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STUDY OF THE RISK FACTORS DETECTED IN THE EVOLUTION OF PATIENTS DIAGNOSED WITH HYPERTENSION

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Abstract

Cardiovascular diseases are part of a group of conditions starting from the heart structures and blood vessels. Since the symptomatology of these conditions is complex, which affects the whole body, special attention is required from the medical personnel. The management of these pathologies is a complex one, which obligatorily implies the existence of good communication between the primary healthcare as well as the treating specialists.

According to the latest statistical studies, cardiovascular diseases are currently the main cause of death worldwide. According to statistics from 2015, 17.9 million deaths were due to cardiovascular pathologies, which is 6.3% more than the death rate in the 90s. From the point of view of the distribution of these conditions depending on sex, the predominance is noted among men of acute coronary diseases and vascular accidents, the same conditions being found also in the case of the opposite sex.[McGill, H. 2008]

Arterial hypertension is defined by specialized literature as a chronic cardiovascular disease. It is characterized by the constant presence of elevated blood pressure values. Over time, this conjuncture creates an environment in which it is stimulated in the development of coronary diseases, aneurysms, but also peripheral vascular disease, as

well as purely cardiac pathologies such as heart failure (which has systemic symptoms), or atrial fibrillation .[Lawes, C, 2001]

Key words: hypertension, cardio-vascular, asthma, dyslipidemia, smoking, diabetes melitus

Introduction

According to specialized literature, the risk of hypertension can be reduced especially by changing the lifestyle, diet and the correct medical treatment administered.
From the point of view of classification of hypertension, it is classified into essential or primary hypertension and secondary hypertension.Primary hypertension represents approximately 90-95% of cases of hypertension, the remaining 5 or 10% of cases are considered cases of secondary hypertension, which is defined as hypertension due to other existing pathologies, such as: chronic kidney diseases, endocrine disorders or the use of contraceptives.[Poulter, N, 2015]

The purpose of this research

In the present clinical research, I want to expose the main risk factors, found in the study group, responsible for the occurrence of arterial hypertension. I believe that this is one of the most important elements in terms of the proper control of this pathology as well as the decrease in the incidence of its occurrence.
It is well known that hypertension associates two types of risk factors: potentially modifiable risk factors (including weight, diet, alcohol consumption, medications, smoking) and non-modifiable risk factors (age, ethnicity, sex, comorbidities, family history).
For an easier understanding of the approach adopted in this work, as well as from the desire to clearly expose the staged thinking that was the basis of the research in question, it was necessary to extract some defining characteristics of the analyzed population, among which we mention:

- Identifying the prevalence of personal pathological antecedents

- Evaluation of the degree of statistical dependence between APP and the main cardiac pathology
- Evaluation of the treatment used both from a descriptive statistical point of view and from the point of view of the correlation with the patients' diagnosis.

Material and methods

Description of the *research group*

This study batch is a cohort type, carried out in a retrospective manner. In order to create this database, the records of patients who presented a definite diagnosis of HTN (either primary or secondary) were selected.This resulted in a final batch of 98 subjects, from within the Galați county. The analyzed information followed the evolution of the subjects, from the first medical consultation, until the moment of recording, from the desire to expose a picture, as real as possible of the impact that the risk factors have on these patients. It is important to mention that patients who met the following criteria were included: patients diagnosed with HTN,
the use of specific hypertension treatments, the documentation of cardiovascular investigations, patients who have expressed their agreement to participate in this study.

The final data, obtained after applying all the inclusion and exclusion criteria, were centralized in a table, according to which the database was created, which led to the development of the statistical analysis. Therefore, for the effective analysis of the research group, from the point of view of descriptive statistics, descriptive statistical indicators were calculated and analyzed for all variables where this calculation approach was considered useful.

Results

The incidence of hypertension type pathology was higher for the female sex 63.27% (n=62), compared to the male gender 36.73% (n=36). It will be noted, the existence of a statistically significant dependence relationship between the gender of the patients and the years in which the first assessment of cardiac pathology took place, according to a chi square test (p =. 046*), based on a value of. 05, $\chi 2(10) = 18.56$. We will issue the initial working hypothesis according to which in the last 3 years HTN predominates in male patients (2:1)

Regarding the distribution of the population, according to the environment of origin, at the level of the analyzed group, a quasi-symmetrical distribution is observed, with extremely small percentage differences between the two coding categories of the "environment of origin" variable. The percentage of patients from urban areas is slightly higher (52.04%, n=51) compared to those from rural areas (47.96%, n=47).

