

Characterization of beta blocker consumption in a pharmacy of an urban area

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Acronyms

ACEI: angiotensin converting enzyme inhibitor

BB: beta blockers

BP: blood pressure

HT: hypertension

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ABSTRACT

Introduction: Hypertension has a high prevalence as the cause of frequent consultation. This disease is the main risk factor for cerebrovascular disease and beta blockers are a mainstay of its treatment.

Objective: To characterize the use of these drugs in the hypertensive population of a pharmacy in an urban area.

Method: A descriptive cross-sectional study was carried out at Pharmacy 6.76, in Santa Clara, Villa Clara, Cuba, from October to December 2013.

Results: The main results showed a predominance of beta blocker consumption in women (53.4%), in the age group of 50-64 years (48.9%), and the most commonly used drug was atenolol (93.2%). Its predominant daily dose was 1 tablet (68.3%); and 2 tablets of propranolol (50.0%). The most commonly associated drugs were diuretics and angiotensin-converting enzyme inhibitors.

Conclusions: Atenolol was the most commonly used beta blocker in this research, and it was often associated with diuretics and angiotensin-converting enzyme inhibitors. There was a predominance of female patients, aged 50-64 years and stage 2 hypertension.

Key words: Beta blockers, Dose, Antihypertensive drugs, Drug interactions

Caracterización del consumo de betabloqueadores en una farmacia de un área urbana

RESUMEN

Introducción: La hipertensión arterial presenta una alta prevalencia como motivo de consulta frecuente. Esta enfermedad es el principal factor de riesgo de enfermedad cerebrovascular y los betabloqueadores constituyen uno de los pilares de su tratamiento.

Objetivo: Caracterizar el uso de estos fármacos en la población hipertensa de una farmacia de un área urbana.

Método: Se realizó una investigación descriptiva de corte transversal, en la Farmacia 6.76 de Santa Clara en Villa Clara, Cuba, durante los meses de octubre a diciembre de 2013.

Resultados: Los principales resultados mostraron un predominio del consumo de betabloqueadores en las mujeres (53,4 %), en las edades entre 50-64 años (48,9 %), y el fármaco más utilizado fue el atenolol (93,2 %). Su dosis predominante fue de 1 tableta diaria (68,3 %), de propranolol, 2 (50,0 %); y los fármacos más asociados fueron los diuréticos e inhibidores de la enzima convertidora de angiotensina.

Conclusiones: El atenolol fue el BB más utilizado en esta investigación y se asoció frecuentemente a diuréticos e IECA. Predominaron los pacientes del sexo femenino, con edades entre 50-64 años y HTA grado 2.

Palabras clave: Betabloqueadores, Dosis, Fármacos hipotensores, Asociaciones farmacológicas

INTRODUCTION

Hypertension (HT) is one of the most important health-care problems of contemporary medicine in developed countries and in Cuba. Its control is the cornerstone on which it is necessary to work to reduce morbidity and mortality from coronary, cerebrovascular and renal diseases. It is defined as the sustained presence of a diastolic blood pressure (BP) equal or higher than 90 mmHg, and a systolic BP equal or higher 140 mmHg, and constitute a global health problem. An adequate control of BP and risk factors is a must, as well as reversing target organ damage¹.

It is estimated that nearly one billion people suffer from it in the world, and 50 million in the United States. Beta blockers (BB) have remained one of the most commonly prescribed drugs in our country, as four of them are among the fifty most commonly used medications²⁻⁴.

In Cuba, the prevalence of HT is close to 30% in the urban population, and 15% in rural areas. The way of dealing with this problem differs from one nation to another, but in general, it is necessary to select and evaluate the treatment options that could provide maximum health and social benefit at a relatively low cost¹⁻³.

Specific treatment with antihypertensive drugs is indicated when changes in the lifestyle of the hypertensive patient do not reduce BP to normal values⁴.

Beta-adrenergic blocking agents are one of the groups of drugs that have proven to achieve the purpose of lowering BP. And it is a group of drugs on which extensive clinical experience exists. Therefore, they have shown to reduce BP in different meta-

analysis and clinical trials, though their effect on morbidity and long-term mortality in certain population groups is still being investigated^{5,6}.

The Scottish physician and pharmacologist James W. Black developed propranolol in the 1960s. The invention of propranolol was hailed as the greatest advance in the fight against heart disease since the discovery of the properties of the *Digitalis purpurea*, in the 18th century^{5,7}. In a short time, and for a decade, it became the best-selling drug in the world^{8,9}. Atenolol was introduced in 1976; it was developed as a replacement for propranolol in the treatment of HT. At present, there are over twenty BB for use in different clinical situations¹.

