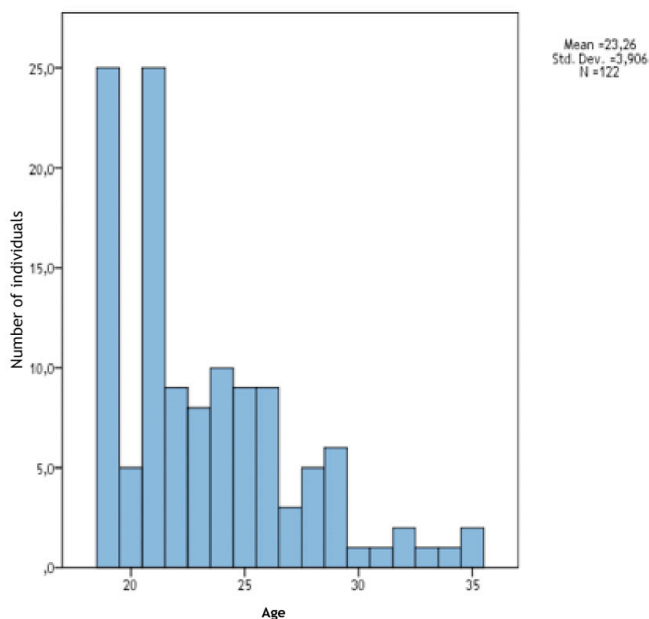
During the sample collection, there was a concern to try to obtain the same number of individuals for each of the genders and races and a very similar average age, in order to homogenize the sample.

As can be seen in Graph 1, the study sample consists of 122 individuals of both genders and races, 60 males (49.2%) and 62 females (50.8%). When we divided them by the races studied, it was found that 30 individuals were male (49.2%) and 31 were female (50.8%), for any of the races studied.



Graphic 1 -Sample characterization according to gender and race.

During the characterization of the sample, we also tried to understand the differences in the average age between the genders of both races, thus it was verified by the age spectrum that it varies between 19 and 35 years, as can be seen in the graph two.



Graph 2 -General characterization of the sample according to age

With regard to the average age this was 23 ± 4 years in women of both races and Caucasian men, while African men have an average age of 24 ± 4 years, as shown in table 1. While analyzing this table, we noticed that in relation to BMI this presented an average of 23 ± 2 kg/m² in Caucasian men and an average of 22 ± 1 kg/m² in African men, while in females the BMI presented an average value of 22 ± 2 kg/m², in both races. The absolute value of BMI ranged from 17.86 kg/m² to 26.23 kg/m². Using the t-Student test, it was verified that there are no significant differences in age ($p=0.503$, gender and $p=0.449$, race) and BMI ($p=0.171$, gender and $p=0.378$, race) between the two races and genders.

STATISTICAL ANALYSIS

The data collected through the survey and manual blood pressure assessments were computerized and processed using the Statistical Package for Social Sciences® (SPSS), version 20.0, Windows® program.

The distribution of variables was tested for normality using the Kolmogorov-

		Age years)				BMI (kg/m ²)			
		Average ± Standard deviation	Max.	Min.	<i>p-value</i>	Average ± Standard deviation	Max.	Min.	<i>p-value</i>
Male	Caucasians	23±4	33	19	0.503	23±2	26.23	17.86	0.171
	Africans	24±4	35	19		22±1	25.65	18.94	
Female	Caucasians	23±4	34	19	0.449	22±2	26.17	19.03	0.378
	Africans	23±4	29	19		22±2	25.99	19.15	

Table1 -Sample characterization according to age and BMI.