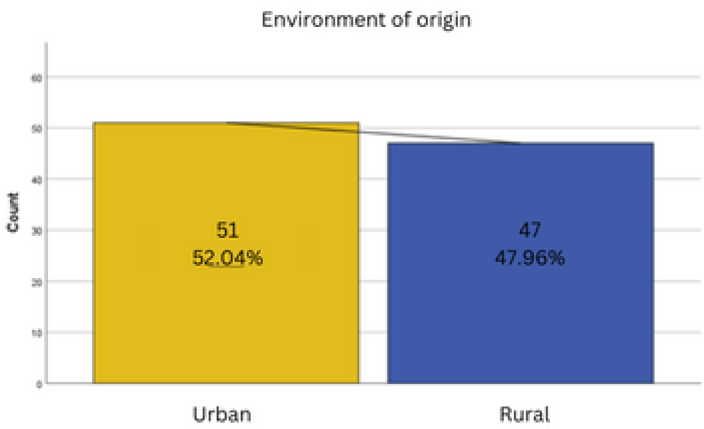

Figure 1 – Distribution of patients depending on their place of origin

An increased incidence of cardiac pathologies was observed in urban patients, this can be justified on the basis of 2 hypotheses:

- The benefit of extensive medical explorations
- Patients from rural areas are predominantly elderly patients, for this reason cardiac pathologies such as ischemic cardiomyopathy predominate (prevailing for the elderly)

Following the statistical analysis performed on the study group, it can be seen that the average detected age is 69.44 years, with a standard error from the average of ±11.76 years. The maximum age of the subjects was 100 years. An index of asymmetry (Skewness) equal to -.395 signifies a slightly imperfect symmetry, recognized on the histogram as the Gaussian curve. Thus, the value of .244 of the standard error deviation of this index, resulting from the statistical analysis, means that there is a positive asymmetry in this study group. Kurtosis index is calculated based on normal distribution. The obtained value signifies a statistically normal distribution.

Statistics

Patients age

N	Valid	98
	Missing	0
Mean		69.44
Median		71.00
Std. Deviation		11.767
Skewness		-.395
Std. Error of Skewness		.244
Kurtosis		.397
Std. Error of Kurtosis		.483
Range		58
Minimum		42
Maximum		100

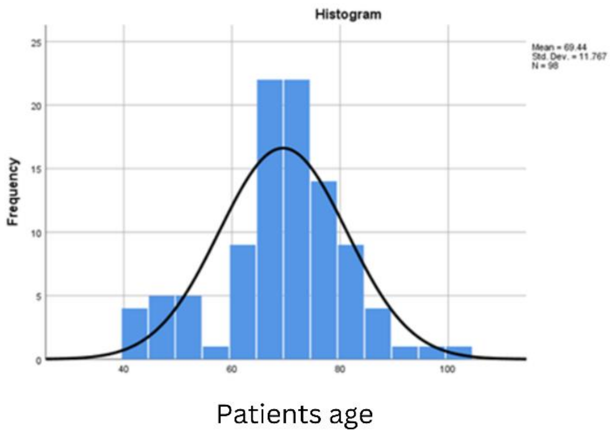

Figure 2–Centralizing table of descriptive statistics data regarding the scalar variable defined as subjects' age (left); Histogram of age distribution of patients enrolled in the cohort (right)

The incidence of the pathology shows a bell-shaped, Gaussian distribution, the maximum occasional peak being defined between decades 6-8 (with a total of 68.4% of the analyzed group). Afterwards, the curve undergoes a decline, thus following the typical positively symmetric (positively skewed) histogram pattern.

It can therefore be stated that, at the batch level, the subjects who respect a certain profile defined by the following characteristics predominate: female patients, from the urban environment, aged between 60-80 years.

As can be seen, non-smoking subjects predominate in the group (in a ratio of 79.6%, n = 78). From this point of view, we can support the fact that at the group level, we cannot speculate the hypothesis according to which HTN is predominantly present due to tobacco consumption.

