

MARKETING RESEARCH ON THE ANGIOTENSIN-CONVERTING ENZYME INHIBITORS ANTIHYPERTENSIVE MEDICINES

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Abstract

Background and aims. The research aimed at investigating sales trends of angiotensin-converting enzyme inhibitors antihypertensive medicines, both in terms of quantity and value, in ten community pharmacies, for a period of three years. The research on the antihypertensive medicines consumption is important for highlighting the ever increasing impact of hypertension among the population.

Methods. The methods used in this research were the following: marketing research, method of sampling, descriptive methods, retrospective analysis, method of comparison.

Results. The results showed that the drugs containing the active substances of the angiotensin converting enzyme inhibitors class had had significant increases in quantitative and value sales, bringing substantial revenues to pharmacies. From the quantitative perspective, the best-selling products were those containing Enalaprilum, while in terms of value, the best-selling medicines were those containing Perindoprilum. We evidenced that spectacular sales were also achieved for products that have Lisinoprilum, respectively Captoprilum, as active substances. The largest quantities were marketed for the Captopril Terapia® product and the highest earnings were recorded for the Prestarium® medicine.

Conclusion. This paper approaches an interesting and topical issue, which can be helpful to professionals (pharmacists, doctors) and other categories, such as economists, statisticians, representatives of companies manufacturing medicines, as well as to hypertensive patients, as it could be used to warn population regarding the incidence of cardiovascular diseases, and, at the same time, trace sales trends in order to accomplish profitable business plans.

Keywords: antihypertensive medicines, angiotensin-converting enzyme inhibitors, marketing research, community pharmacies

Background and aims

Arterial hypertension (HTN) is a medical condition, widespread in Romania, as well as worldwide. This disorder holds one of the first places in the top of diseases which affect the Romanian population. According to a Study

of Prevalence of Hypertension and Cardiovascular Risk Assessment in Romania (SEPHAR), 4 out of 10 Romanians suffer from hypertension, Romania being considered a country with a high total cardiovascular risk [1-3].

Antihypertensive medicines decrease the blood pressure values, increased in case of hypertension, to the physiological ones. Angiotensin-converting enzyme inhibitors (ACE inhibitors) are substances that interfere

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with the renin-angiotensin system [4], being efficacious antihypertensive agents, and reducing blood pressure for 37-75% of the patients when used as a single medication, and for more than 90% of the patients when used in conjunction with diuretics [5]. Specific inhibitors of ACE (= angiotensin I converting enzyme to the vasoconstrictor angiotensin II) are presented as:

- active forms as such: Captopril, Lisinopril;
- pro-drugs (esters): e.g. Enalapril, Perindopril, Ramipril, Quinapril, Benazepril, Fosinopril, Trandolapril [4,5].

The objectives of this research have been the following: analyzing and presenting the sales related to the ACE inhibitors class antihypertensives in the community pharmacies in Cluj-Napoca; conducting rankings of the best selling medicines belonging to this class, both in terms of quantity and value, based on their active substances, by common international names (INNs), as well as based on their trade names; highlighting the ever increasing impact of hypertension among the population.

Materials and methods

The research was conducted by analyzing the sales of medicinal products that exclusively contain active substances of the angiotensin converting enzyme inhibitors class, approved by the National Agency for Medicines and Medical Devices (ANMDM) and included in the Index of medicinal products for human use [6], during three years, between 01.01.2009 and 31.12.2011.

The data were obtained from 10 community pharmacies in Cluj-Napoca, which, at the time of the research, represented 6.8% of all the pharmacies in the city. The "Pharmec" management software programs belonging to the studied pharmacies were used. The data collected from the pharmacies were processed using Microsoft Office Excel.

The methods employed in this research were the following: marketing research, method of sampling, descriptive methods, retrospective analysis, method of comparison.

The marketing research refers to collecting, recording, analyzing and systematically interpreting the data, which may help decision-makers involved in the marketing field of goods, services or ideas [7].