(BMI – Body Mass Index; Max. – Maximum; Min. – Minimum)

	Caucasian					African				
	Male		Female		<i>p-value</i>	Male		Female		<i>p-value</i>
	Average	Standard deviation	Average	Standard deviation		Average	Standard deviation	Average	Standard deviation	
Systolic BP (mmHg)	117	±10	112	±9	0.029	126	±10	113	±11	<0.001
Diastolic BP (mmHg)	74	±8	70	±6	0.092	85	±7	81	±6	0.022

Table 2 -Mean values of systolic and diastolic blood pressure, according to race and gender

(BP - Blood Pressure)

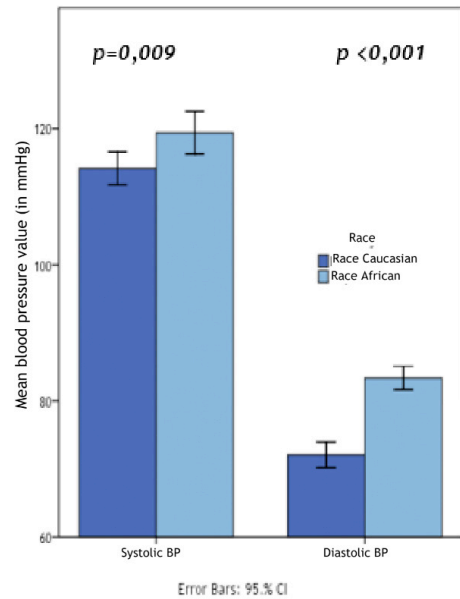
Smirnov test. For the analysis of race and gender distribution and for the general characterization of the sample, double-entry frequency tables were used. The chi-square tests of independence verified whether there were significant differences in the distribution of variables for p-values less than 0.05 and a 95% confidence interval. To compare the numerical variables of the sample, we resorted to the t-Student test.

RESULTS

To assess the results, we performed a methodical statistical analysis of the systolic and diastolic blood pressure values of each individual, by race, by gender and later by race and gender.

RACE

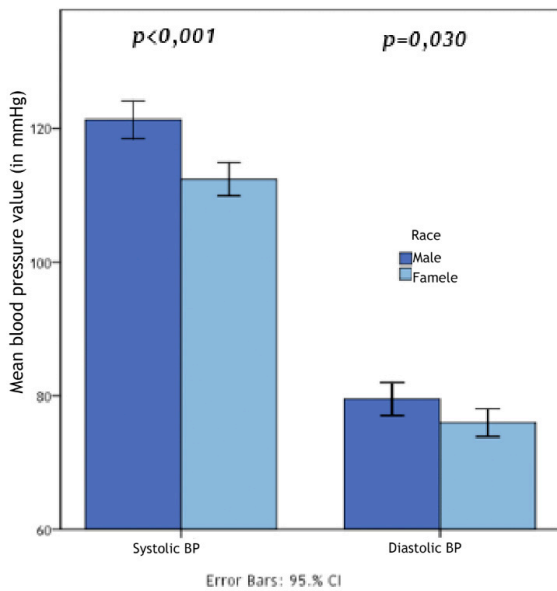
With regard to African individuals, we obtained a mean systolic blood pressure (SBP) of 119.43 mmHg and diastolic blood pressure (DBP) of 83.36 mmHg, while in Caucasian individuals the mean value of SBP was 114.18 mmHg and DBP of 72.05 mmHg. Using the t-student test, we verified that there are statistically significant differences between races, both in the mean SBP value ($p=0.009$) and in the mean DBP value ($p < 0.001$), as shown in graph 3.



Graph 3 -Comparison between races of the mean value of systolic and diastolic blood pressure.

GENDER

Analyzing the differences in the mean values of systolic and diastolic blood pressure in relation to gender, it was observed that male individuals have higher mean values of blood pressure both in systolic BP, with a mean value of 121.33 mmHg and in diastolic BP with a mean value of 79.5 mmHg, in relation to females who had a mean value of systolic blood pressure of 112.42 mmHg and diastolic blood pressure of 75.97 mmHg. We found again that there are statistically significant differences in systolic ($p < 0.001$) and diastolic ($p=0.030$) blood pressure values, this time between genders (graph 4).



Graph 4 -Gender comparison of mean systolic and diastolic blood pressure.

RACE AND GENDER

Analyzing blood pressure in relation to race and gender, we can see that African men had higher mean blood pressure values than Caucasian men, and the same was true of women, as can be seen in Table 2.