A number of 60 patients in the study group does not associate cardiovascular diseases, the rest associate ailments such as AMIand ischemic heart disease, CHF, arterial disease, ventricular and aortic insufficiency, previously recognized but inadequately treated hypertension, coronary artery disease

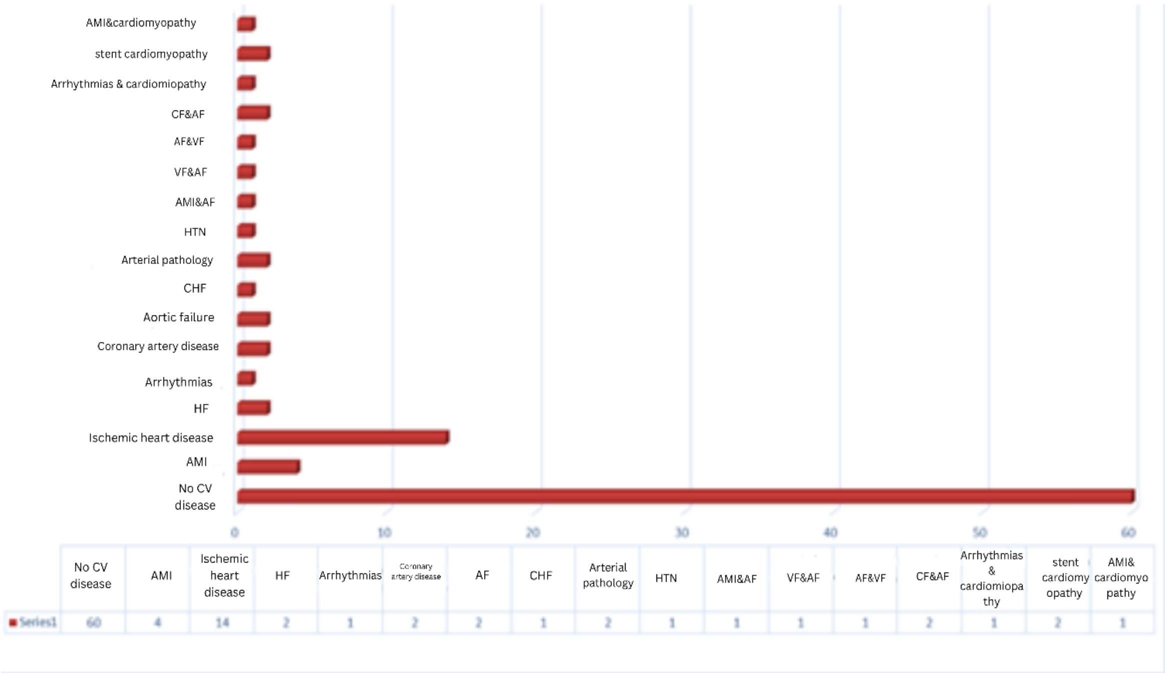

Figure 3 – Distribution of cardiac APPs at batch level

Only 3% of patients had associated endocrinological type pathology, which is why the null hypothesis will be issued according to which, at the level of this group, endocrinological pathology does not represent a risk factor in the subsequent appearance of HTN, or which requires particular management measures. It will be noted that in the case of neurological pathologies, the weights are similar to the previous situation, only 3% of patients accusing pathology of the type: stroke, sekelar stroke or epilepsy.

Although cardiac pathologies are closely related to respiratory ailments at the level of the population enrolled in the study group, the same incidence of cases of respiratory pathology is noted, namely characterized by the fact that only 5% of the subjects associate COPD, or bronchial asthma.

It is important to remember that the specialized literature confirms the increased incidence of hypertension-type pathology in subjects who also associate metabolic-type pathology, especially patients with dyslipidemia and DM. At the level of the analyzed group, most subjects (53.1%) do not associate this type of condition. In the following, the values of the main analyzed paraclinical parameters are defined. This time we are referring to the staged analysis (pre-, respectively post-initiation of drug treatment) of the lipid profile of the subjects defined by the total cholesterol value, respectively the triglyceride values.

Statistics

		Systolic BP before treatment	Diastolic BP before treatment	cholesterol	triglycerides	cholesterol after treatment	triglycerides after treatment	cardiovascular risk %	consult number	consult time frame
N	Valid	98	98	98	98	98	98	98	98	97
	Missing	0	0	0	0	0	0	0	0	1
Mean		165.06	84.45	204.45	149.08	194.52	135.09	26.85	33.08	5.60
Median		163.00	85.00	192.00	129.40	191.00	122.00	26.00	37.50	6.00
Std. Deviation		15.000	15.228	58.824	84.080	44.725	78.408	7.880	9.985	1.272
Skewness		.284	-.106	.977	1.882	.259	2.922	-.204	-1.380	-.751
Std. Error of Skewness		.244	.244	.244	.244	.244	.244	.244	.244	.245
Kurtosis		-.653	.851	2.159	4.522	.048	13.454	-.685	.892	-.046
Std. Error of Kurtosis		.483	.483	.483	.483	.483	.483	.483	.483	.485
Minimum		140	40	104	48	85	42	11	4	2
Maximum		200	120	450	524	320	581	43	41	7