These drugs are classified as blockers of β_1 and β_2 receptors (non-selective blockers) and β_1 receptor blockers (cardioselective). BB block the action of endogenous catecholamines adrenaline and noradrenaline, particularly on β -adrenergic receptors. The β_1 receptors are located mainly in the heart and kidneys; β_2 receptors are located in the lungs, gastrointestinal tract, liver, uterus and vascular smooth muscle and cardiac muscle^{1,2,10}.

The BB have a very wide use in therapeutics. Their effect is slow, and takes a few days to appear. Several mechanisms are involved in their pharmacological action; they reduced minute volume, cardiac output, peripheral vascular resistance—related to their chronic administration—and the central sympathetic tone, and also have a role in inhibiting renin secretion. Propranolol has many side effects that reflect the block of β_1 and β_2 receptors, but these occur less frequently with β_1 selective agents¹¹⁻¹⁶.

The BB are part of the national and international

therapy used in hypertensive patients. For this reason, this study was conducted with the aim of characterizing the use of BB in the population belonging to Pharmacy 6.76 in Santa Clara.

METHOD

Type of study

A descriptive cross sectional study and on the use of BB in patients belonging to the Pharmacy 6.76, in the city of Santa Clara, was conducted from October to December 2013.

Universe

The prescriptions for 88 adult patients who met the following criteria were studied.

Inclusion and exclusion criteria

All users of BB, in the above mentioned period, were included, except for children under 18 years.

Drugs

The pharmacy dispenses atenolol, 100 mg, and propranolol, 40 mg.

Techniques and procedures

- Data collection: Medical certificates of patients were used as a secondary source of information.
- Analysis and procedures: With the information collected, a database was formed in Excel, which was then processed using the Statistical Package for Social Sciences (SPSS) version 15.

RESULTS

The distribution of patients by age and sex (**Table 1**) shows that patients aged 50-64 years (48.9%) were predominant, as well as female patients (53.4%). The Mann-Whitney test showed

no significant differences in mean age ranges between the sexes ($p = 0.355$).

Table 2 shows the distribution of patients according to treatment with BB and the stage of HT. There was a predominance of patients with stage 2 hypertension (83%) and atenolol treatment (93.2%). Also, in the patients treated with atenolol and propranolol (the only BB dispensed in this pharmacy), stage 2 hypertension predominated, which corresponds to 82.9% and 83.3%, respectively. There was no association between the variables ($p = 0.317$).

Table 3 shows the distribution of patients by treatment with BB and dosage. In those using atenolol, there was predominance of 1 tablet daily (68.3%), and among those treated with propranolol, the most frequently used dose was 2 tablets per day (50%). Significant differences in the mean dose between BB was observed ($p = 0.00$).

Table 1. Distribution of patients by sex and age. Pharmacy 6.76, Santa Clara, Villa Clara. October-December 2013.

Age group	Sex				Total	
	Female		Male		Nº	%
	Nº	%	Nº	%		
20 – 34	7	14.9	0	0	7	8
35 – 49	9	19.1	9	22	18	20.5
50 – 64	19	40.4	24	58.5	43	48.9
65 and over	12	25.5	8	19.5	20	22.7
Total	47	53.4	41	46.6	88	100

Monte Carlo significance for the Mann-Whitney test of the age difference between the sexes = 0.355

Source: Medical certificates.

Table 2. Distribution of patients by treatment with BB and stages of hypertension.

Stage of HT	Beta blocker				Total	
	Atenolol		Propranolol		Nº	%
	Nº	%	Nº	%		
1	10	12.2	0	-	10	11.4
2	68	82.9	5	83.3	73	83
3	4	4.9	1	16.7	5	5.7
Total	82	93.2	6	6.8	88	100

Monte Carlo significance for the chi square test = 0.317

Table 3. Distribution of patients by treatment with BB and dose.

Dose (Tablet/day)	Beta blocker				Total	
	Atenolol		Propranolol		Nº	%
	Nº	%	Nº	%		
0,5	23	28	0	0	23	26.1
1	56	68.3	1	16.7	57	64.8
2	2	2.4	3	50,0	5	5.7
3	1	1.2	2	33.3	3	3.4
Total	82	93.2	6	6.8	88	100

Significance of Monte Carlo for the Mann-Whitney test of the difference in dose between BB = 0.00

Table 4. Distribution of patients by treatment with BB and diuretics.