In order to achieve a representative selection from all pharmacies in Cluj-Napoca, *a method of sampling* based on some statistical algorithms of random stratified sampling was used [8-15], taking into account the following criteria of stratification: the location of the pharmacies (data were collected from pharmacies located in different areas of the city); the working hours of the pharmacies (among the selected pharmacies, some operate on two shifts per day, having their working hours from 8 a.m. to 22 p.m., others have a 24/7 schedule; the pharmacies affiliation (thus, from all the selected pharmacies, a number of five belong to

pharmacy chains, and the other five are individual).

The retrospective analysis is a method aimed at a particular time frame, which will be further split into several different periods of time [16].

Results

Analysis of the ACE inhibitors quantitative sales (based on the active substance)

Figure 1 shows a synthesis of the results obtained by analyzing the quantitative sales of ACE inhibitors medicines, taking into account the comprised active substances (common international name - INN), in the 10 community pharmacies in Cluj-Napoca, analyzed during the three years, between January 1st 2009 and December 31st 2011.

Below are the results obtained for each of the three years considered in the study - 2009, 2010 and 2011 – regarding the quantitative sales of the ACE inhibitors (INNs) in all 10 analyzed pharmacies.

For 2009, a clear dominance of the products that contain Enalaprilum was noted, followed by those containing Captoprilum, then the ones with Perindoprilum.

For 2010, pharmaceutical formulations containing Enalaprilum were still the most requested in the pharmacies, but there was a similarity between the Captoprilum and Lisinoprilum products.

For 2011, it was observed that formulations containing Enalaprilum as an active substance were still the most requested, but the Lisinoprilum products had had a growing demand, having the most spectacular progress compared to all other substances throughout the study.

Analysis of ACE inhibitors sales, in terms of value (based on the active substance)

Figure 3 shows a synthesis of the results obtained by analyzing the *value* of the sales of ACE inhibitors medicines, taking into account the comprised active substances (INNs), in the 10 community pharmacies in Cluj-Napoca analyzed during the three years (2009, 2010 and 2011).

Further, the sales results obtained for each of the three years of study (2009, 2010 and 2011) are presented, in terms of value, for the products containing active substances of the ACE inhibitors class, in all 10 pharmacies analyzed.

In 2009, the best-selling products, in terms of value, were those containing Perindoprilum, followed by those containing Lisinoprilum.

In 2010, the same dominance of the Perindopril products can be seen, as well as an increase in sales of the products containing Lisinoprilum, but also of those containing Enalaprilum.

In 2011, the Perindoprilum formulations remain bestsellers, followed by those containing Lisinoprilum.

Sales analysis based on the products marketed in pharmacies (by trade names)

The results obtained from the analysis of quantitative

and value sales of the ACE inhibitors products marketed in the analyzed pharmacies, are summarized in Table I.

Table I displays the pharmaceutical products containing ACE inhibitors marketed in the analyzed community pharmacies, arranged according to the quantitative sales volume (in units = number of packs

marketed) and the value sales volume (expressed in Romanian New Lei: RON), in ascending order; therefore, the least sold products are on top of the table and the products that led to the highest sales are at the bottom of the table.

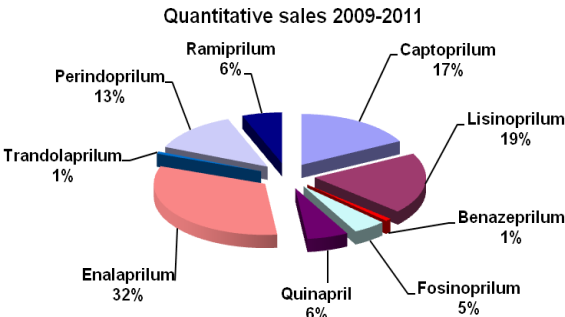


Figure 1. ACE inhibitors quantitative sales proportions.