Figure 3 - Centralizing table, descriptive statistics of the scalar variables recorded at the level of the analyzed lot

Thus, values of the paraclinical investigations arranged as follows will initially be noted:

- Descriptive statistical analysis does not define missing values
- Cholesterol – mean value of 204.45 mg/dL, with a standard deviation of 58.82 mg/dL. The highest value detected at the batch level was 450 mg/dL. The corresponding histogram is defined as having a curve shift to the left with peak incidence around 190-200 mg/dL. The existence of a prominent downward slope is noted, with the maximum values defined above the threshold of 400 mg/dL.
- Triglycerides - mean value of 149.08 mg/dL, with a standard deviation of 84.08 mg/dL. The highest value detected at batch level was 524 mg/dL. This time, the histogram is defined as in the case of cholesterol, with the values deviated to the left side, with the maximum incidence peak around the value of 100 mg/ dL. As with pre-treatment cholesterol, triglyceride values define a slow downward slope, peaking above the 500 mg/dL threshold.

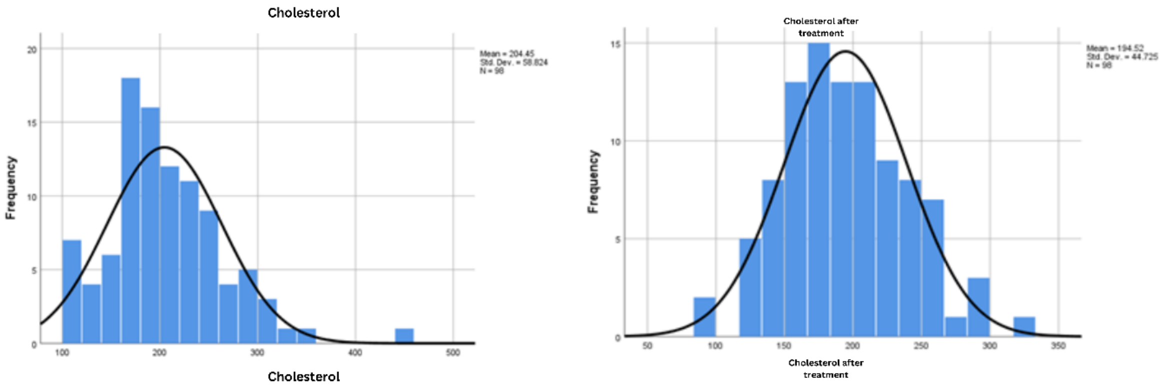

Figure 4 – Comparative histograms of cholesterol values depending on the time of initiation of therapy

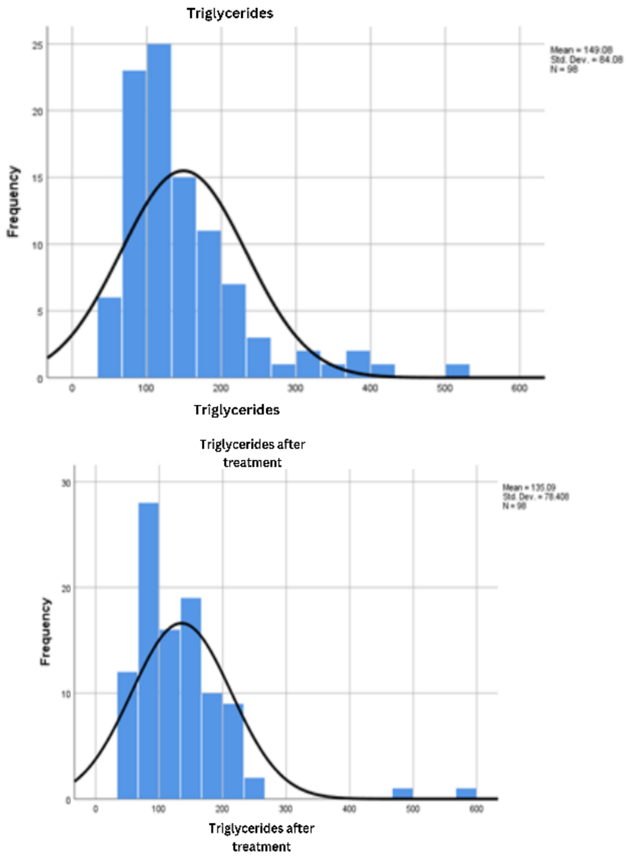

Figure 5 – Comparative histograms of triglyceride values depending on the time of initiation of therapy

