

MARKET ANALYSIS OF ANGIOTENSIN CONVERTING ENZYME (ACE) INHIBITORS

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Pharmaceutical Management

by

Meghna Raj

Under the Supervision and Guidance of

Mr. Puneet Gupta

Managing Director

Biovish Pharmaceuticals

Dr. Ashok Peepliwal

Associate Professor

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2021

DECLARATION BY STUDENT

I hereby declare that this dissertation titled '**Market Analysis of Angiotensin Converting Enzyme (ACE) Inhibitors**' is the bonafide record of my original research work. I declare that it has not been submitted to any other University or Institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

Signature: *Meghna Raj*

Name of the student: **Meghna Raj**

Date: **June 21, 2021**

COMPLETION CERTIFICATION

CERTIFICATE

This is to certify that Ms. Meghna Raj in partial fulfilment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur has successfully completed her internship at Biovish Pharmaceuticals during March 22, 2021 to June 19, 2021.

Place: Ahmedabad

Date: June 21, 2021



Puneet Gupta

Managing Director

Biovish- Ahmedabad

CERTIFICATE

This is to certify that dissertation titled '**Market Analysis of Angiotensin Converting Enzyme (ACE) Inhibitors**' is a record of the research work undertaken by **Meghna Raj** in partial fulfilment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide

IIHMR University, Jaipur

Date:

School Dean

IIHMR University, Jaipur

Date:

ABSTRACT

Angiotensin-converting enzyme (ACE) inhibitors have important clinical significance in chronic heart failure, essential hypertension, renovascular hypertension, and diabetic nephropathy. ACE inhibitors have been shown to prolong the life of severe chronic heart failure. In essential hypertension, they are relatively free of side effects. But they are more expensive than diuretics or beta blockers. In renovascular hypertension, they help control blood pressure, but kidney function must be closely monitored (especially if bilateral disease). In diabetic nephropathy, they may slow down the progression of kidney disease by lowering the pressure in the glomerulus. In patients with chronic heart failure, angiotensin-converting enzyme (ACE) inhibitors such as captopril, enalapril, and quinapril have been shown to improve hemodynamic, leading to symptoms that reduce fatigue and shortness of breath, and improve physical function, eliminates the need for hyponatremia and diuretics and ventricles. ACE inhibitors are as effective as digitalis and can even be regarded as first-line treatment. The results are promising. It is used for long-term use of ACE inhibitors to treat patients with myocardial infarction who prevent the heart from expanding. ACE Inhibitors can improve the prognosis of patients with severe heart failure and hyponatremia.

Key Words: Angiotensin Converting Enzyme (ACE), Captopril, Enalapril, Quinapril, Hyponatremia, Nephropathy, Beta-blockers, Renovascular Hypertension, Diabetic.

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“No one who achieves success does so without acknowledging the help of others. The wise and confident acknowledge this help with gratitude.”

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I also place on record, my sense of gratitude to one and all who, directly or indirectly have lent their helping hand in this venture.

MEGHNA RAJ

MBA-PM 11

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ABBREVIATIONS

ACE- Angiotensin Converting Enzyme

CVD- Cardiovascular Disease

HTN- Hypertension

CCB- Calcium Channel Blockers

ARBs- Angiotensin Receptor Blockers

ADH- Antidiuretic Hormone

RAS- Renal Artery Stenosis

SARS- Severe Acute Respiratory Syndrome

ARDS- Acute Respiratory Distress Syndrome

PA- Prior Authorization

CKD- Chronic Kidney Disease

CHAPTER:1

INTRODUCTION

Hypertension is considered as one of the major chronic diseases which results in high mortality and morbidity in today's growing world. Socio-economic, behavioural, nutritional, and public related issues also result in an increase in cardiovascular disease (CVD) throughout the world.

Hypertension and diabetes are key reasons for cardiovascular and cerebrovascular disease.

Cardiovascular infection is the main source of death for people around the world. In India, cardiovascular illness represented 8% (15,000) of all passing's in 2015. The justification CVD starts with a factor of dangers, for example, Hypertension and advances to atherosclerosis and target organ harm, eventually prompting cardiovascular breakdown or stroke, angiotensin-changing over chemical (ACE) inhibitors have become crucial apparatuses in the clinical treatment of hypertension and cardiovascular sickness. A higher pervasiveness of hypertension (HTN) among diabetics in India had detailed since 1985. Components that administer the determination of a medication over the other may rely upon different elements including patient sickness profile, age, related comorbid conditions, cost of treatment. Nonetheless, while ACE inhibitors have been displayed to diminish mortality and grimness in placebo-controlled preliminaries, ARBs have not. In this manner, an examination of the efficacies of these two medication classes in essential hypertension for forestalling absolute mortality and cardiovascular occasions is significant. These are among the profoundly recommended drugs for hypertension and cardiovascular breakdown. This inhibitor hinders the actuation of the renin-angiotensin framework, which is a significant go between of circulatory strain and it's anything but a focal job in the pathogenesis of numerous sorts of illness. The primary ACE inhibitor, Captopril, was brought into the market in 1981. Because of the many symptoms of captopril like proteinuria, skin rashes and modified taste, were ascribed to its sulfhydryl bunch, so on the lookout, this ACE inhibitor was presented e.g., enalapril, lisinopril, benazepril, and ramipril.