DISCUSSION

The sample of this study consists of healthy individuals of African and Caucasian races, of both genders, sedentary, without alcohol and smoking habits, non-obese, with similar sociodemographic conditions and ages between 19 and 35 years.

In order to minimize the influence of external factors that are likely to change the results of the study and cause differences, we tried to homogenize the two racial groups under analysis as much as possible, since previous studies of this type were not adjusted in terms of environmental, nutritional conditions, occupational and socioeconomic level, factors that can affect the blood pressure of individuals, which proved to be a strong limitation of these studies(Somers and Rankin 1961).

When we study blood pressure in both races and the analysis of some studies found we realize that there are significant differences in blood pressure control between Caucasian and African patients, from this analysis we also understand that the latter are less prone to blood pressure control blood pressure than Caucasian subjects thus showing a higher prevalence of hypertension(Bosworth et al. 2008)NC. MEASUREMENTS AND MAIN RESULTS: Baseline data were obtained from the Take Control of Your Blood pressure study and included clinical, demographic, and psychosocial variables potentially related to clinic BP measures. African Americans were more likely than whites to have inadequate baseline clinic BP control as defined as greater than or equal to 140/90 mmHg (49% versus 34%; unadjusted odds ratio [OR] 1.8; 95% confidence interval [CI] 1.3-2.5. Still in the course of the literature review, we found a study that states that even if they have similar socioeconomic conditions, the prevalence of arterial hypertension is about 50% higher in African individuals compared to Caucasians, once again demonstrating that socioeconomic levels have a strong influence on the prevalence of hypertension(Cooper et al. 2005). This may suggest that before implementing more intensive treatments to control hypertension, more attention must be paid to adherence, medication and opportunities for individuals to access primary health care.(Cooper et al. 2005). This study also allowed us to observe that Caucasian men have higher values of hypertension than women of the same race, which is not verified when comparing with the African race.(Cooper et al. 2005). When we statistically treated the data we collected, we found that there are statistically significant differences in blood pressure between races and genders, with the African race having higher mean BP values than the Caucasian race and men also having higher values. than

women.

We also compared the BP differences between African and Caucasian individuals and noticed that there is a higher BP value, 5mmHg, in the first race compared to the second, which was also found by Duprez and his collaborators who stated that African individuals have a large number of small-caliber vessels, which may explain the fact that the blood pressure of African individuals is 2mmHg higher than the SBP of Caucasian individuals(Duprez et al. 2009).

Regarding the values of systolic and diastolic blood pressure, there are also some variations described that indicate that systolic blood pressure is twice as prevalent in African individuals(Grim et al. 2005). In our study, this difference was more evident between genders than between races. The global prevalence of systolic arterial hypertension (SAH) between men and women is similar, although it is higher in men aged up to 50 years. Some studies with a simultaneous approach to gender and race have shown that African women have SAH values about 130% higher than Caucasian women(Grim et al. 2005), and in African race differences are also observed, with African women having higher rates of hypertension than men(Jerome Brandon and Proctor 2020), which increases the risk of developing cardiovascular disease(Thomas et al. 2005).In our study this difference was not found, however we found that on average

African women had 10mmHg more diastolic blood pressure than Caucasian women.

In the Coronary Artery Risk Development Study in Young Adults (CARDIA), which studies the incidence of blood pressure indices over a 10-year period, an incidence of 16.4% was observed in African men and 7.8% in African men. Caucasian men(Duprez et al. 2009), which awakens us to the importance of this type of investigation in which racial differences are studied. Once these medical sciences are in constant evolution, it is suggested that studies of this type continue, however all possible limitations must be minimized so that there are not so many external factors influencing the results of the studies.

CONCLUSION

This study allows us to conclude that there are racial differences in terms of blood pressure. It has been noticed that African-Americans have higher systolic and diastolic blood pressures compared to Caucasians. This way, we found statistical differences in the values that did not have a pathological character, taking into consideration, the normal values of BP.

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