In evolution, the following particularities of the results of the existing paraclinical examinations will be defined:

- Cholesterol detected after initiation of treatment is defined as having a mean value of 194.45 mg/dL, respectively a standard deviation of 44.75 mg/dL. This time it will be noted that both the minimum detectable values (85 mg/dL) and the maximum (320 mg/dl) are low, compared to those before the initiation of therapy. The performed histogram defines a distribution that, although it has a normal Gaussian aspect, this time the median of the bell is centered, with the median located around the value of 200 mg/dl, the maximum peak being at the threshold of 180 mg/dl. It is practically noticeable the shift to the left of the distribution values with the increase in the frequency of low cholesterol values.
- Triglycerides after initiation of therapy are characterized by an average value of 135.09 mg/dl, with a standard deviation of 44.72 mg/dl. This time, if the values of this parameter are followed by comparison, it will be observed that the minimum and maximum values are higher compared to those before treatment (of 42 mg/dl and 581 mg/dl, respectively). The histogram corresponding to the distribution of triglyceride values maintains the same range of values as the pre-treatment one, but this time it will be observed, as we mentioned before, the predominance of cases with higher values, compared to those previously detected.

A series of working null hypotheses will thus be issued:

- At the batch level, there is an improvement in the values resulting from the reevaluation of total cholesterol (in response to the therapy that was opted for)
- The initiation of therapy did not have a promising result in the case of paraclinical results of triglycerides, a fact that leads us to issue a suspicion of the risk of subsequent appearance in the patients' evolutions of hypertriglyceridemia.

Another extremely important factor in the analysis of the individual characteristics of the enrolled subjects is defined under the variable called "cardiovascular risk", defined in percentages. It will be noted that at the level of the analyzed group, an average cardiovascular risk value of 26.85% with an associated standard deviation of 7.880% is noted.

Descriptive statistical analysis evaluates the impact of paraclinical data of cholesterol and triglycerides on the risk of cardiovascular disease. It will be noted that at the level of the group, patients with hypercholesterolemia are at risk of developing hypertriglyceridemia later, if they do not already have it at the time of taking into account.

Next, I have attached through the underlying figure, a Matrix Scatterplot suggesting the interdependence relationship existing at the batch level, between three scalar variables: the age of the patients revealed at the time of taking into account, the value of the systolic blood pressure before the initiation of drug therapy, respectively the expressed cardiovascular risk in percentages as could be defined at the time the patient was enrolled in the study group.

Defining fit linescorresponding to each of the three interactions will reveal the existence of directly proportional, positive interdependence relationships. Thus I will present the following conclusions:

- Although the age of the patients do not show a strong relationship of dependence by referring to the TAs values, the existence of a linearity between the two variables can be observed
- Regarding the cardiovascular risk, the discrete deviation to the left side is noticeable, with the predominance of values below the 30% threshold, by placing the median value at 26%. The leptokurtic aspect is given by the values of the Skewness and kurtosis statistical indicators.
- At the same time, the age of the patients is a variable in a direct dependency relationship with the risk of cardiovascular disease: it increases proportionally with the age of the patients. We will thus accept the hypothesis that elderly subjects have a risk of cardiovascular disease of more than 25%