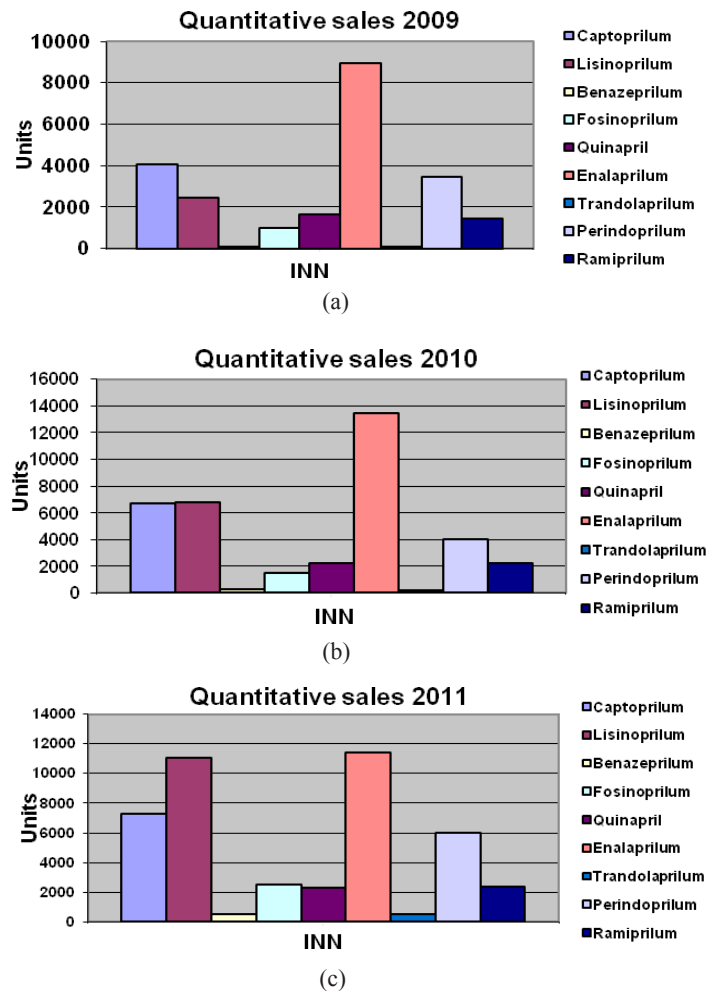


Figure 2. ACE inhibitors quantitative sales in 2009 (a), 2010 (b), 2011 (c).

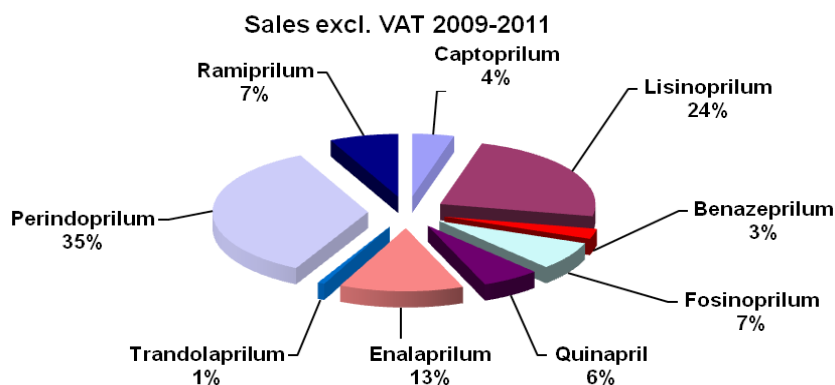


Figure 3. Proportions of ACE inhibitors sales, in terms of value.

