

# RIASE

REVISTA IBERO-AMERICANA DE SAÚDE E ENVELHECIMENTO  
REVISTA IBERO-AMERICANA DE SALUD Y ENVEJECIMIENTO

## **IBP STUDY - IDANHA-A-NOVA/PT BLOOD PRESSURE STUDY**

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## ABSTRACT

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**Objective:** To determine the prevalence of Arterial Hypertension in the adult population of the municipality of Idanha-a-Nova, as well as to verify its treatment and control rates, and to discriminate which are the associated risk factors. **Methods:** It is a cross-sectional, analytic, observational and prospective study which was performed in each of the various townships, forming a base sample of 992 individuals, of which 52,4% are female, and 47,6% are male, between 18 and 95 years of age. Data collection was performed between June and July of 2013, consisting of the evaluation of arterial pressure values, for this purpose three evaluations were performed with a regular interval of 5 minutes. **Results:** The prevalence of Arterial Hypertension found was of 51,0%, of which 25,7% were female and 25,3% male. It was also confirmed that, out of the total of inquired individuals, 30,7% started to take Anti-Hypertension medication, and out of these, 49,8% showed normal levels of blood pressure. Within the risk factors found the most predominant ones were Arterial Hypertension family history and Dyslipidemia, reaching values of 36,0% and 35,2%, respectively. **Conclusion:** The study shows elevated values of Arterial Hypertension in the county of Idanha.

**Descriptors:** Prevalence; arterial hypertension; cardiovascular diseases; risk factors

## INTRODUCTION

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Arterial Hypertension (AHT) is defined as a multifactorial systematic disease characterized by elevated and sustained levels of blood pressure (BP), in which the diagnostic should always be confirmed through repeated measurements, in ideal conditions, in at least three spaced intervals. This pathology is considered to be the largest public health problem in the world, and also the main cardiovascular risk factor, mainly due to its' risk of development and control difficulty (Brandão *et al.*, 2010; E. Brito, Pantarotto, & Costa, 2011; Costa *et al.*, 2007).

In Europe, the average AHT prevalence is of 44%, while in the United States of America it's of 28% and in Canada of 27% (Dias, Martins, Belo, & Fiuza, 2009). Concerning Portugal, according to epidemiological study of prevalence of metabolic syndrome in the Portuguese population - VALSIM (Dias, *et al.*, 2009) and prevalence, awareness, treatment and control of hypertension in Portugal - PAP (Macedo *et al.*, 2007) studies, the AHT prevalence in our country is of 42,6% and 42,1%, respectively.

AHT is strongly associated with the development of cardiovascular diseases, of which Myocardial infarction (MI) and Strokes continues to be the main cause of morbidity and mortality at a global scale. In Portugal, Strokes also hold some of the highest values in the world, according to the World Health Organization (WHO), in 2005 approximately six million of deaths had a close relationship with the occurrence of this pathology (E. Brito, *et al.*, 2011; Macedo, *et al.*, 2007).

The objective of the study is to determine the prevalence of AHT in the county of Idanha-a-Nova, as well as the predisposed risk factors and to ascertain treatment rates and pathology control.

## METHODS

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The present study is transversal, analytic, observational, with prospective data research, having its' investigation sample collected in the various parishes of the county of Idanha-a-Nova.

A questionnaire was distributed to all individuals agreeable to participation in the study. The objective of the questionnaire was to obtain information related to their socio-demographic profile, their gender and age (which was then distributed in age groups spaced in 10 years); anthropometric variables (height (meters), weight (kg) and body mass index (BMI) in Kg/m<sup>2</sup>).

For the BMI study, the individuals were grouped based on their WHO classification: being considered have low weight if <18,5 kg/m<sup>2</sup>, normal weight if 18,5 – 24,9 kg/m<sup>2</sup>, overweight if 25 – 29.9 kg/m<sup>2</sup> and obese when > 30 kg/m<sup>2</sup> (WHO, 2014). Their smoking habits were also studied, as well as their physical activity (all possible activities are covered, without considering their typology, intensity and duration), their personal cardiovascular disease history (considering their results exposure levels, myopericarditis, dilated cardiomyopathy and Heart murmur, amongst others), diabetes *mellitus* (DM) and dyslipidaemia. The individual's AHT family history was also part of the questionnaire (for the presence of the pathology in close relatives).

