



Original Research

Cost analysis of oral antihypertensive tablet brands in PakistanAnum Sattar^{a*}, Hina Rehman^b, Safila Naveed^c,^a Department of Pharmacy Practice, Faculty of Pharmacy and Pharmaceutical Sciences, Ziauddin University, Karachi, Pakistan.^b Department of Pharmacy Practice, Institute of Pharmaceutical Sciences, Jinnah Sindh Medical University, Karachi, Pakistan.^c Department of Pharmaceutical Chemistry, Karachi University, Karachi, Pakistan.**Abstract**

Hypertension is a major cause of death worldwide, accounting for 12.8% of all deaths and 53.7% of disability-adjusted life years. It affects over 40% of the population and incurs significant healthcare costs, with over half allocated to prescription drugs. Low adherence to antihypertensive medication is a significant issue, with pricing disparities across manufacturers and physicians' lack of knowledge about treatment costs. The expensive generic medicine is often less effective than its less-priced counterpart. This study aimed to analyze cost variation among brands of oral antihypertensive formulations available in Pakistan. Data were entered into Microsoft Excel 2013 after collection calculations were made for cost ratio and percentage cost variance. Specific medicine costs were evaluated by several companies. Analysis of price fluctuation % has been done. The % cost variation and cost ratio of different categories of antihypertensive drugs in the same dosage form and strength that are available in Pakistan by using the % cost variation and cost ratio formula. This study examined the cost of eight classifications of antihypertension drugs, including calcium channel blockers, beta-blockers, ACE inhibitors, Angiotensin antagonists, Diuretics, Alpha-blockers, Renin Inhibitors, and Centrally acting drugs. ACE inhibitors had cost differences of 191- 864%. Angiotensin antagonists demonstrated 75- 700%. The examination of calcium channel blockers indicated a lowest price of PKR 2.34 per tablet for diltiazem 30 mg and a high price of PKR 41.50 per tablet for nifedipine 30 mg. Beta-blockers exhibited a price variance from 83.3- 1250%. Centrally acting medications, exemplified by methyldopa, varied from 2.12 to 12.2. Finally, diuretics and alpha-blockers had considerable price variability, with spironolactone ranging from 4.80 to 24 PKR per tablet and doxazosin from 6 to 78.40 PKR per tablet. Among the all classes of hypertensive drugs furosemide from the diuretic class was found the lowest cost variation. Furosemide cost was 0.5 PKR per tablet, cost variation of 50%, and propranolol 40mg from the class of beta blockers found the highest cost variation which was 1250%. The study compared antihypertensive medication brands in Pakistan, providing valuable insights into accessibility and cost characteristics. The findings can assist patients and healthcare professionals in choosing affordable options for hypertension

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Keywords: Antihypertensive, Brands, Cost, Analysis, Pakistan, Cost variation



Introduction: In undeveloped nations, the primary health care issue is changing from contagious diseases to non-communicable diseases, which have higher rates of morbidity than death and reduce an individual's productivity. The population's health is seriously threatened by non-communicable conditions including diabetes and hypertension¹. Hypertension leads to a rise in the force of blood flow against the lateral walls of arteries and veins. It is a significant contributor to the risk of the majority of cardiovascular disorders, including coronary heart disease, stroke, congestive heart failure, and impaired renal function².³ However, the prevalence of hypertension in the entire nation or historical trends is not estimated, though. Nearly 18.9% of Pakistanis aged 15 and older were hypertensives, according to the National Health Survey of Pakistan (NHSP)^{4,5}. It is a curable illness that can be managed with ongoing antihypertensive medication therapy. The most widely prescribed antihypertensive medications include diuretics, beta-blockers, ACE inhibitors, ARBs, and calcium channel blockers^{6,7}.