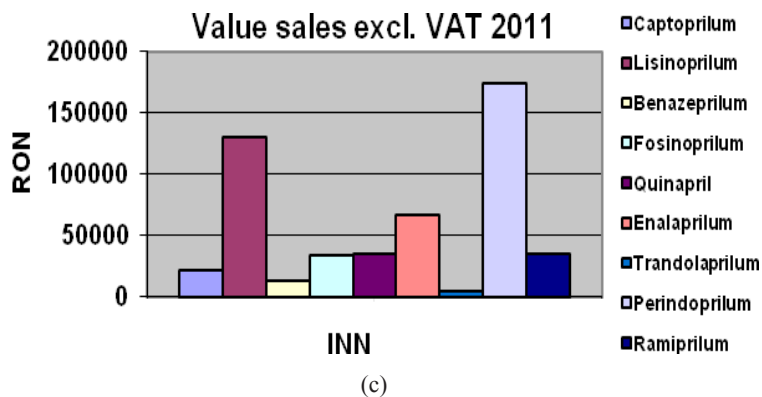
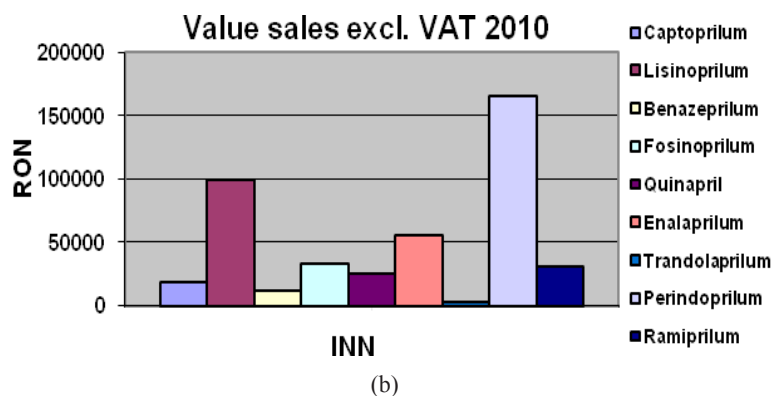
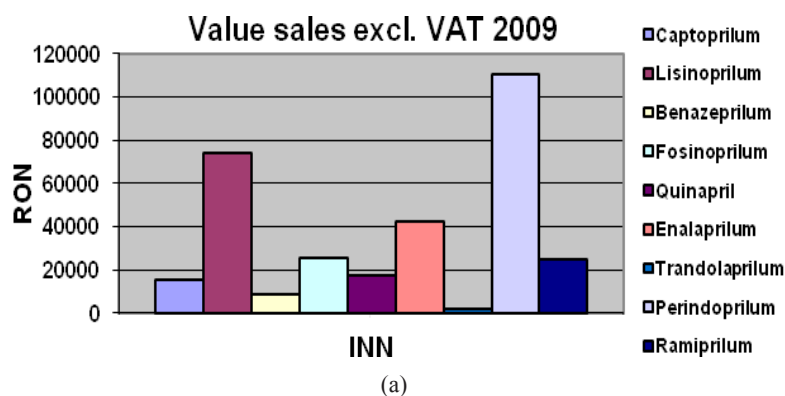


Figure 4. ACE inhibitors sales value (excluding VAT) in 2009 (a), 2010 (b), 2011 (c).

Table I. ACE inhibitors medicines sales volume between 2009 and 2011.