As a way to classify the different forms of AHT appearance, the following were determined: AHT taken when the average values of the three evaluations of Systolic blood pressure (SBP) and Diastolic blood pressure (DBP) were above ordinary limits; the medicated AHT defined for all individuals that were currently on anti-arterial hypertension medication; controlled AHT for all individuals currently on anti-hypertension therapy who

presented normal BP values, and finally, the general AHT prevalence for all individuals who presented elevated level of BP and who were currently on anti-hypertension medication was stipulated.

As for the BP value classification, the 2013 *European Society of Hypertension* and the *European Society of Cardiology* Guidelines were the base, considering Grade 1 AHT (slight AHT) when SBP values were between 140-159 mmHg, and DBP values at 90-99 mmHg; Grade 2 AHT (moderate AHT) with SBP values between 160-179 mmHg and DBP values at 100-109 mmHg; Grade 3 AHT (severe AHT) with SBP values above or equal to 180 mmHg and DBP values above or equal to 110 mmHg. In addition to these Grades, great BP values (SBP at <120 mmHg and DBP at <80 mmHg), average values (SBP at 120-129 mmHg and DBP at 80-84 mmHg) and borderline values (SBP at 130-139 mmHg and DBP at 85-89 mmHg) were also discriminated (Mancia *et al.*, 2013).

As a way to determine BMI, each individual's weight was collected using an *AUCHAN*® scale, and their height was confirmed using their official ID card.

After the questionnaire form was filled, the individual's BP was measured, according to the auscultation method, with use of a *Bremed*® aneroid sphygmomanometer with and incorporated stethoscope. Thus the procedure was composed of many closely monitored stages, with a complete explanation to the individual as it progressed, answering any questions, therefore allowing for a more relaxed stance, this way avoiding any erroneous BP measurements. It was attested, by the investigator, that each individual had not practiced any kind of physical activity in the last 60 minutes, also that they had not ingested any alcoholic drinks, coffee, food, nor smoked within 30 minutes of the beginning of the evaluation. A correct seating arrangement was implemented, so that the individual was comfortably seating, their legs crossed and feet steady on the floor, with their used arm at heart level, with the palm of their hand facing upward. The arm's circumference was then taken, with the cuff placement at 2 to 3 cm above the cubital fossa, centered with the base of the brachial artery. Following its palpation, the stethoscope bell is placed, without adding too much pressure. The cuff was then inflated, until a value superior to the estimated SBP was reached. Posteriorly, the cuff was slowly deflated, thus determining the SBP and DBP values, which corresponded to the first and last *Korotkoff* sound, respectively. This way, three BP measurements were taken, with a 5 minute interval between each (Rocha, 2012).

The base sample was gathered in different locations in each of the parishes that form the county of Idanha-a-Nova, being that all participation in the study was voluntary. In terms of data research, the inclusion criteria was of individuals with 18 years of age or more, living in the different parishes of the county. The exclusion criteria was defined, a priori, that the data research could not take place in health institutions or nursing homes.

Regarding the population sample of the county of Idanha-a-Nova, data from the 2011 CENSUS (*Census 2011 - Resultados Definitivos, 2011*), published by the National Statistics Institute, was used. Thus it was ascertained that the population of the study was of 9716 inhabitants. The calculation of the sample took a trust level of 95% with a 3% error margin. To assure the sample was a proper representation of the county being studied, it was formed by 962 inhabitants. Of these, 52,4% were female, and 47,6% were male, with ages between 18 and 95 years of age. Concerning the age distribution of the population sample, the most predominant age group was from 50 to 59 years of age.

The data relevant to the sample population was inserted, analyzed and processed using the 0.8.1 version of the PSPP® (*program for the analysis of sampled data*) statistical analysis program.

A simple descriptive analysis was used to characterize the sample and its variables distribution, by calculating the absolute (n) and relative (%) frequency for the qualitative variables. The quantitative variables average was calculated, along with its standard deviation, and maximum and minimum values. The statistical significance criteria was established with  $p \leq 0,05$  and a trust level of 95%.

The chi-square test was used as a way to check the existing relationship between different variables, while the *t-student* test was used for the differences between two independent sample groups, and the *pearson* correlation for relationships between continuous variables.

As a way to adjust the different risk factors, a multivariate logistic regression model was used, applying the *Forward Wald* method, thus the model assumptions were evaluated according to what was described in Marôco. (Marôco, 2007).

The participants of the study had the opportunity to ask questions, this way gaining knowledge regarding the investigation objectives. An informative consent form was also given, which each individual was to read carefully and sign, and if illiterate, the content was also verbally explained, and all doubts cleared. Every piece of collected data was simple used for statistical ends, and as such it was completely anonymous. This way, the investigation team declares the existence of any conflicts of interest, and compromised itself to respect the principals of the Helsinki Declaration.

