The Treatment of Arterial Hypertension

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ABSTRACT: Arterial hypertension is the leading cause of death worldwide and is one of the most important public health problems. Arterial hypertension is a major cardiovascular risk factor with an increasing incidence. In this paper we set out to analyze a group of 3050 patients hospitalized between January 2013 and December 2017 in terms of drug therapy. We found that the majority of patients received drug treatment with a converting-enzyme inhibitor as a monotherapy, and the most common drug association was the association between conversion enzyme inhibitor and calcium channel blocker.

KEYWORDS: Arterial hypertension, medical treatment, mortality

Introduction

Arterial hypertension (AHT) is the leading cause of death worldwide and is one of the most important public health problems. Arterial hypertension is a major cardiovascular risk factor with an increasing incidence [1].

Hypertension is defined by increasing blood pressure (BP) above 140/90mmHg.

The World Health Organization (WHO) [2] defined AHT as a persistent increase in systolic BP values above 140mmHg and/or diastolic≥90mmHg in persons not receiving antihypertensive therapy.

The 2018 ESH -ESC guidelines recommend that the first therapeutic goal should be to reduce values below 140/90mmHg for all patients.

If treatment is well tolerated, values should be lowered to 130/80mmHg or even below for most patients. In most patients below 65 years of age it is recommended to decrease the systolic blood pressure (SBP) in the range 120-129mmHg [3].

The prevalence of AHT increases with age, especially in over 30 years old patients.

The mechanisms involved in the occurrence of over 95% of cases of AHT are multiple. BP is determined by the product between cardiac output and peripheral resistance. AHT can result from the change of either factor. AHT has been called a "silent killer" because it is mostly undiagnosed and untreated, which leads to a silent impairment of blood vessels, heart, brain and kidneys. The BP reduction will lead to a decreased risk of stroke, chronic kidney disease, heart failure, aortic dissection, acute coronary events or even death.

In order to lower the BP we have several methods at hand, which range from changing the lifestyle to antihypertensive medication and even cardiovascular interventions such as renal denervation.

According to the new ESC/ESH guideline of 2018, it is recommended that antihypertensive treatment can be considered even at high normal BP values (130-139/85-89mmHG) if the cardiovascular risk is very high when associated with ischemic heart disease. Except for a few cases of secondary AHT, most cases cannot be cured [4].

The main classes of drugs used in the treatment of AHT are angiotensin II conversion enzyme inhibitors, angiotensin II receptor blockers, beta blockers, calcium channel blockers and diuretics (thiazide and thiazide-like) [5,6].

Antihypertensive treatment can be started with a single drug or using two or three drugs given individually or in fixed dose tablets.

The current guideline recommends initiating antihypertensive treatment with a fixed-dose combination of two drugs that improves the efficiency and speed of BP control.

Aim

Our aim through this paper was to provide quantitative and qualitative data from a group of patients hospitalized that underwent various types of antihypertensive therapy.
Material and Methods

The studied group includes 3050 hypertensive patients admitted to the cardiology department of the Caracal Municipal Hospital between January 2013 and December 2017.

All patients over the age of 18 years were included regardless of gender, origin or AHT class. The value of systolic BP upon admission was considered as a reference value. The patients' consent was obtained for data processing, after obtaining the approval of the ethics commission from Caracal Municipal Hospital in order to process the data for scientific purposes.

Hypertensive patients received as antihypertensive treatment—mainly angiotensin converting enzyme inhibitors, followed by the association between angiotensin converting enzyme (ACE) inhibitors and calcium channel blockers. Some received sartans, Ca-blockers and beta-blocker as monotherapy (Figure 1).

We prospectively collected data from the observation sheets and entered it into Microsoft Excel files for statistical analysis, in order to document any relationship between the clinical and paraclinical data of the patients.

To characterize the numerical data we used the common statistical indicators: the arithmetic mean and the standard deviation, as well as the scattering indicators—minimum, maximum, median and quartiles.

If the analysed data had a Gaussian distribution we compared the average values by using Student’s t-test.

We recalled at six months intervals a subgroup of patients admitted between January and December 2017 for blood pressure measurement, in order to demonstrate if a certain class of antihypertensive medication can maintain lower BPs over a timeframe. We used the Chi square test to evaluate the difference in means.

Figure 1. Distribution of patients according to drug therapy.
Results

Most of the 3050 patients admitted to the Caracal Municipal Hospital received IEC (26.75%). The most commonly used drug combination in our group was between IEC and Ca-blocker (15.34%). Ca-blockers were administered alone in 385 patients (12.62%). Sartans were administered alone in 121 patients (3.96%). Beta-blocking medication was used alone in 205 patients (6.72%).

The mean age of patients receiving ACE inhibitors was lower than that of patients without this medication, with a highly significant difference ($p=0.00000028<0.001$) (Figure 2).