Medicine (mg)	Quantity (Units)	Medicine (mg)	Amount (RON)
Enalapril LARO 5	32.15	Enalapril LARO 5	110.82
Lisinopril Actavis 5, 10, 20	102.11	Lisinopril Actavis 5, 10, 20	1,570.11
Lisinopril Sandoz 10, 20	332.66	Lisinopril Sandoz 10, 20	3,948.88
Zenra 2,5, 5, 10	357.75	Zenra 2,5, 5, 10	4,135.89
Gopten 0,5, 2,4	472	Enalapril Aliud Pharma 10, 20	5,911.66
Ampril 5, 10	620.77	Gopten 0,5, 2,4	9,259.05
Enalapril Aliud Pharma 10, 20	660.19	Ampril 5, 10	11,698.9
Cibacen 5, 10, 20	898.35	Vivace 2,5, 5, 10	19,956.61
Vivace 2,5, 5, 10	1,584.74	Fosypril 10, 20 Terapia	28,597.71
Fosypril 10, 20 Terapia	1,838.8	Cibacen 5, 10, 20	34,488.45
Perindopril Teva 4, 8	1,968.02	Enalapril Terapia 5, 10, 20	36,621.93
Tonolysin 2,5, 5, 10, 20	2,519.32	Lisinopril Atb 10, 20	38,557.51
Monopril 10, 20	2,774.71	Tonolysin 2,5, 5, 10, 20	45,242.79
Tritace 2,5, 5, 10	2,823.05	Captopril Terapia 25, 50	54,919.6
Lisinopril Atb 10, 20	2,935.92	Enap 5, 10, 20	54,965.95
Enalapril Terapia 5, 10, 20	5,314.27	Tritace 2,5, 5, 10	55,830.01
Accupro 5, 10, 20	6,362.46	Monopril 10, 20	66,896.04
Prestarium 5, 10	11,464.12	Enalapril 5, 10, 20 LBM	67,245.35
Enap 5, 10, 20	11,739.58	Accupro 5, 10, 20	78,252.56
Ranolip 5, 10, 20	13,682.31	Perindopril Teva 4, 8	95,873.59
Enalapril 5, 10, 20 LBM	15,249.47	Ranolip 5, 10, 20	214,271.85
Captopril Terapia 25, 50	17,088.17	Prestarium 5, 10	353,742.7
Total	100,820.92	Total	1,282,097.96

Discussion

Analysis of the ACE inhibitors quantitative sales (based on the active substance)

From a quantitative perspective, Figure 1 illustrates that the best sold substance belonging to the class of angiotensin-converting enzyme inhibitors, during the three years of study, has been Enalaprilum, with 33,853.72 units (packs, boxes of that product) sold, which represents 32% of the total quantity released in the 10 pharmacies analysed. After analysing the results, it was found that, from the point of view of the marketed quantity, the two following substances in that class, were Lisinoprilum (20,245.9 units, representing 19% of the total) and Captoprilum (18,070.8 units, with a percentage of 17). From the point of view of the total marketed quantity, the Enalaprilum, Captoprilum, and Lisinoprilum products respectively, sum up 72,170.56 units.

The outcomes can be explained by the fact that the three substances are more affordable, being manufactured in Romania by companies such as Terapia-Ranbaxy, Antibiotice Iași or Labormed Pharma. Thus, other extra amounts, such as the import taxes or other possible commercial additions, are no longer paid. The substances

whose production methods are quicker and less expensive record greater quantities sold, because many patients want to receive products as quickly and as inexpensive as possible.

The lowest values were registered by Trandolaprilum, Benazeprilum and Fosinoprilum, with a total of 6,685.43 units issued, equivalent to 7% of the total sales.

During the three years of study, in terms of quantitative sales (see figure 2), the permanent dominance of products that contain Enalaprilum as an active substance has been observed, as well as the spectacular evolution of the products containing Lisinoprilum.

It has been noted that pharmaceutical formulations containing Lisinoprilum and Captoprilum have been counted among the best selling products; this could be explained by the fact that these substances have a low acquisition price and their process of synthesis is not very expensive, as they are active forms as such.

It should be noted that, from year to year, the quantities released from pharmacies regarding substances belonging to the class of angiotensin-converting enzyme inhibitors have been continuously increasing; this may have been due to the increasing number of patients diagnosed

with hypertension.

Analysis of ACE inhibitors sales, in terms of value (based on the active substance)

Figure 3 illustrates that Perindoprilum is the substance that brought the highest incomes to the studied pharmacies, during the three years of analysis. Products containing that substance have accumulated sales of 450,081.2 RON, which represents 35% of the total sales of products containing ACE inhibitors, in the 10 pharmacies analysed. According to the revenues, the two following substances are formulations containing Lisinoprilum (303,591 RON, equivalent to 24% of the total receipts) and Enalaprilum (164,878.2 RON, representing 13% of the total revenue of 1,282,097.96 RON). Those first three substances have brought to pharmacies, throughout the study, total receipts of 918,550.4 RON, equivalent to 71.85% of the total sales.