In Pakistan, the rising incidence of hypertension are serious issues that need to be addressed. In a developing nation like Pakistan, the cost of therapy is a key concern for both doctors and patients. This has an impact on how well patients comply with their treatment^{8,9}. Currently ranked third by volume and thirteenth in terms of value globally, the Pakistan pharmaceutical business is expanding at an incredible rate¹⁰. Branded generic drugs account for three-fourths of the market and are the dominant product segment¹¹. In our country, the same medication is sold under numerous brands at greatly varying prices. The price of medicines is a significant factor in patient care, particularly in developing nations, and is a crucial component of rational drug prescription¹². In Pakistan, the majority of medications are available under brands, and doctors typically order these under brand names¹³. The rising cost of treatment along with the burden of disease has impacted our nation's health economy. Effective hypertension care is urgently needed to reduce morbidity and death. As there are several antihypertensive medications available in Pakistan the cost is a significant barrier to their use. It places a significant strain on patients from low-income backgrounds, which can occasionally cause psychiatric distress in the patient^{14,15}.

Since the introduction of generic medications in Pakistan, the price of antihypertensive medications is no longer a significant concern. But whether the patient will accept it is still up for debate. The recent study aimed to assess the finances of various pharmacological medicines for the treatment of hypertension that were offered in India. It aimed to inform the patient about the price variances among drug makers and assist in selecting affordable medications that would improve financial adherence^{16,17}. Over the past few years, Pakistan has conducted several surveys that were representative of the efficacy

and effectiveness of essential medicines and hypertensive drugs by using different methods like WHO/HAI^{18,19}. In Pakistan, there is a dearth of research on the differences in brand costs. The primary factor in non-communicable illnesses is cost. A lot of patients stopped the treatment because of financial difficulties. The reason for non-adherence to medication is the expenditure. This gap must be filled to help and support both doctors and patients in choosing the reasonable treatment. This study aimed to analyze cost variation among brands of oral antihypertensive formulations available in Pakistan.

Methodology:

Study design: This cross-sectional descriptive study was carried out to get comprehensive information on the various types of hypertensive drugs in Pakistan. This study focused on cost variation among the same brands by manufacturing the different companies.

Duration of study: The duration of this research was two months, starting on 1st September 2022 and ending on 30th October 2022.

Sample size: The most widely used classes of anti-hypertensive medications were selected for the sample size. These groups were calcium channel blockers, beta-blockers, ACE inhibitors, Angiotensin antagonists, Vasodilators, Diuretics, Alpha-blockers, Renin Inhibitors, and Centrally acting drugs. These nine groups of drugs covered (n = 213) brands of anti-hypertensive drugs. The Other Vasodilators class was excluded from the study since we did not have enough information on it. Eight classes were included in the study demonstrated in Figure 1.

Criteria for inclusion and exclusion: This research includes all single-agent and oral antihypertensive medications. We selected a maximum of five brands of each strength of the drug and a minimum of three brands of each strength of the drug. The criteria for exclusion included drugs with less than three brands, injectable formulations, combination medication therapies, and any antihypertensive medication that was not priced.

Data collection: The price of a specific oral anti-hypertension medication of the same drug and in the same strength that is manufactured by various companies was obtained from a drug information portal (pharmapedia Pakistan). A drug portal in Pakistan is available online and lists all the medicine brands available in Pakistan. In addition to offering the cost of various brands, this portal also offers all the fundamental details about drugs. Using a drug information drug store, we individually went through all of the chosen generic antihypertensive medications, selecting five brands with varying strengths. We then created a list of all the medications, including brand names, company names, and pill prices.

Statistic evaluation: Data was entered into Microsoft Excel 365 after collection calculations were made for cost ratio and percentage cost variance. For each brand, the price of tablets of medication was estimated in Pakistani rupees (PKR). Price per tablet was used

for calculations to determine the variation between the maximum and least expenses of medicine. The cost ratio and % cost variance was determined for each drug with the same strength and different strengths manufactured by different pharmaceutical companies. The following equations were used to get the percentage difference in the medicine prices and cost ratio.

Formulas;

$$\% \text{ Cost variation} = \frac{\text{maximum cost} - \text{minimum cost}}{\text{minimum cost}} \times 100 \quad (1)$$

$$\text{Cost ratio} = \frac{\text{maximum cost}}{\text{minimum cost}} \quad (2)$$

The proportion of the costliest to the least expensive brand of the same medicine is used to determine the cost. Knowing how much costlier the most expensive medicine preparation is compared to the more affordable formulation is useful. Tables and charts are used to display the data.

Ethics and declarations: Ethical approval was not required because only publicly available price data were used.