# RESULTS

## *Anthropometric profile*

The total of individuals present in the sample presented BMI values between 16,23 e 48,70 kg/m<sup>2</sup>, with an average of 26,61 kg/m<sup>2</sup> and a pattern deviation of 4,61 kg/m<sup>2</sup>. It was possible to verify that, in the sample distribution per BMI classes, 40,3% of the individuals were overweight, 21,0% were obese, 1,7% were below the average weight, while 37% had normal weight values. Thus it was possible to verify that the majority of the inquired individuals weighted more than the average weight.

## *Risk Factors*

Regarding the analysis of risk factors, as one can check on figure 1, the most predominant were the family history of AHT and dyslipidemia, with prevalence of 36% and 35,2%, respectively.

It was also possible to discern that, of the total of inquiries made, 54,3% practiced regular physical activity, thus observing that 45,7% fit the most prevalent risk factor, a sedentary lifestyle. The study also showed that 22,2% of the individuals also had smoking habits, 13,0% had already experienced an episode of cardiac disease, the most frequent pathologies being the cardiovascular ones (coronary disease at 4,6% and strokes at 0,5%, arrhythmias at 3,6%, valvulopathy at 0,6%, and other clinical situations with a percentage of 0,9%). It was understood that DM was also present in 11,6% of the total of individuals, becoming the sixth largest risk factor present.

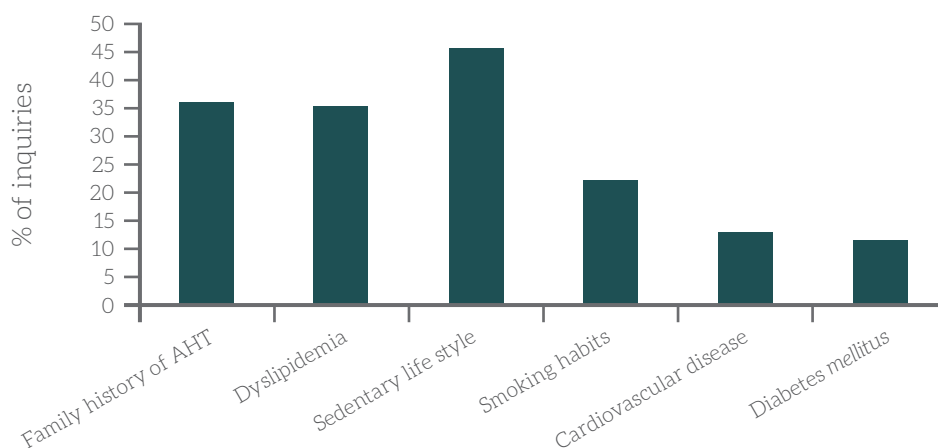


Figure 1 - Graph of risk factors in the population of the study

*Prevalence of Arterial Hypertension*

*Prevalence of Arterial Hypertension in the adult population of the county of Idanha-a-Nova*

The prevalence of AHT in the municipality of Idanha-a-Nova was of 51,0%, with similar distribution amongst both female (25,7%) and male (25,3%) genders.

The obtained SBP values were between 76,67 mmHg and 193,33 mmHg, with an average of 126,62 mmHg and a standard deviation of 19,88 mmHg.

Found DBP values were between 50 and 120 mmHg, with an average of 79,27 mmHg and standard deviation of 12,39 mmHg.

The prevalence of AHT was analyzed in regards to gender and age, and as it is possible to confirm in figure 2, with more prevalence of AHT in the male gender sample in the 18-29, 30-39 and 50-59 age stages, while the female gender is more predominant in other classes. In addition, the study also revealed that gender differences remain similar, without substantial percentage discrepancies. It is also possible to observe that, as age increases, so does the prevalence of AHT, with the exception of the last age stage ( $\geq 80$  years) with can be explained by the reduced number of individuals in this particular age group in relation to others. With the graphic analysis, it was concluded that the largest prevalence of AHT is to be found in the 70-79 age group of the feminine gender (26,7%).