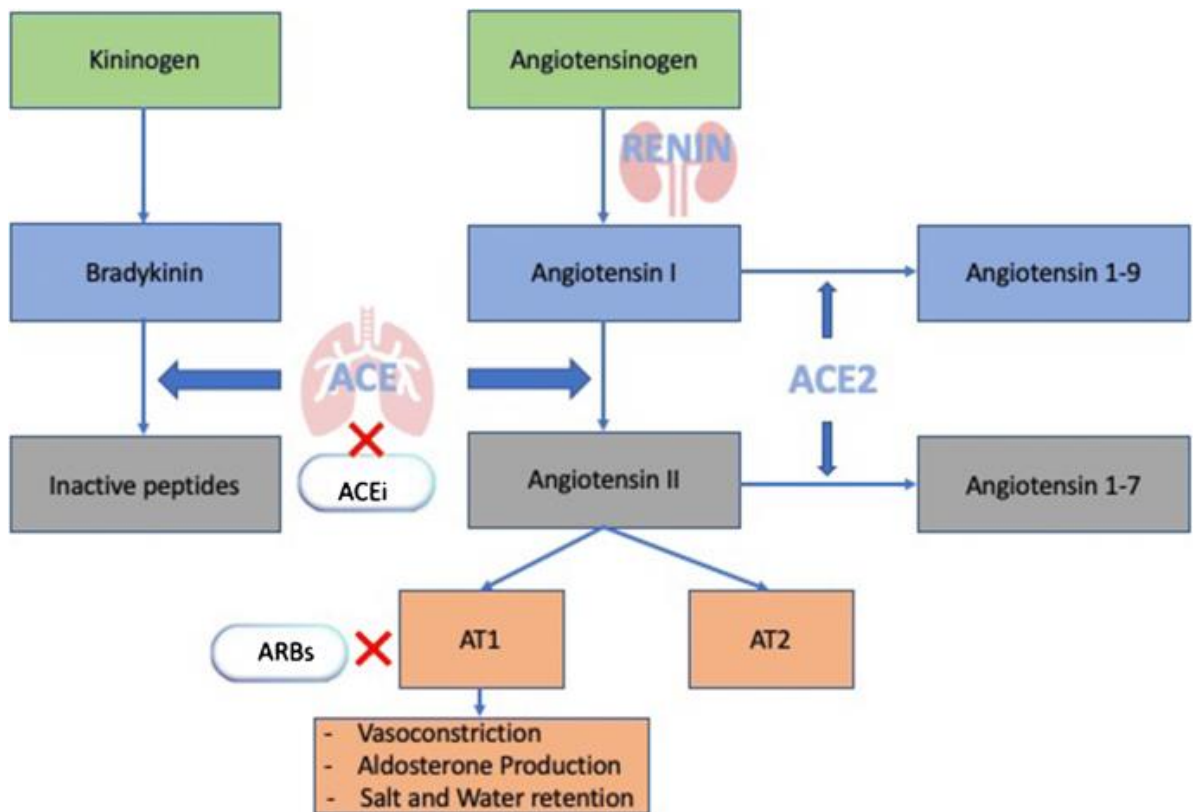


Figure:1 Mechanism of Action of ACE Inhibitors

The market portion of ACE is exceptionally complete and divided, and this postures numerous difficulties for drug organizations. Past proof from clinical reports has shown that ACE inhibitors massively affect any medication in cardiovascular sicknesses, decreasing the danger of death, myocardial dead tissue, stroke, diabetes, and renal impedance. Pro inhibitors have two essential capacities. To begin with, they decline the measure of sodium held in the kidneys. Also, they stop the creation of a chemical called angiotensin II. This chemical for the most part causes veins to limit. At the point when this chemical isn't created, blood moves through the vessels all the more successfully. This aides the veins to unwind and grow, which brings down pulse. For a superior visual, envision a nursery hose. It would last more and will require more strain to get a gallon of water through a hose with a quarter-inch distance across than it would acquire it's anything but a nursery hose with a one-inch measurement. Less pressing factor would make the water spill out of the hose. More pressing factor would make the water stream out without any problem. An angiotensin-changing over catalyst inhibitor (ACE inhibitor) is a drug utilized fundamentally for the treatment of hypertension (raised pulse) and congestive cardiopathy. They repress the angiotensin-changing over catalyst, a crucial part of the renin-angiotensin framework. Pro inhibitors apply their hemodynamic impacts chiefly by hindering the renin-angiotensin-aldosterone framework, yet they

additionally manage the movement of the thoughtful sensory system and increment prostaglandin amalgamation, along these lines inciting vasodilation and all the while influencing vasoconstriction elements and volume factor. Pee sodium discharge doesn't influence pulse and contractility, and may effectly affect kidneys, coronary conduits and cerebral blood stream. It appears to be that ACE inhibitors can be effectively used to treat cardiovascular breakdown. They can diminish preload and afterload. Angiotensin changing over catalyst inhibitors are generally used to treat hypertension and stable persistent cardiovascular breakdown. Disappointment, myocardial dead tissue (MI), and diabetic nephropathy. Animates the change of angiotensin I to angiotensin II. Pro inhibitors are cutthroat ACE inhibitors that forestall the change of angiotensin I to angiotensin II. Angiotensin II is an amazing vasoconstrictor. At the point when it is hindered, it can bring down circulatory strain by expanding veins and lessening aldosterone discharge. Gain bits of knowledge into the hormonal arrangement of RAS to assess the helpful impacts of ACE inhibitors and comprehend the objective of hypertension treatment. At first, the nearby glomerular cells of the afferent arterioles orchestrate prorenin, which is effectively lysed into renin. The development of renin and angiotensin I. The angiotensin I atom is changed over to angiotensin II by ACE. Angiotensin II is a particle that effectively affects different frameworks. Angiotensin II at first causes vasoconstriction and in the long run increments foundational pulse. Angiotensin II additionally invigorates the adrenal cortex and pituitary to deliver aldosterone and antidiuretic chemical (ADH), separately. Because of the movement of the interior mineralocorticoid receptor, aldosterone causes sodium ingestion, which thusly causes water assimilation, ADH inhibitors are a class of medications used to treat and control hypertension, which is a significant danger factor for cardiovascular breakdown, stroke and different coronary corridors sickness. Most cases are essential and can't be credited to a particular reason. This action inspects the signs, contraindications, components, results and other key components of ACE I treatment in the clinical climate as indicated by the central issues needed for treatment. The experience of patients with cardiovascular breakdown, sped up hypertension or fundamental hypertension taking excess of diuretics and along these lines diminishing sodium/volume by enacting the renin-angiotensin framework raises worries about hypotension at the main portion. This is infrequently the situation with current low-portion diuretic treatment. Patients with respective renal conduit stenosis may have renal weakness. If there are indications of fringe vascular infection, renal disability ought to be suspected. Pro inhibitors are utilized for lack of hydration, like looseness of the bowels and spewing, to forestall orthostatic

hypotension and intense kidney injury as a result of the danger of lethal dysplasia, ACE inhibitors ought to be stayed away from in ladies of childbearing age. The danger of diabetes when taking ACE inhibitors interestingly is lower than when consuming numerous other antihypertensive medications. Expert inhibitors have a decent impact when utilized in blend with thiazides and thiazide-like diuretics.