In our group, we demonstrated using the Student's t-test, that there is a highly significant difference between the mean systolic blood pressure of those who received IEC treatment, respectively, those in the group who did not receive ACE inhibitors ($p=0.000009<0.001$) (Figure 3).

By conducting the Student's t-test, we identified a highly significant difference between the systolic blood pressure of those who received Ca-blockers, respectively those who did not receive, with those in the group who received Ca-blockers having a mean blood pressure higher than the others ($p=1.39 \times 10^{-35} <0.001$) (Figure 4).

We found no significant difference between the average ages of those who received treatment with Ca-blockers, compared to those who received other medications ($p=0.074>0.05$) (Figure 5).

We found that the average ages of those who received treatment with sartans were higher than the others ($p=0.031<0.05$) (Figure 6).

By using the Student's t-test, we proved that those who received sartans had higher mean systolic blood pressure compared to those who did not receive this treatment ($p=0.000017<0.001$) (Figure 7).
In the group of 3050 patients we showed that there was no significant difference between the average ages of those who received treatment with beta-blockers, and those who did not receive, respectively (p=0.896>0.05) (Figure 8).

However, we identified a highly significant lower systolic blood pressure in those who received beta-blockers compared to those who did not receive this treatment (p=3.45x10^{-17}<0.001) (Figure 9).

We monitored a subgroup of 587 patients admitted between January and December 2017, recalling them at six months intervals for blood pressure measurement.

We identified a significantly higher percentage of cases of lowering BP in patients who had Ca-blockers prescribed compared to those who did not, with the result of the Chi square test being p=0.007<0.05 (Figure 10).

Although the percentage of those with low BP was higher among those who have undergone treatment with sartans too, the difference was not statistically significant (Chi square test p=0.475>0.05) (Figure 11).
Discussions

Arterial Hypertension is a chronic condition defined as blood pressure above normal (120-139/80-89 mm Hg). According to the latest studies, AHT is an important public health problem affecting over one billion people, and by 2025 an estimate shows that AHT will affect 1.5 billion [7,8].

In addition to changing the lifestyle, the vast majority of hypertensive patients also need drug therapy to reach the therapeutic targets of blood pressure.

Blood pressure will decrease by a value that depends on several factors: age, presence of comorbidities and tolerability of treatment.

Angiotensin converting enzyme (ACE) inhibitors [9,10] but also angiotensin II receptor blockers belong to a class of drugs called and known as renin-angiotensin-aldosterone system inhibitors [11-13].

Aldosterone receptor antagonists and renin inhibitors also belong to this class. Calcium channel blockers block the entry of calcium ions into the cells. At the myocardial level, calcium
ions generate impulses in the nodal tissue and drive these impulses to the myocardium [16-18].

Excitation and contraction of the myocardium occur with the involvement of calcium ions [19,20].

Due to the different chemical structure and the different way of binding to the calcium channel, these drugs are divided into two classes: dihydropyridines (nifedipine) with high vascular selectivity and non-dihydropyridines (diltiazem and verapamil) with anti-arrhythmic properties due to high nodal tissue selectivity [21-23].

Medication with beta-adrenergic receptor blockers is often used in cardiovascular pathology: angina pectoris, arterial hypertension, arrhythmias, heart failure, aortic dissection, CMHO, mitral valve prolapse, because catecholamines have an important role in the physiology of the cardiovascular system [24-36].

The studied group includes 3050 hypertensive patients admitted to the cardiology section of the Caracal Municipal Hospital between 2013 and 2017.

By analyzing the group from the viewpoint of the administered drug therapy, we found that the majority of patients received treatment with angiotensin converting enzyme inhibitors and from the viewpoint of the drug associations, the most frequent association was between the conversion enzyme inhibitors and the calcium channel blockers.

A peculiarity of our group is that the age of the patients who received inhibitors of the conversion enzyme is lower than that of the patients who did not receive this medication, which is a highly significant difference according to the Student’s t-test.

Regarding the administration of calcium blockers, we did not find a highly significant difference between the ages of the patients who received, and those who did not receive this therapy, respectively.

According to the data from the literature and in our group the age of the patients who received medication with calcium channel blockers was higher compared to the age of the patients with IEC.

Comparing the average values of the BP with the administration of the drug therapy, we found that there are highly significant differences in the group that received IEC treatment, calcium blocker or sartans as a result of the Student’s t-test.

Conclusions
Arterial hypertension is the most common diagnosis in patients on the lists of family doctors and represents the condition with the highest prescription of medication.

Most cases of arterial hypertension cannot be cured. In our group, administration of ACE inhibitors and Ca-blockers resulted in higher mean BP values compared to other medications.

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Conflict of interests
None to declare.

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