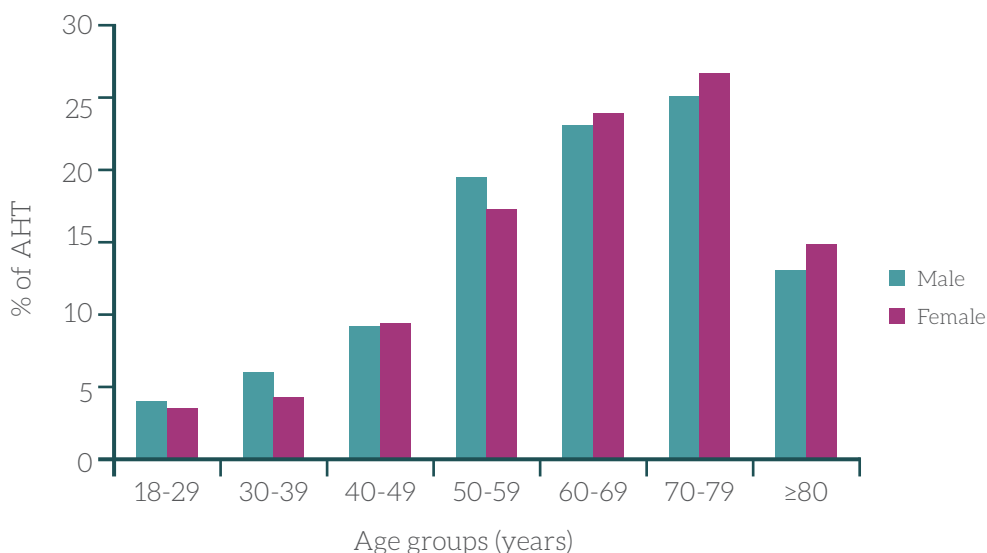


Figure 2 - Relation between the prevalence of AHT in both genders and age groups in the population of study

Applying the chi-square test to evaluate for any connection between AHT and the gender and age variables, it was concluded that AHT isn't related to gender ( $p=0,193$ ), but is associated with age, as there is a statistical significance between both ( $p<0,01$ ).

The AHT percentage per each parish of the municipality of Idanha-a-Nova was estimated, and the results show that the counties of Idanha-a-Velha (80,0%), Oledo (75,7%) and Alcafozes (72,0%) have the highest prevalence of AHT. On the other hand, the counties of Monfortinho (28,3%), Medelim (35,7%) and Penha Garcia (36,5%) have the lowest percentage of AHT, as can be observed in figure 3.

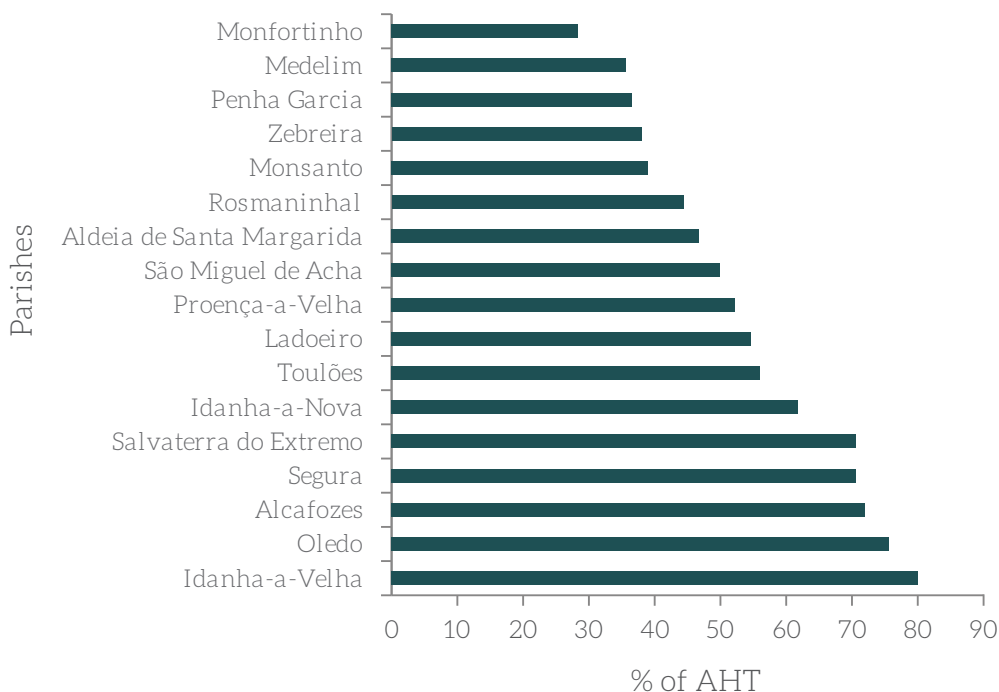


Figure 3 - Distribution of AHT per each parish of the country of Idanha-a-Nova

*Relationship between general AHT and risk factors*

As a way to adjust the various risk factors present in the study, a multivariate logistic regression model was used, applying the *Forward Wald* method. Thus it was verified that the gender, age, AHT family history, cardiovascular diseases and BMI presented significant predictive values towards the probability of AHT development, as is shown in table 1. According to the model used, the male gender group increases 1,869 times the probability of developing AHT, the age group increases it to 1,063 times per year, family history of AHT up to 2,360 times, cardiovascular diseases 2,398 times and BMI 1,101 times per Kg/m<sup>2</sup>, in relation to the individuals that do not present these risk factors.