The examination pointed toward researching deals patterns of angiotensin-changing over catalyst inhibitors antihypertensive drugs, inside the local area drug stores. The exploration on the antihypertensive medication's utilization is imperative for featuring the consistently expanding effect of hypertension among the populace and along these lines the market portion of ACEI is amazingly aggressive and divided, and this stance numerous difficulties for the partners thus examinations are the need of great importance to infer better agreement and assessment of the market of ACEI. Hypertension is one of the most grounded hazard factors for cardiovascular and nephropathy and hence the treatment of hypertension is reliably advancing in light of new proof distributed each now so and path over new medications are being added at a quick speed. There's additionally a shift seen inside the decision of prescription recommended particularly to their ideal impact on the decreasing going with associative problems.

Older drugs are being replaced by newer, more effective drugs with fewer side effects. In this way, you can evaluate the highly fragmented market and competitive environment to provide effective solutions for new competitors and gain a competitive advantage. The overall situation of the research will determine the market potential of ACE inhibitors in this field, so this research will focus on the evaluation and expansion of the number of ACE inhibitors in market trends, as well as the analysis of the latest entrants of the same kind.

CHAPTER:2

REVIEW OF LITERATURE

Kaur et al., 2020: The study focuses on the prevalence of ACE inhibitors. Approximately 25% of adults worldwide are diagnosed with hypertension, and this proportion is gradually increasing. Model predictions show that by 2025, the number of hypertensive patients will increase by approximately 1.15 billion developing countries. The highest prevalence of hypertension in India is 50 to 59 year-old males and 60 to 64-year old females, which are mainly concentrated in urban areas, while the population in the 60 to 64 year-old age group in rural areas is gradually increasing. In the past 20 years, the formation of new antihypertensive drugs such as ACE inhibitors and ARB has increased exponentially. In terms of drug selection for hypertension, the choice has shifted from β -blockers and diuretics to ACE inhibitors and ARBs. ACE inhibitors are the most wanted drugs, followed by CCB (30.7%), beta blockers (13.8%) and diuretics (6.8%). ACE inhibitors are also superior to other drugs in their positive effects on comorbidities. Studies shows that only a few patients who are treated with antihypertensive monotherapy but who use two or more drugs in combination can achieve good blood pressure control. Most patients require continuous and effective blood pressure control. Side effects are important for the successful treatment of high blood pressure because most side effects are dependent on dose , and the use of low-dose combinations can minimize problems because they can benefit the patient. To improve efficiency and safety. This may enhance the quality of life of patients. For about 50% of patients in this category, the most used ACE inhibitors are enalapril and ramipril. (Sandoz, December 2014).

Arief et al., 2013: The study conducted to observe that the physicians had desired monotherapy greater frequently than the aggregate and regularly prescribed system among monotherapy in ACE inhibitor class. ACE inhibitors are most effective instructions of medicine which are prescribed to diabetic sufferers as the medication save you the opportunity of prevalence of diabetic nephropathy, retinopathy, and different comparable complications. ACE inhibitors' annual income in India in 2013 have been approximately 1582m and marketplace percentage became approximately 54% withinside the remedy area.

Gomathi et al., 2015: The observation was carried out to examine the treatment of hypertension, various classes antihypertensive agents together with angiotensin-changing

enzyme inhibitors (ACE inhibitors), diuretics and their combinations also are to be had in India. The technique of choice of 1 drug over the alternative can also rely upon the elements which encompass affected person profile, age, and related mixture of antihypertensive retailers together with angiotensin-changing enzyme inhibitors (ACE), (ARB's), (CCB), beta-blockers and diuretics.

Anamaria Boboia et al., 2017: Research has focused on antihypertensive drugs with angiotensin-converting enzyme inhibitors. Market research investigating the number and consumption of antihypertensive drugs is important to determine the rapid growth in the impact of hypertension on the population. Drugs containing active ingredients of ACE inhibitors have increased significantly in both quantity and value, bringing considerable income to pharmacies. Quantification also shows that the best-selling products containing enalapril are the most valuable. -Sales of preparations that also contain perindopril. The data also shows that products containing lisinopril and captopril as active ingredients have also achieved impressive sales. Captopril Therapy has the largest sales volume, while Prestarium has the largest profit.

Hazel Mae Abraham et al., 2016: This research article introduced the study was comparatively effective and safety of angiotensin receptor blockers in the treatment of arterial hypertension; the study found that hypertension is a common disease in adults worldwide and one of the main causes of death. Keep blood pressure Hypertension guidelines recommend that diuretics, calcium channel blockers (CCBs), angiotensin receptor blockers (ARBs), and RCT antihypertensive drugs should be suitable starting antihypertensive drugs for most people. In the past few decades, it has been proven to be one of the highly effective drugs for the treatment of hypertension and related diseases. Therefore, in the treatment and history of hypertension, there is no clinical reason to use ARB in combination with ACEI (or a direct renin inhibitor). The superior pharmacological properties of ARB improve the compliance of antihypertensive therapy and improve the patient's ability to control hypertension. Patients who are sensitive to other antihypertensive drugs. Include categories of ACE inhibitors.

Arora P.K et al., 2013: Understanding this assessment can provide information about the development of ACE inhibitors, their lifestyle, and the development of ACE inhibitor capsules. Hypertension is a steady rise in blood pressure, called first hypertension and secondary hypertension. The disease is related to various risk factors such as obesity. Diabetes, old age, reduced physical activity, etc. Hypertension has been treated with Ayurveda, Chinese medicine and Unani for a long time. There are now a wide variety of

allopathic capsules, including the class of diuretics, calcium channel blockers, alpha blockers, beta blockers, Vasodilators, valuable sympathetic drugs and ACE-inhibitors. Non-drug treatments include weight discounts, sodium discounts, accelerated potassium intake, and alcohol discounts. Various courtship studies of interest have spawned the synthesis of ACE inhibitors, some of which have not yet reached the level of improvement in Nita medicine. This comprehensive assessment provides various recommendations for the classification of hypertension, antihypertensive drugs, and history, drugs, and non-therapeutic treatments. The renin-angiotensin system (compared to the nearby ASD circulation), ACE inhibitor mechanism and ACE inhibitor amplification. The review also highlighted the latest advances in medical research, ACE inhibitors, peptide mimetics, computer studies of dual, natural and reusable ACE inhibitors, and the conformational requirements for ACE inhibitors in ACE inhibitors and capsules.