Results: The cost of various brands of eight classifications of antihypertension with low and high prices was examined in this study. These brands are manufactured by different pharmaceutical companies. These eight classes included calcium channel blockers, beta-blockers, ACE inhibitors, Angiotensin antagonists, Diuretics, Alpha-blockers, Renin Inhibitors and Centrally acting drugs.

ACE Inhibitors: ACE inhibitors are among the most prevalent types of antihypertensive drugs. In the ACE inhibitor assessment, we evaluated ramipril, enalapril, and lisinopril. The strengths of Ramipril included 1.25 mg, 2.5 mg, 5 mg, and 10 mg, with a cost variation ranging from 191 - 452. Enalapril strengths of 5, 10, and 20 mg have a cost variance ranging from 98-864%. Lisinopril was available in strengths of 5, 10, and 20 mg, with a cost variance ranging from 221 - 610. The minimum price of 1.45PKR per tablet was for enalapril 5mg, while the maximum price was 69 PKR per tablet for 5mg ramipril.

Angiotensin antagonist: The second group comprised Angiotensin Antagonists. Angiotensin antagonists are a prevalent category of antihypertensive medications, including losartan, candesartan, telmisartan, and Olmesartan. Losartan was available in dosages of 2 mg, 50 mg, and 100 mg, while candesartan was offered in strengths of 4 mg, 8 mg, 16 mg, and 32 mg. Telmisartan 20 mg, 40 mg, and 80 mg; Olmesartan 20 mg and 40 mg. The minimum price of 4.0 PKR per tablet was analyzed for candesartan 4 mg, while the maximum price was 90 PKR per tablet for candesartan 32 mg. The cost variation ranged from 75-700%.

Calcium channel blockers: The calcium channel blockers class was the third category of antihypertensive medications, comprising nifedipine, felodipine, and diltiazem. We did not find sufficient data for felodipine, hence it was excluded from the

research, while nifedipine was assessed at a strength of 30 mg and diltiazem at strengths of 30 mg and 60 mg. The cost variation spanned from 82.6- 538%. The minimum price for diltiazem 30mg was 2.34 PKR per tablet, while the maximum price for nifedipine was 41.5 PKRper tablet.

Beta-blockers: Beta-blockers constitute the fourth family of antihypertensive medications, comprised of atenolol, nebivolol, carvedilol, propranolol, and metoprolol. Atenolol was available in dosages of 25 mg, 50 mg, and 100 mg; Nebivolol in 2.5 mg and 5 mg; Carvedilol in 3.25 mg, 6.25 mg, 12.5 mg, and 25 mg; Metoprolol in 100 mg; and Propranolol in 10 mg and 40 mg. The cost variation ranged from 83.3 - 1250. The smallest price for propranolol was 0.34 PKR per tablet for 10 mg, while the maximum price for nebivolol was 28.3 PKR per tablet for 5 mg.

Centrally acting drug: The fifth category of antihypertensive medications was centrally acting drugs, which included methyldopa at a dosage of 250 mg. The minimum cost was 2.12 PKR per tablet and the highest cost was 12.2 PKR per tablet.

Renin Inhibitors: Renin inhibitors were the sixth category of antihypertensive medication in the study using Aliskiren at strengths of 150 and 300 mg. The price variance ranged from 67.1 - 377. The minimum cost for Aliskiren at 150 mg was 24.5 PKR per tablet, while the maximum cost for 300 mg Aliskiren was 117 PKR per tablet.

Diuretics: Diuretics, including Spironolactone and Furosemide, were also assessed. The pricing for Spironolactone 100 mg started at PKR 4.8 per tablet and reached a maximum of PKR 24 per tablet. The price range for Furosemide 40 mg was 0.5 - 1.5 PKR per tablet. The examination of these pharmaceuticals offers facts about the price fluctuation and possible effects on prescribing patterns and accessibility to patients.

Alpha-blockers: Alpha-blockers constitute the eighth category of antihypertensive medications, which includes doxazosin and terazosin. Doxazosin was available in strengths of 2 mg and 4 mg, while terazosin was offered in strengths of 1 mg, 2 mg, and 4 mg. The price ranges from 81 - 292%. The lowest price for terazosin 1mg was 6 PKR per tablet, while the highest was 78.4 PKR per tablet for 4mg doxazosin.