Table 1 - Relationship between AHT and risk factors, multivariate analysis

Risk factors	Significance (p)	Odd Ratio (OR)	Confidence interval 95%	
			Minimum limit	Maximum limit
Genders	0,001	1,869	1,278	2,733
Age	<0,001	1,063	1,050	1,076
Family history of AHT	<0,001	2,360	1,609	3,460
Cardiovascular diseases	0,010	2,398	1,232	4,669
BMI	<0,001	1,101	1,057	1,147

Regarding the sensibility and specificity of the used model, the area obtained was inferior to 0,815 of the ROC (*Receiver Operator Characteristic*) curve, which allows us to conclude that the used model has a good discriminating capacity.

#### *Measured, medicated and controled AHT Prevalence*

Regarding the measured AHT, the percentage obtained was of 35,7%, slightly more elevated on the male gender group (18,6%) than the female one (17,0%).

Out of the total questioned individuals, 30,7% claimed to take antihypertension medication, whereat, out of these, 13,2% belonged to the male gender group and 17,5% to the female gender group. The medicated AHT percentage in each parish of the county in question was also estimated, and it was possible to conclude, through this analysis, that the parishes of Alcafozes (44%), Salvaterra do Extremo (41,2%) and São Miguel de Acha (41,1%) are the ones with the highest percentages of medicated AHT. On the other hand, the lowest percentages of medicated AHT were found in the parishes of Penha Garcia (9,5%), Monfortinho (20,8%) and Medelim (21,4%).

Out of all the individuals taking anti-hypertension medication (30,7%), 49,8% presented BP values along the average levels (controled AHT), while the rest, even with implemented therapeutics, kept their BP values above the desired average (non-controled AHT), as can be observed in figure 4.

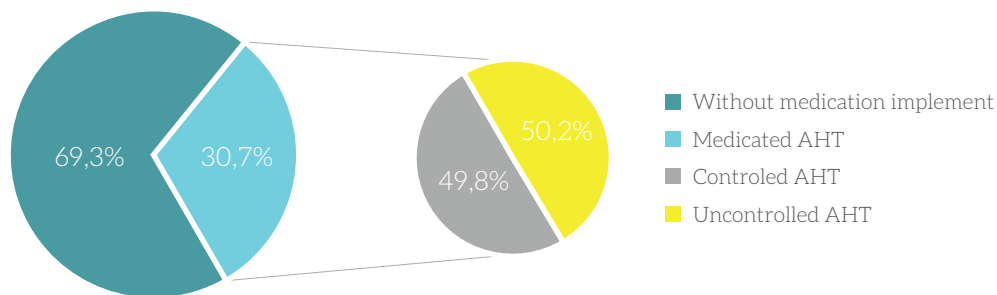


Figure 4 - Prevalence of medicated AHT, uncontrolled AHT, controlled AHT, and percentage of subjects who were not on medication in the population of study

Similarly to the general and medicated prevalence of AHT, the controlled AHT in each of the parishes was also researched. It was found that the parishes of Aldeia de Santa Margarida (100%), Proença-a-Velha (87,5%) and Monsanto (78,3%) had the highest percentage of controlled AHT, while the parishes of Alcafozes (18,2%), Oledo (20%) and Idanha-a-Velha (25%) had the lowest percentages of control.

## DISCUSSION AND CONCLUSIONS

This study can be included in a series of studies made throughout the years, within Europe, Germany has a AHT prevalence of 55%, followed by Finland with 49%, Spain with 47%, England with 42%, and Sweden and Italy with 38% (Babatsikou & Zavitsanou, 2010). At a national level, the Simões study (Simões, Coelho, & Pereira, 2011) has shown that 62,4% of the population of the city of Castelo Branco had AHT. The Gomes study (Gomes, Coelho, & Pereira, 2012) also concluded that there is an AHT percentage of 63,3% in the county of Covilhã. In turn, the epidemiological study to assess of the risk of cardiovascular disease in Portugal - AMALIA (Perdigao, Rocha, Duarte, Santos, & Macedo, 2011) has shown a lower AHT rate, namely of 23,5%, which could be undervalued as this percentage was formed through the use of questionnaires in direct interviews, an evaluation of the BP values not having been made to the individuals questioned. Our study also verified an elevated prevalence of AHT in the adult population of Idanha-a-Nova. According to the given results, the AHT prevalence is of 51,0%.