In terms of value, the lowest sales have been recorded for substances such as Trandolaprilum (9,259.06 RON - 1% of the total amount), Benazeprilum (33,598.52 RON - 3% of the total sum) and Captoprilum (55,616.06 RON - 4% of the pharmacies' total revenue, which amounts to 1,282,097.96 RON).

Throughout the three years analyzed (see figure 4), Perindoprilum has been the bestselling substance, bringing the highest grossing to the pharmacies, followed by Lisinoprilum, whose quantitative sales have also experienced significant progress. The rest of the substances have had a less pronounced growth, but it should be noted that although these increases are not as prominent, they exist, however, which may highlight the fact that hypertension is more common in Romania. In 2011, compared to 2010, sales did not increase as much as in 2009-2010. The economic crisis could have been the main determinant that has negatively affected sales [17].

Sales analysis based on the products marketed in pharmacies (by trade names)

By interpreting the quantitative results shown in Table I, it is noted that the medicinal product Captopril® (25 mg, 50 mg) produced by Terapia-Ranbaxy has had the highest sales (17,088.17 units issued), representing 16.94% of the total sales. This great value may be explained by the fact that this drug is manufactured in Cluj-Napoca, and the acquisition costs to pharmacies in Cluj-Napoca are lower than if they had been produced in other counties. Other elevated levels of sales have been recorded by Enalapril LBM® (5 mg, 10 mg, 20 mg) with 15,249.47 marketed units, and Ranolip® (5 mg, 10 mg, 20 mg) with 13,682.31 units. These first three medicines have led to 45.64% of the total quantitative sales.

Moreover, Table I shows small quantities marketed for: Enalapril LARO® (5 mg) with 32.15 marketed units, Lisinopril Actavis® (5 mg, 10 mg, 20 mg) with 102.11 marketed units, and Lisinopril Sandoz® (10 mg, 20 mg) with 332.66 marketed units.

The best-selling pharmaceutical product belonging to the class of angiotensin-converting enzyme inhibitors has been Prestarium® (5 mg, 10 mg), with a value of 353,742.7 RON, followed by Ranolip® (5 mg, 10 mg, 20 mg), with 214,271.85 RON value receipts brought to pharmacies. The following medicaments which have brought great revenues to pharmacies are: Perindopril Teva® (4 mg, 8 mg), Accupro® (5 mg, 10 mg, 20 mg) and Enalapril LBM® (5 mg, 10 mg, 20 mg). These products have led to the revenues amounting to 809,386.05 RON, which represents 63.12% of the total earnings.

The lowest values for the sales have been registered by products such as Enalapril LARO® (5 mg), with receipts amounting to 110.82 RON; however, this product has been issued only in four out of ten pharmacies participating in the study. The next products which have had low sales values are: Lisinopril Actavis® (5 mg, 10 mg, 20 mg) with a total of 1,570.11 RON, and Lisinopril Sandoz® (10 mg, 20 mg) with a total value of 3,948.88 RON.

Conclusions

The research results have indicated that the sales of medicines containing angiotensin-converting enzyme inhibitors have had spectacular growths from 2009 to 2011.

From the point of view of the active substances (INNs), Enalaprilum has been a sales leader as far as quantity is concerned, but Perindoprilum has been ranked first as far as value is concerned, based on the amounts brought to the pharmacies.

Among the drugs containing ACE inhibitors, the quantitative best-selling product has been Captopril Terapia®. The medicine that has brought the highest incomes to the pharmacies is Prestarium®, with a total of 353,742.7 RON, which represents 28% of the total revenue from the sales of ACE inhibitors in pharmacies, during the three years of study.

The present research may prove helpful to warn the population of the incidence of cardiovascular diseases, as well as to trace the sales evolution with the aim of achieving profitable business plans.

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