George L. Bakris et al., 2001: The observation was made to analyze the protection of the endothelium, which is the metabolically active inner layer of the vascular system and seems to be a key factor in maintaining cardiovascular disease (CVD). The endothelium reacts to hemodynamic and hormonal factors and releases substances that support blood vessels. Homeostasis The first step in the development of cardiovascular disease. Angiotensin-converting enzyme (ACE) inhibitors inhibit the formation of the vasoconstrictor angiotensin II and have been shown to be important drugs for the treatment of hypertension and congestive heart failure. Large-scale clinical studies conducted in the past decade have shown that ACE inhibitors are an effective therapeutic agent, which can not only prolong survival and reduce the frequency of acute heart attacks, but also reduce all diseases. People at high risk of cardiovascular disease (including diabetic patients). The ACE in tissue is much higher than that in plasma. Studies have shown that ACE inhibitors work at the tissue level and have long-term cardioprotective effects, including slowing the progression of atherosclerosis. At the tissue level, it is important to reverse or prevent further vascular damage. Clinical and research studies of ACE inhibitors have shown that the use of these drugs in patients with cardiovascular disease risk factors can improve outcomes and reduce medical and hospital costs. Due to increased factors leading to hypertension and hypercholesterolemia, inhibition of tissue ACE appears to have an overall cardioprotective effect in patients receiving the highest approved dose of ramipril. It has been proven to be safe and continues to improve vascular health.

Morales Daniel et al., 2020: A study on angiotensin converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARB) is believed to affect susceptibility to COVID19. So far, observational research lacks rigorous verification and international versatility. Susceptibility of hypertensive patients to COVID19. High blood pressure is more likely to cause serious complications, including hospitalization and death, due to COVID19, which is caused by the Coronavirus 2 Severe Acute Respiratory Syndrome (SARSCoV2). Block the effects of ARBs of the renin-angiotensin system (RAS) and make people more susceptible to COVID19. Since there is no direct evidence that the damage caused by COVID19 should not be stopped, it is modified through long-term exposure to ASA treatment; however, conflicting guidelines have emerged that encourage drug users to use them. Efforts are being made to investigate the discontinuation of ACE inhibitors and ARA II in patients with COVID19 symptoms. They are unlikely to lead to timely large-scale population studies. Assess the susceptibility of ASA users to COVID19: Some studies report that COVID19 increases the risk of myocardial damage, leading to poor cardiovascular outcomes.

Gheblawi Mahmoud et al., 2020: The research report of angiotensin converting enzyme (ACE2) claims that it has many physiological functions related to its trivalent function: the negative regulator of renin angiotensin system (RAS), amino acids and receptors SARS CoV and SARSCoV2 lung transport Mediator, cardiovascular system-system, intestine, kidney, central nervous system and adipose tissue, ACE2 has recently been identified as a SARS CoV2 receptor, is the infectious agent responsible for COVID19, and provides immunity, inflammation, ACE2 and cardiovascular diseases Although it is an evolution closely related to SARS CoV, the SARSCoV2 receptor binding domain shows differences in several important amino acid residues that confer increased binding to human ACE2 receptors. Affinity, which may explain the more general pathogenicity of SARSCoV2. ARSCoV2 is powered by endocytosis activation, proteolytic cleavage and processing. The CE2 system is an important protective measure to prevent conservative heart failure and lower ejection fraction (including myocardial infarction and hypertension), lung disease and diabetes. ACE2 controls the imbalance of intestinal flora, and vascular permeability has become an important mechanism of pulmonary hypertension and cardiovascular complications. Diabetes recombinant ACE2, Ace2 gene delivery, Ang-17 analogs and Mas receptor agonists can enhance the effect of ACE2, and as a potential treatment is activated by angiotensin II and angiotensin II levels and angiotensin 17 through RAS activation disease. Our review summarizes the progress

made in the past 20 years and highlights the key role of ACE2 as a new SARSCoV2 receptor and as a negative regulator of ASA and its impact on the COVID19 pandemic and related cardiovascular diseases.

CHAPTER:3

METHODOLOGY

OBJECTIVE AND SCOPE OF STUDY

- **Objective:** The main objective is to find out the market analysis of Angiotensin Converting Enzyme (ACE) Inhibitors.
- **Primary Objective:**
 - To analyse the drug regarding ACE inhibitor.
 - To identify types of drugs used in the market for antihypertension.
 - To quantify market of drug products and brands of ACE.
 - To examine the competitor landscape of ACE.
- **Scope of the study:**
 - The major scope of this study is to know that what is the scope and acceptance of ACE Inhibitors in Gujarat Region and then to identify its market strategy to increase its sales and promotional tools.
- **Sample Design:**
 - Descriptive
- **Sample Size:**
 - 200
- **Sample Population:**
 - Pharmacist
- **Sample Area:**
 - Gujarat
- **Tools used for Data Collection:**
 - Direct Questionnaire Method
- **Types of Questionnaires:**
 - Structured
- **Types of questions:**
 - Close & Open ended
- **Tools used in Data Analysis:**
 - Microsoft-EXCEL
- **Data Collection Method:**

- **Primary-** Collected by the means of questionnaire.
- **Secondary-** Gathered from the medical journals, literature, and internet.

➤ **Study Duration:**

- 2 Months

Inclusion and Exclusion Criteria:

All respondents i.e., pharmacist who understood English and Hindi have been eligible to take part and have been covered within the study. Those who are mentally incompetent, not able to concentrate or communicate are excluded from the study.

ETHICAL CONSIDERATION

The examination has been finished with legitimate exploration rules. Enough time has been given to the respondent of the assessment with the objective that they can depict their genuine view on research questions. Consent from the respondent has been taken and legitimate approval was similarly ensured for the utilization of their given data. The disclosure of respondent character has been established on their assent where in the event that they will uncover the character, their character was shown. The usage of assistant data from the source was perceived with suitable reference.