In regards to the SBP and DBP values found in this study (126,62 and 79,27 mmHg, respectively), there was a certain discrepancy encountered related to the average SBP value

when in comparison to PAP studies (Macedo, *et al.*, 2007) (the average SBP value being 134,7 mmHg), VALSIM (Dias, *et al.*, 2009) (136,0 mmHg), Gomes (Gomes, *et al.*, 2012) (135,3 mmHg) and Simões (Simões, *et al.*, 2011) (132,8 mmHg). The DBP average, despite this, is not so different, having a 80,5 mmHg average in the PAP study (Macedo, *et al.*, 2007), 79,0 mmHg in VALSIM (Dias, *et al.*, 2009), 79,9 mmHg in Simões (Simões, *et al.*, 2011), being that the lowest value was found only in the Gomes study (Gomes, *et al.*, 2012) with 77,7 mmHg.

Regarding the gender group distribution of the AHT percentage obtained in the county of Idanha-a-Nova there were no significant changes between the female group (25,7%) and the male group (25,3%). The chi-square test was used, and no statistical relationship was found between gender and the obtained AHT prevalence ( $p=0,193$ ), which matches the AMALIA study (Perdigao, *et al.*, 2011), which itself didn't show significant statistical difference between the AHT percentages obtained in the female group (24,9%) and the male group (21,8%). In the VALSIM study (Dias, *et al.*, 2009), AHT percentage differences between genders were also minimal, being that 43,09% of the individuals belonged to the male gender group and 42,19% were of the female gender group. The PAP study (Macedo, *et al.*, 2007) presented a larger discrepancy between gender, regarding the AHT percentage obtained, being most noticeable in the male gender group (49,5%) than the female one (38,9%). The Simões (Simões, *et al.*, 2011) showed similar results to the PAP study (Macedo, *et al.*, 2007), seeing as it also presented a large difference regarding the AHT rate between the female (61,4%) and the male gender (38,6%).

The prevalence of AHT over the years was also studied, and it was discerned that it is higher has age increases, diminishing only after the age of 80. However, it should be taken in consideration that the sample 18-29 and  $\geq 80$  age groups have less individuals than others of the base sample, which can be seen as an explanation for the diminished percentage of AHT found in this last group. In the AMALIA study (Perdigao, *et al.*, 2011), the last age group ( $\geq 80$  years) includes the highest AHT percentage (34,6%). In turn, the PAP study (Macedo, *et al.*, 2007) shows that AHT tends to evolve progressively along the years, without presenting any kind of decreasing values. The VALSIM study (Dias, *et al.*, 2009) also shows a progressive AHT evolution as age increases. In relation to the AHT prevalence in the county of Idanha-a-Nova, it has shown the highest percentage in the 70-79 female age group (26,7%), similarly to the AMALIA study (Perdigao, *et al.*, 2011), in which the highest percentage of hypertension was found in the same age group.

The statistical relationship between age groups and AHT was also verified utilizing the chi-square test, which has shown a high statistical significance between both variables ( $p<0,01$ ), meaning that these are directly associated. Furthermore, through the logistic regression model used, it was possible to discern that age increases the probability of

developing AHT 1,063 times per each year. In conclusion, it is shown that age is a risk factor and is associated with an increase of BP, in particular SBP. Such is not only explained by the increase of collagen production by the cells of the smooth muscle of the arterial tree, but also by the elevated sensibility of the sodium and nitric oxide deficit present in the elderly population, which leads to a rise in oxidative stress. These alterations modify the vessel dispensability, caused by elasticity reduction and increased stiffness, this ways conditioning an increase of SBP, increasing the metabolic needs of the heart, which in turn also can condition Left Ventricular Hypertrophy and, posteriorly, Heart Failure (Gonzaga, Sousa, & Amodeo, 2009).