Diuretics	Beta blocker				Total	
	Atenolol		Propranolol		Nº	%
	Nº	%	Nº	%		
Hydrochlorothiazide	22	51.2	0	-	22	48.9
Chlorthalidone	20	46.5	2	100	22	48.9
Spironolactone	1	2.3	0	-	1	2.2
Total	43	95.6	2	4.4	45	100

Monte Carlo significance for the chi square test = 0.334.

The analysis of the association of BB and diuretic treatment (**Table 4**) shows that only 45 hypertensive patients (51.1%) treated with BB also used diuretics. Of these, the majority (95.6%) used atenolol and, in equal proportion, hydrochlorothiazide and chlorthalidone, both with 48.9%, respectively. No statistical associations between variables were found ($p=0.334$).

Table 5 shows the 13 patients (14.8%) treated with BB and angiotensin converting enzyme inhibitor (ACEI). It shows that the enalapril (61.5%) and atenolol

Table 5. Distribution of patients with BB and ACE inhibitors.

ACEI	Beta blocker				Total	
	Atenolol		Propranolol		Nº	%
	Nº	%	Nº	%		
Captopril	5	41.7	0	0	5	38.5
Enalapril	7	58.3	1	100	8	61.5
Total	12	92.3	1	7.7	13	100

Fisher test significance = 0.060.

(92.3 %) were the most commonly used, without statistically significant association ($p = 0.060$).

DISCUSSION

Hypertension is a global problem and demands appropriate responses. The narrow limits of the doctor-patient binomial must be surpassed and include much more, such as family environment and society as a whole^{1,2,12}. The predominance BB consumption in patients aged 50-64 years and stage 2 hypertension is consistent with the literature reviewed^{6,9,13-16}.

In a study on the characterization of unclassified hypertensive patients, presenting to an emergency department, it was found that 52.6% of them had stage 2 hypertension¹⁷. While in the municipality of Villalba in Venezuela, there was a predominance of stage 1 hypertensive patients, which accounted for 70.42% of cases¹⁴.

An important aspect is the difference in classifications of HT. In the literature reviewed, this disease is classified in adults aged 18 and over as normal BP, prehypertension, stage 1 and 2 hypertension; with its corresponding values of BP^{2,12}. In some texts, stage 1 and 2 remain, but stage 3 or severe hypertension is added with its corresponding values of BP^{2,4,16}. These differences must be cleared for better classification, diagnosis and medical registration of patients, since their treatment depends on this. It is also necessary to point to the fact that medical certificates show differences in classifications, which makes difficult the medical classification of patients in the health area. For a proper individualized treatment, it is important a good diagnosis and medical classification of patients; as this is the foundation of therapeutics.

The prevalence of atenolol as BB can be justified due to the selective action of this drug on β_1 receptors, which is associated with fewer adverse reactions. The prevalence of a daily dose of one tablet should be monitored, because the antihypertensive effect may diminish towards the end of the dosing interval. Blood pressure should be measured immediately to determine if the control is satisfactory². Therefore, an increase in the dose

or its frequency may be necessary¹³. The predominance of two daily tablets of propranolol and the required treatment dosage do not agree with the literature reviewed^{3,13,17}, where the recommended dose is three tablets.

The use of diuretics as part of the antihypertensive treatment agrees with several of the texts reviewed, but could be used in a larger number of patients; because these are drugs of choice to initiate the treatment of HT in most patients, due to their effectiveness and low cost; also they are recommended as initial monotherapy or with other first-line antihypertensive drugs. In multiple clinical trials, the combination of diuretics with BB has been virtually unbeatable in preventing the cerebrovascular complications of HT^{1-5,13,17}, and the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommended them as first-line treatment drugs^{2,8}.

The prevalence of enalapril consumption, compared to captopril, associated with BB, is similar to that found in a similar study conducted in the western part of Habana¹⁷. This situation has been assessed in multiple studies. It is recognized that enalapril is a good therapeutic option, as monotherapy or in combination with other drugs, specifically with diuretics^{1,2,3,9,17}. It is noteworthy that the text of Clinical Pharmacology suggests that ACE inhibitors and BB, when combined, seem to effectively prevent the progression of kidney damage in hypertensive patients^{1,2,3,9,17}.

About a quarter of the adult population suffers from HT. The emergence of new drugs and new combinations in a single tablet has displaced the BB from the first-line treatment; however, they retain their great value, especially when the treatment is individualized and patients are suitably selected.

CONCLUSIONS

Atenolol was the most commonly used BB in this research, and it was often associated with diuretics and ACE inhibitors. There was a predominance of female patients, aged 50-64 years and stage 2 hypertension.

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