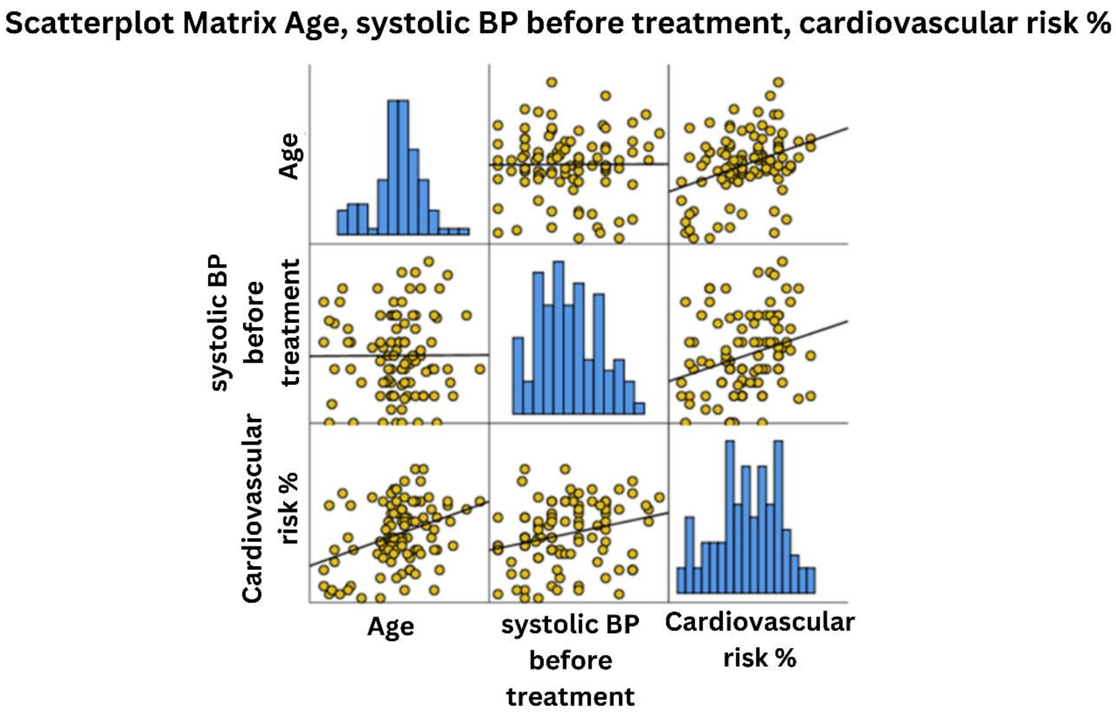

Figure 6 – Matrix scatter plot

Discussions

High blood pressure causes more than 7 million deaths per year. In particular, older adults account for the majority of hypertension-related morbidity and mortality—in large part due to the dramatically higher prevalence among the elderly [Mozaffarian et al., 2015].

Numerous studies have highlighted the fact that the age of onset of hypertension is a hereditary characteristic. Framingham along with Johns Hopkins, in their studies, observed that early hypertension under the age of 55 was associated with more than 3.4 times the risk in offspring. At the same time, the late onset of hypertension in the parents did not have a significant impact on the offspring.

By age, the prevalence of hypertension in 2017-2018 among adults aged 18 years and older was 45.4% and was higher among men (51.0%) than women (39, 7%).

The highest percentage was observed among the age category over 60 years, followed by that between 40-59 years (54.5%), the lowest percentage being registered in the 18-39 years category (22 ,4%). In terms of sex-dependent prevalence, there is a higher percentage among men aged 18-39 and 40-59 years, while in the 60+ category, the percentages are with insignificant differences , respectively 75.2% men and 73.9% women.

An increased risk of cardiovascular and renal diseases was observed in men compared to women of the same age. Using the technique of 24-hour ambulatory blood pressure monitoring, numerous recent studies have shown that men have a higher blood pressure value compared to women of similar ages.

Wiinber and colleagues, in their study of 352 Danish men and women aged 20 to 79 years, found that blood pressure increased with aging in both men and women, but that men had a higher mean sea for 24 hours. Khoury and colleagues performed ambulatory blood pressure monitoring in 131 men and women aged 50 to 60 years, and the results showed that men had higher blood pressure than women. Results were similar in a meta-analysis study by Staessen et al. In addition, the Third National Health and Nutrition Examination Survey (NHANES III) showed that men generally had higher blood pressure than women by middle age.

Conclusions

At the group level, it is noted that the incidence of HTA type pathology was lower among men.The average detected age is 69.44 years, with a standard error from the mean of 11.76 years. Most cases of hypertension were detected in the urban environment. It is important to carry out rigorous anamnesis on patients diagnosed with HTN, although no statistically significant differences were noted in their evolutions, depending on personal pathological antecedents.

Another extremely important element for quantifying the risk of cardiovascular diseases is represented by the BP values before the initiation of drug therapy. Thus, the higher the blood pressure values are at the time of taking the patient into account, the higher the risk of the subsequent occurrence of cardiovascular disease.

For the correct management of elderly patients known to have hypertension, it is important to simultaneously analyze the scalar parameters discussed: their age, especially to pay attention to patients aged between 60 and 90 years; their blood pressure values, to define a risk of cardiovascular disease that exceeds the 25% threshold

Carrying out staged analyzes of cholesterol and triglycerides has prognostic value, regarding the risk of cardiovascular disease

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