One of the most seen results of our study is related to the BMI, as a total of 40,3% of questioned individuals had excess weight, 21,0% were obese, 1,7% had bellow average weight, and only 37% of the total sample had average values. This data is related to various current studies that have shown the elevated number of individuals with above average weight, as with the Simões (Simões, *et al.*, 2011) investigation which showed similar results, with 46,0% of the individuals having excess weight and 27,4% obesity, the AMALIA study (Perdigao, *et al.*, 2011) with 42,3% of the sample population showing excess weight, and a lower percentage of obese individuals 9,3% and the Sarno study (Sarno & Monteiro, 2007), which concluded that 32,7% of the sample had excess weight and 10,3% were obese. By intersecting BMI with AHT it was possible to conclude, with the logistic regression model, that this variable increases the chance of AHT occurrence by 1,101 times per Kg/m<sup>2</sup>, something that is also shown in other studies which prove the association between AHT and obesity, in both genders since a young age. In adult individuals, even if physically active, the 2,4kg/m<sup>2</sup> BMI rise promotes a larger risk of developing AHT (Brandão, *et al.*, 2010; Sarno & Monteiro, 2007).

Still related to studied risk factors, the most predominant ones found were AHT family history and dyslipidemia, with prevalence of 36,0% and 35,2%, respectively. It is of importance to mention that AHT family history, according to the logistic regression model used, increases the chance of developing AHT by 2,360. In fact, this pathology presents a strong genetic predisposition, as if confirmed by the percentages found in the Mendonça studies (Mendonça, Lima, & Oliveira, 2012), where 64% of the sample that suffered a stroke had AHT family history and Gama (Gama, Mussi, Mendes, & Guimarães, 2011), in which more than 50% of the family had an AHT percentage of 84%. The Gomes study (Gomes, *et al.*, 2012) also found a AHT family history of 57,2%. However, the genetic predisposition present in the development of AHT can change along the years, depending on the lifestyle of each individual (Gonzaga, *et al.*, 2009), which was already confirmed in the Shi study (Shi *et al.*, 2009), which indicated that genetic support can be altered as age progresses.

Regarding dyslipidemia, the Gomes study (Gomes, *et al.*, 2012) presented a percentage of 52,9% of individuals with this cardiovascular disorder, while the AMALIA study (Perdigao, *et al.*, 2011) reached a much lower percentage, namely of 19,7%.

It is known that regular physical exercise allows for, not only the prevention of AHT in individuals with regular BP values, but also allows for the reduction of these in individuals with hypertension. Effectively, in order to maintain a reasonable quality of life, everyone should, at least five times a week, practice 30 minutes of physical activity of moderate intensity (Brandão, *et al.*, 2010; D. Brito, Araújo, Galvão, Moreira, & Lopes, 2008; Guedes & Lopes, 2010; Laterza, Amaro, Negrão, & Rondon, 2008; Scher, Nobre, & Lima, 2008). Regarding physical activity, the percentage presented in our study is related to all and any activity, without discriminating type, intensity and duration. The study of this variable presented one of the most surprising results, which was that a large percentage of individuals practiced physical activity regularly (54,3%). The numbers obtained by our study are very different from others, as in the Gomes (Gomes, *et al.*, 2012) investigation, which shows that only 5% of the sample practiced physical exercise, and in AMALIA (Perdigao, *et al.*, 2011), where only 24,0% of the individuals practiced it.

Apart from the already mentioned factors, it was also shown that 13,0% of the individuals had cardiovascular pathologies, of which 4,6% were related to ischemic heart pathology history, 3,6% to arrhythmias. It was possible to confirm that cardiovascular disorders increase 2,398 times the probability of AHT occurrence. This percentage is very similar to the one found in the Gomes study (Gomes, *et al.*, 2012), according to which 15,1% of the individuals had already suffered cardiovascular disorders.

Still in relation to the studied risk factors, it was concluded that DM was present in 11,6% of the sample total. And, if on one hand the AMALIA study (Perdigao, *et al.*, 2011) showed an inferior value (8,9%), the Simões study (Simões, *et al.*, 2011) showed superior percentages (23,1%). The relationship between DM and AHT has been studied in depth, with various articles showing the functional and structural changes of arteries in diabetics, observing a higher level of arterial rigidity in these, when compared to non-diabetic individuals of the same age group (Bortolotto, 2007).

In terms of smoking habits, the investigation shows a prevalence of 22,2% of smoking individuals, which is superior to the values found in the Simões (Simões, *et al.*, 2011) (15,7%) and AMALIA (Perdigao, *et al.*, 2011) (16,3%) studies. On one hand the simple act of smoking a cigarette is proven to increase BP and heart rate (HR) which can last up to 15 minutes, on the other, many epidemiological studies have shown that BP levels in smoking individuals are similar to those of non-smokers (Santos & Lima, 2009).