CHAPTER:4

RESULTS

FINDINGS AND INTEPRETATIONS

1. Analysis Of ACE Inhibitors Molecules Present in The Market.

Presence of ACE Inhibitors in Retail Store	Total Count	%
Ramipril	80	31%
Lisinopril	50	19.23%
Fosinopril	45	17.31%
Enalapril	35	13%
Captopril	30	12%
Others	20	8%
Grand total	260	

Table 4.1

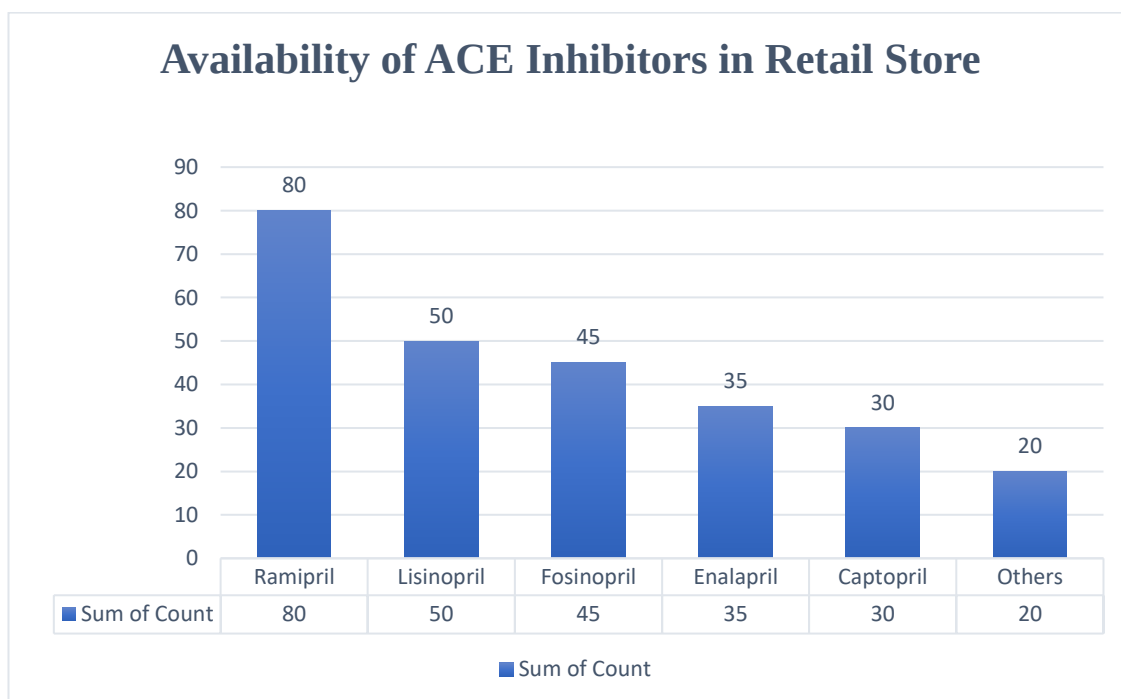


Chart 2: Presence of ACE Inhibitors in Retail Store

Interpretation: The research states that Ramipril is the maximum promoting molecule of ACE inhibitors round 31% respondent standard its presence in a medical store. Followed through Lisinopril (19.23%), Fosinopril (17.31%), Enalapril (13%), Captopril (12%) and others such as (Perindopril, Imidapril, Benazepril) additionally comprise 8%

availability attractiveness rate. It suggests that Ramipril is extra ability than the relaxation of the ACE inhibitors molecules.

2. Analysis of Different Dosage Strength of Ace Molecules

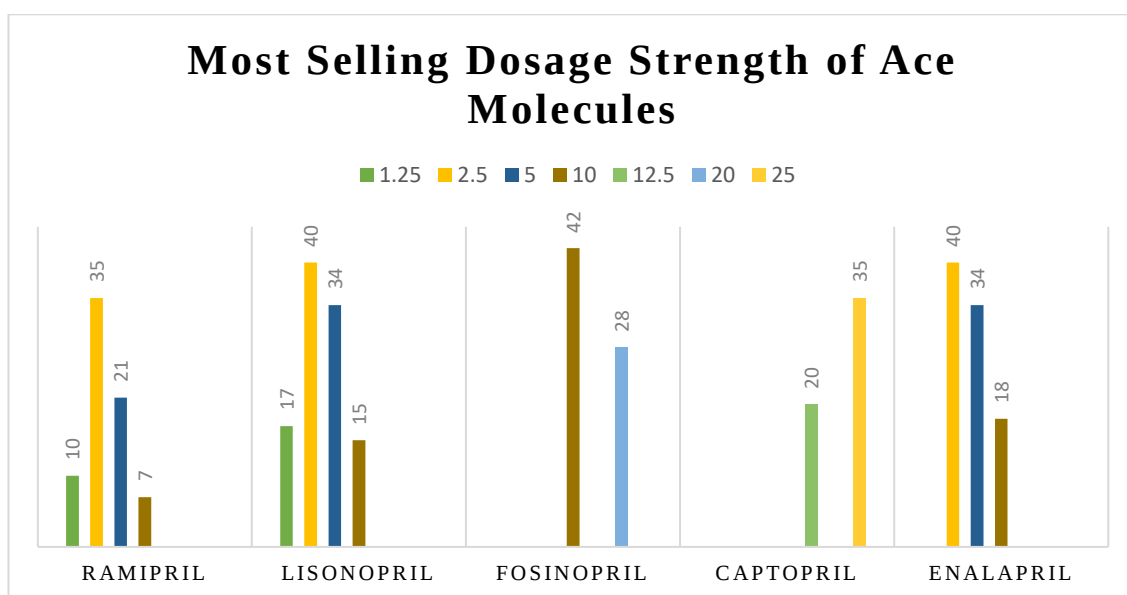


Chart 3: Analysis of most selling dosage strength of ACE molecules

Interpretation: The above graphical representation shows that compared with various ACEI inhibitor molecules, Ramipril 2.5 mg is the best-selling dose, followed by Lisinopril 2.5 mg, Fosinopril 10 mg, Captopril 25 mg and Enalapril 2.5 mg. The prescription has different efficacy and pharmacological effects for everyone, but the most commonly prescribed by doctors are ACE inhibitors: Ramipril, Lisinopril and Enalapril.