In the total of questioned individuals 30,7% said to take anti-hypertension medication, which is a much smaller number than the one presented in Simões (Simões, *et al.*, 2011) (79,3%), Gomes (Gomes, *et al.*, 2012) (53,7%) and PAP (Macedo, *et al.*, 2007) (39,0%) studies. Out of the individuals included in the medicated AHT percentage 49,8% of these showed BP levels within average. This prevalence is superior to the one shown in PAP (Macedo, *et al.*, 2007) (11,2%) and Gomes (Gomes, *et al.*, 2012) (30,3%) studies, but very similar to the one in Simões (Simões, *et al.*, 2011) (49,2%).

If on one hand AHT shows many modifiable risk factors, such as obesity, dyslipidemia, smoking, a sedentary lifestyle and DM, on the other it also presents a group of factors that cannot be changed, which are mainly age, gender and heredity (Brandão, *et al.*, 2010; Gonzaga, *et al.*, 2009; Santos & Lima, 2009). In this study the previously mentioned risk factors were adjusted, using a multivariate logistic regression model which allowed us to conclude that gender, age, AHT family history, cardiovascular disease and BMI present predictive positive values to a higher chance of AHT occurrence.

In view of the elevated AHT prevalence obtained in this study, due to the lack of control regarding it and the elevated risk of developing cardiovascular diseases, it is extremely important and eminent to approach possible treatments to this pathology. This can be done with the use of drugs, or through a nonpharmacological treatment which consists, mainly, of the adoption of preventive measures that have as goal changes in an individual's lifestyle, through weight loss, reduction of sodium ingestion, adoption of the DASH diet (a dietary approach to AHT), increase of physical activity and limitation of alcohol consumption, amongst others (Brandão, *et al.*, 2010).

Regarding the AHT pharmacological treatment, the main objective is the treatment of the disease, through the reduction of BP, as well as the reduction of morbidity and mortality due to cardiovascular events. However, the sudden symptom disappearance, or the normalization of BP levels are seen as a motivation to stop the treatment, which carries serious consequences of such behavior. Furthermore, some individuals with hypertension prefer to abandon treatment due to lifestyle changes, such as diet, weight management, regular physical activity, as well as the continuous drug prescription (Duarte, Cyrino, Cerqueira, Nemes, & Lyda, 2010).

Lastly, the study sought to find if there was a correlation between AHT rates and the geographical distribution in the parishes of the county of Idanha-a-Nova. So, as to the prevalence of AHT, it was discovered that the parishes with the highest percentages (Idanha-a-Velha, Oledo and Alcafozes) were the ones near the center of the county, where supposedly there are more means of obtaining diagnostic and therapeutic support. The

same parishes also had a larger value of non-controlled AHT. In regards to medicated AHT, the parishes of Penha Garcia, Monfortinho and Medelim had the lowest percentages of pharmacological treatment, being situated slightly farther away from the center of the county, which shows difficulty in getting access to health services. The parishes with the highest AHT control rate (Aldeia de Santa Margarida, Proença-a-Velha and Monsanto) don't show a strong relation regarding their positioning.

Our study also shows some limitations, of which the technique regarding sample selection should be mentioned. Even though the methods used can ensure a level of representation in the base sample, in the end the technique cannot guarantee a completely random sample, due to the voluntary involvement of the individuals in this study, since many times it was simply a matter of convenience. Also the fact that the data related to risk factors was obtained by questionnaire, and as such, it is based on a statement from the individuals, it might place some limitations on this investigation, since there might have been imprecision on the answers obtained.

In conclusion, this study is of import, as it has allowed us to gain knowledge on the prevalence of AHT in a municipality never before present in such an investigation. An elevated prevalence of AHT was found, and as such it is advised to encourage the treatment of individuals with hypertension, to promote sensibility campaigns and the need to modify their risk factors, to implement primary prevention strategies, to alert young people and show the need to adopt healthy lifestyles, have a closer following of elderly needs and to verify if the therapeutic measures are working, as well as the existence of easy access primary health care services. As this is proven to the reality of the county studied, we can certainly transpose this example to the many locations of Portugal where we should value equity in the access to health care, even to places located far from big centers, as a way to act preventively, as early as possible.

Present scientific evidence shows that there is great concern with the results obtained with AHT, and as such, it is advised to implement preventive measures as far as primary health care institutions are concerned, stressing the importance of new investigations to ascertain possible modification in AHT control rates after preventive measures are active, and whether the application of those measures can influence a lower risk on the development of cardiovascular diseases.

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