3. Analysis of Weekly Sales of Ace Inhibitors

No. of strips sold per week	Count
Average Strips sold per week	20
Maximum	30
Minimum	8

Table 4.2

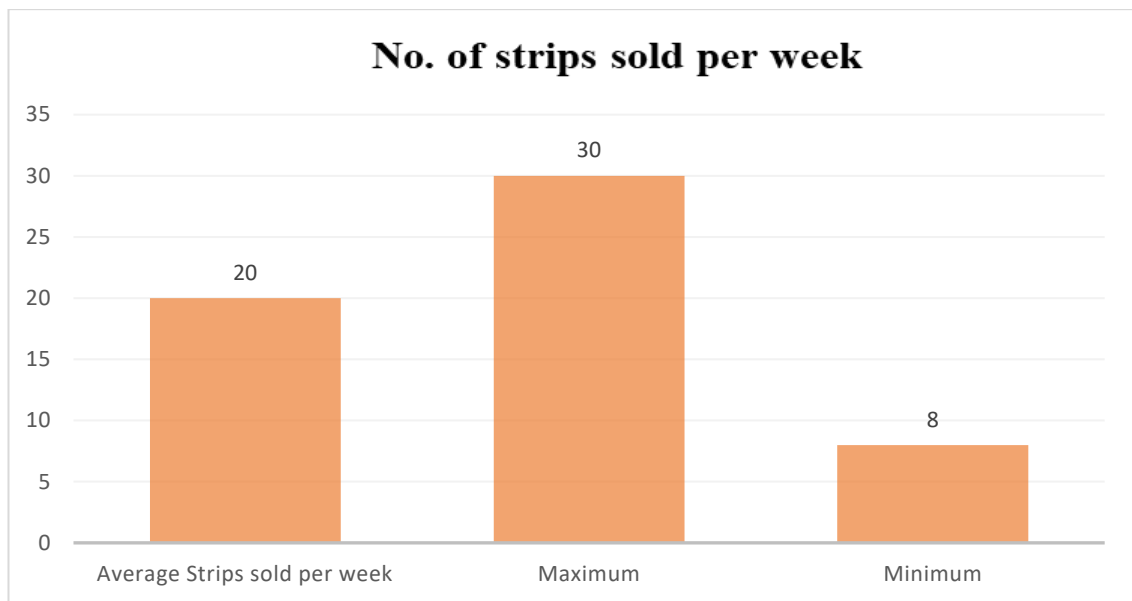


Chart 4: Analysis of number of strips sold per week.

Interpretation: The graph illustrates that the market research of the number of strips sold per week of ACE inhibitors during the survey was found to be 30 with a maximum number and 8 with minimum and 20 with average no. of strips sold per week in the pharmacies.

4. Analysis of Consecutive Prescribed Brands of ACE Inhibitors

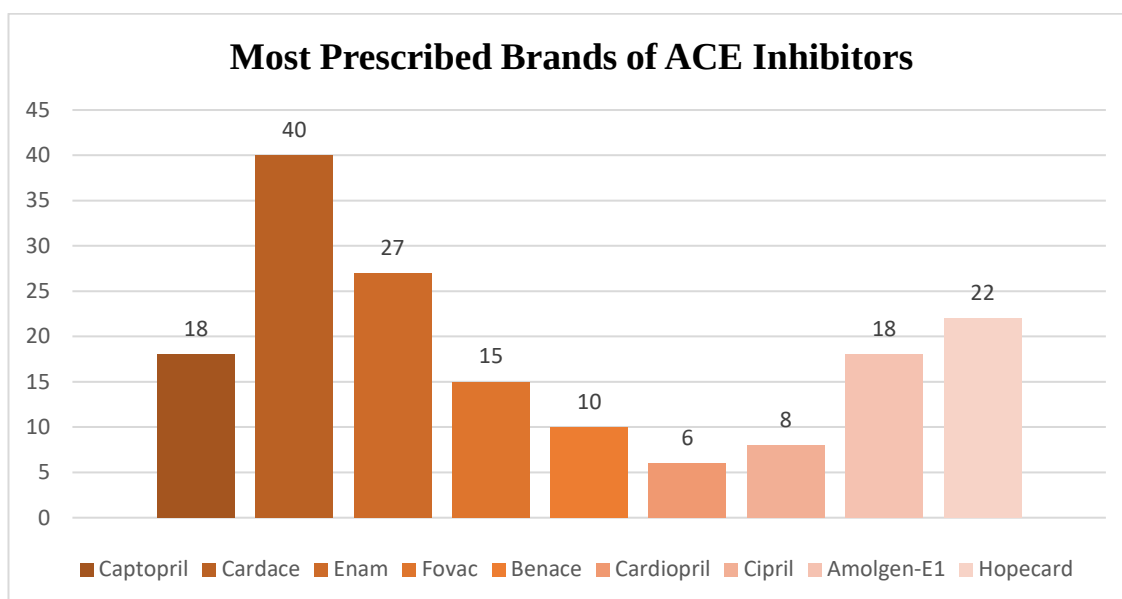


Chart 5: Most prescribed Brands of ACE Inhibitors

Interpretation: The above graph illustrates that Cardace is the most prescribed brand with 40 strips count sold per week followed by Enam with 27, Hopecard with 22, Amlogen, and Capotril with 18. The top 5 brands are Ramipril, Enalapril and Lisinopril are the main giants of the market. The competition between the brands for other molecules was quite defined with limited brands capturing a significant market share.

5. Market Analysis on The Reason for Keeping the Brands Of ACE Inhibitors

Availability of Brands of ACE Inhibitors	Count of Reason for keeping only these brands of ACE inhibitors	Percentage
Availability of Distributor	30	24%
High Margin	10	8%
Higher Prescription	85	68%
Grand Total	125	

Table 4.3

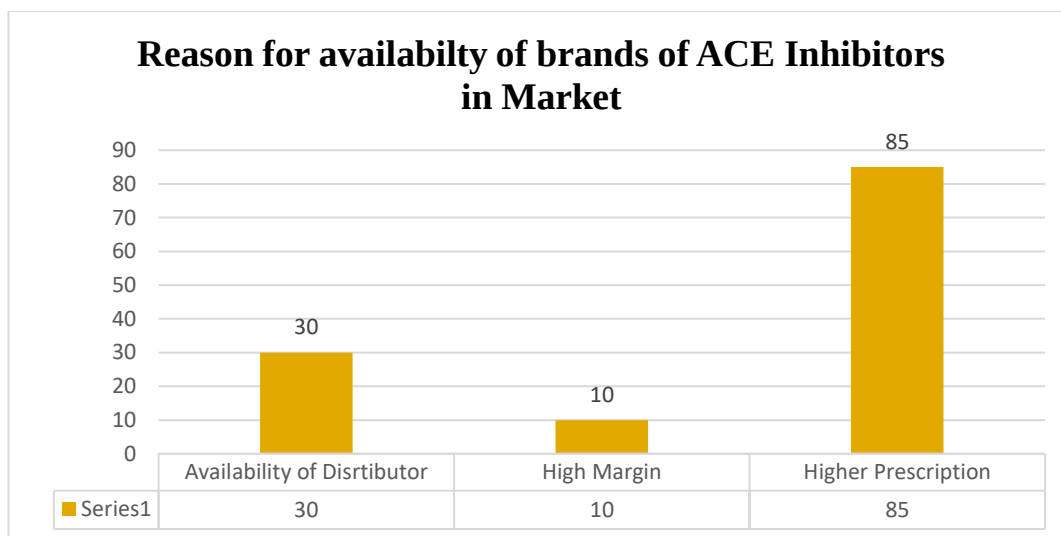


Chart 6: Market Analysis on the reason for availability of ACE Inhibitors in Market

Interpretation: The chart shows that according to the pharmacy market monitoring, the availability of brands on the market is for good reasons, mainly depending on the doctor's prescription. The availability of distributors, high profit margins and, most importantly, the number of prescriptions of the brand. The higher the formula, the higher the demand. From this point of view, the availability of the brand will also increase.

6. Current Market Scenario in the Order of ACE Inhibitors

Current Market trends in the prescription of ACE Inhibitors	Count of in comparison to the past, the prescription of ACE Inhibitors	Percentage
Increase	40	31%
Decrease	20	15%
Remained Same	70	54%
Grand Total	130	

Table 4.4

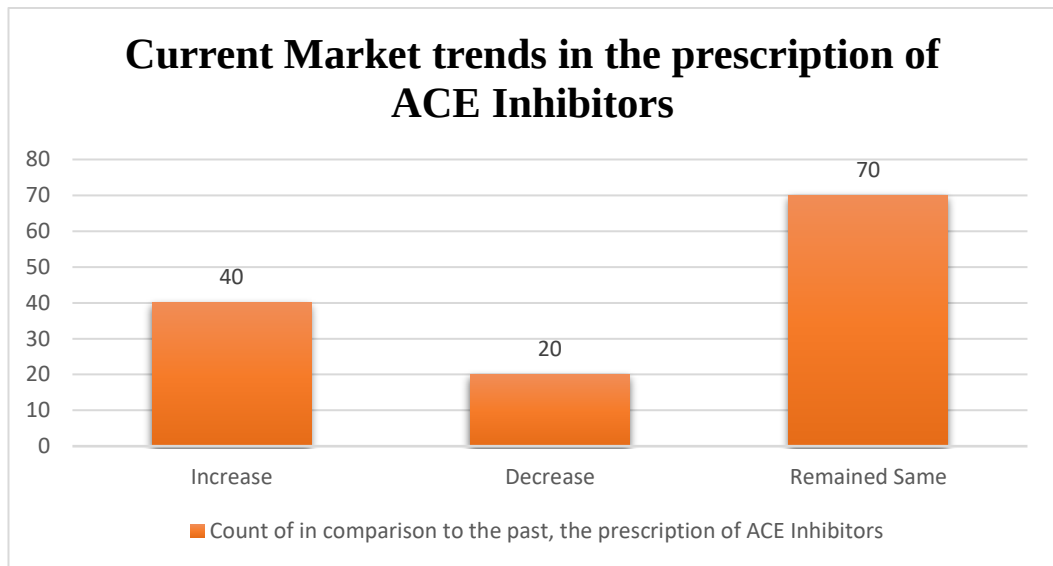


Chart 7: Current Market trends in the prescription of ACE Inhibitor

Interpretation: The graph depicts that about 54% of respondent said that they did not observe any changes in the frequency of prescription at their stores whereas 31% of respondents agreed it there is a ascend in the remedy of ACE inhibitors and 15% referenced that there has been a ruin in the solution of ACE inhibitors

7. Current Trends in The Selling Price.

Current trends in the selling price	Total	%
Expanded	14	11%
Reduced	73	60%
Remained same	30	25%
Grand Total	117	

Table 4.5

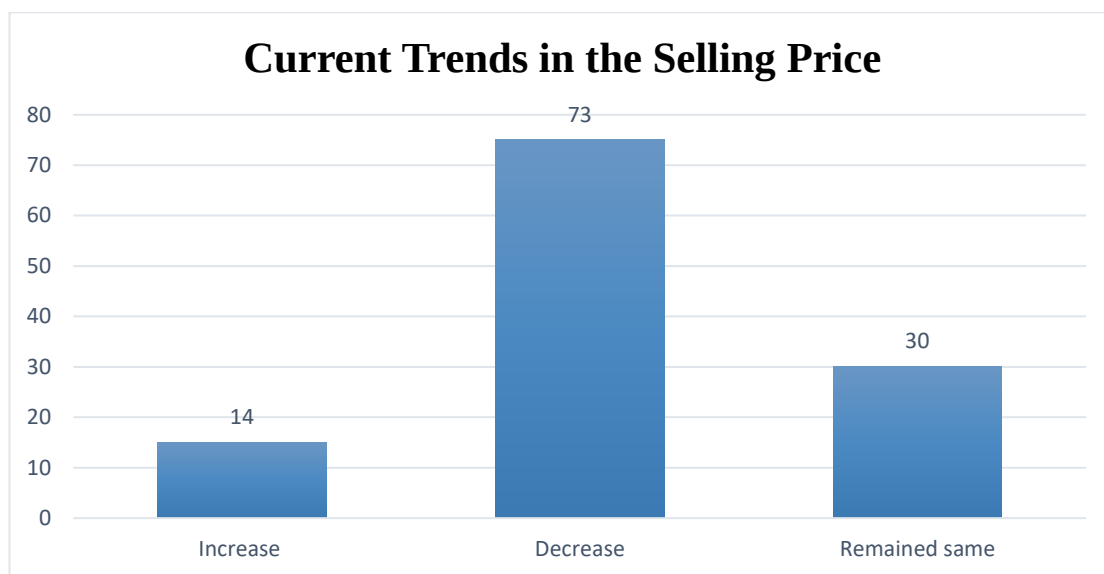


Chart 8: Analysis on current Market trends in the selling price

Interpretation: The above graph depicts that during the survey process, about 63% of respondents said that due to fierce market competition, sales prices have fallen, and 25% of respondents said that sales prices have remained unchanged. 13% of respondents said that the selling price of ACE inhibitors was higher than the previous year.

8. Analysis Of Anti-Hypertensive Market Landscape

Column1	Brands of B-blockers	Brands of Diuretics Class	Brands of CCB	Brands of Angiotensin receptor blocker	Brands of ACE inhibitors
Most prescribed brands	Betaloc	Acecid	Renidil	Cesar	Cardace
	Ciplar	Hydrazide	Dicard	Cortel	Hopecard
	Bisocar	Frusnex	Acord	Arbitel	Enam
Average weekly sales (per strip)	6	24	15	17	13
	8%	32%	20%	22.66%	17.33%

Table 4.6

Interpretation: The table shows the counter hypertensive specialists that immediate contest with the ACE inhibitors on the lookout. The profoundly endorsed specialists are Diuretics after that ARB, Calcium Channel Blockers, ACE Inhibitors and Beta-blockers.

CHAPTER:5

DISCUSSION

The anti-hypertensive market was found to consist of 8% Beta-Blockers, 20% Calcium channel blockers, 32% Diuretics, 22.66% Angiotensin Receptor Blockers, 17.33% ACE Inhibitors. The ACE Inhibitors market divided into Ramipril (30.43%), Lisinopril (19.57%), Fosinopril (16.09%), Enalapril (14.35%), Captopril (10.87%) and others Like (8.70%). High prescription inflow was a leading factor in the availability of specific brands in the market. According to primary data, the rate of prescription has remained same in comparison to the past while the selling price has decreased. This might result in high competitive market with wider aspects of competition amongst the brands.

In the year 2008, Medicaid applications spent approx. \$ 309.8 million on ACE inhibitors and ARBs. Albeit numerous components clarifying the cost by influencing use (e.g., event of hypertension, coronary illness, and diabetes) are past the control of utilization executives, esteem monetary investment funds might be gained through a superior percent of common medication remedies and a superior percent of ACE inhibitors withinside the generally of ACE inhibitor and ARB use. In 2009, ACE inhibitors had been the fourth most extreme applied medication superbness withinside the United States with 162.8 million solutions, and ARBs had been the eleventh greatest applied medication grandness with 82.5 million remedies. Usage of ACE inhibitors and ARBs can be esteem amazing for their authorize markers chiefly while conventional pills are used in area of logo call pills These procedures are not normalized, and each state has its own arrangement of approaches. Fischer and Avorn (2003) assessed that there were expected expense investment funds for Medicaid of \$450 million from more noteworthy generally utilization of conventional medications. Because of the helpful compatibility of ACE inhibitors and ARBs, combined with the accessibility of cheap conventional ACE inhibitors, numerous private payers require PA or step-treatment for ARBs. Thus, the current examination has 2 goals: (a) portray ACE inhibitor and ARB use and spending in the Medicaid expense for administration program from 1991 through 2008, and (b) gauge the likely expense reserve funds for the Medicaid programs from a higher proportion of conventional ACE inhibitor usage.

This review exerts a layout on the focus of pharmacology of ACE inhibitors and the expansion of clinical trials. It is clearly mentioned that the cardiovascular and renal benefits of ACE inhibitors exceed the initial controlled indications for the medication of hypertension. Especially the role of bradykinin remains same. Even the most enthusiastic supporters of these drugs can foresee their widespread clinical applications. In addition, ACE inhibitors have been used as catalysts in very tangible forms to study the molecular and cellular mechanisms of vascular diseases and have achieved results.

CHAPTER:6

CONCLUSIONS

The ACE Inhibitors seize about 18% to 20 % of the Anti-hypertensive market in the city yet their market has been intensely impacted by the consistently expanding business sector of ARBs. Ramipril and Lisinopril are exceptionally endorsed, yet its market is additionally profoundly divided due to the huge market contenders. For new contestants, the market seems, by all accounts, to be exceptionally difficult due to the client dependability set up towards the current brands.

The outcomes showed that the medications containing the dynamic substances of the angiotensin changing over protein inhibitors class had huge expansions in quantitative and esteem deals, carrying generous incomes to drug stores. From the quantitative point of view, the top of the line items were those containing Enalaprilum, while as far as worth, the top of the line drugs were those containing Perindoprilum. We confirmed that staggering deals were additionally accomplished for items that have Lisinoprilum, individually Captoprilum, as dynamic substances.

The market procedures might be applied to build piece of the pie. Salesforce assumes a vital part in the remedy age in an exceptionally aggressive market. Cardiovascular illnesses are the most common reason for death and incapacity in created and non-industrial nations. There is a wide variety in the costs of antihypertensive medications showcased in India. Along these lines, an investigation was intended to discover variety in cost in the ACE Inhibitors accessible in India either as a solitary medication or in blend and to assess the distinction in cost of different brands of similar ACE Inhibitors and ARBs by figuring rate variety in cost in Indian rupees.

The investigation shows that there is a wide variety in the costs of various brands of same ACE Inhibitors and ARBs in Indian market. Greatest expense variety 400% is for Lisinopril (2.5mg), trailed by Enalapril (10mg) 394.16%, Telmisartan (20mg) 322.22%. There is a wide distinction in the expense of various brands of ACE Inhibitors and ARBs accessible in India. They have significant job in administration of hypertension especially whenever related with different morbidities like diabetes. The clinicians endorsing these medications ought to know about these varieties in cost to lessen the expense of medication treatment and increment the patient adherence to the treatment.

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ANNEXURE

Asses the respondent (Pharmacist) through questionnaires to get the response regarding market scenario of ACE Inhibitors by the following questions:

1.What molecules of ACE inhibitors are available at your pharmacy?

Molecules	Dosage Strength	Brand name

2.What is the reason for keeping only these brands of ACE inhibitors?

a) Higher prescription b) availability of distributor c) high margin

3.In comparison to the past, the prescription of ace inhibitors has.

a)Increase b) decrease c) remained same

4.In comparison to the past, the average price of ace inhibitors has?

5.What are the most prescribed brands of ARB?

6.What are the most prescribes brand of calcium channel blockers?

7.What are the most prescribed brands of diuretics?

8.What are the most prescribed brands of beta blockers?

9.What are the weekly sales of the antihypertensive drugs?

Betablockers	Calcium channel blocker	Vasodilators	ARB	Diabetes

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