Among the all classes of hypertensive drugs furosemide from the diuretic class was found the lowest cost variation. Furosemide cost was 0.5 PKR per tablet, cost variation of 50%, and propranolol 40mg from the class of beta blockers found the highest cost variation which was 1250%. Table 1 shows all brand's strengths, no of brands, least or maximum price, cost variation, and cost ratio, and Figure 2 shows the graphical presentation of cost variation among all antihypertensive brands.

Discussion: This research evaluated the price variations between different brands of hypertensive drugs that are sold in Pakistan. In this study, we

examined the eight groups of hypertensive drugs and 213 total brands of all-encompassed classes from the online portal pharmapedia Pakistan. The notable differences in prices seen within each class of medications demonstrate the impact of several variables, including brand awareness, marketing techniques, and production costs, on pricing. These variations may have an impact on a person's capacity to get inexpensive prescription drugs and follow recommended treatment plans. To guarantee equal access to therapy and lower the financial strain on patients, cost-effective antihypertensive medications must be readily available. Parallel research by Kamath L. also demonstrated that there are more variances in cost variation across different brands of antihypertensive medications²⁰. Numerous analogous investigations have been conducted on oral hypoglycemics, anxiety, ophthalmic preparations, antiglaucoma medications, oral hypolipidemics, TB, and anticancer agents, with comparable findings^{21,22}. A similar study was conducted by the by Karve et al. indicates that the costs of the majority of antihypertensive products exhibit a percentage price variance over 100%²³. Research was carried out in Nepal on the cost analysis of antihypertensive products, revealing substantial variation²⁴. In our study furosemide cost variation was low 50% a similar result of furosemide was found in another study that was conducted by Sharma et al in 2022 on antihypertensive drugs²⁵. The lowest and highest prices for many manufacturers of oral antihypertensive formulations varied significantly. The cost ratio was found to be quite high as well. The majority of oral antihypertensive brands had the highest prices that were more than twice as high as their lowest prices (percentage cost variation of more than 100%), which is unacceptable for patients because these medications are meant to be taken for an extended time. Kamath and Satish's research discovered comparable findings regarding variations in prices and percentage variations in costs²⁰. Our study revealed a significant cost variation for propranolol 40mg, with a difference of 1250%. Additionally, we observed a similar high-cost variation for the same drug in the 10mg strength²⁵.

The primary factor contributing to the global emergence of coronary illnesses is high blood pressure²⁶. Nevertheless, a significant portion of patients in diagnostic workups continue to experience untreated high blood pressure despite the availability of effective antihypertensive drugs and extensive research evidence. As per research, control rates differ between different nations and geographical areas^{27,28}. Although knowledge of hypertension is relatively high (62% in Australia and 72% in the US), the control rates are extremely depressing (24% and 35%, respectively). The situation is particularly dangerous in the South Asian area since China recorded just 8% control rates and India had 6% in the treatment of hypertension²⁹. Approximately 1 billion individuals worldwide are

thought to have hypertension right now (defined as a reading of >140/90 mmHg), and 1.56 billion are projected to have it by 2025³⁰.

Pakistan experiences a situation like this. According to Pakistan's Pakistan National Health Survey, 33 percent of adults over the age of 45 and 18% of adults overall have high blood pressure. In another study, 18% of Pakistanis have high blood pressure, and every third person over the age of 40 is more susceptible to a wide range of ailments. Additionally, it was said that only half of individuals with hypertension received a diagnosis and only half of those identified received treatment. Therefore, only 12.5 percent of instances with hypertension had acceptable control. There is a dearth of records in certain rural villages, such as Baluchistan, but the control rate is probably going to worsen³¹.

Physicians' knowledge of medication costs is inadequate. In such a scenario, if expensive brands are recommended, patients must pay unreasonably more money, which generates financial stress and may impact the client counterpart's adherence. If medication costs are given more attention throughout physicians' medical training courses, the scenario might be rectified. Only a few medications are now covered by a drug price control order. More medications should be placed under government price regulation. The National Pharmaceutical Pricing Authority (NPPA) and the Medication Price Control Order (DPCO) are efficient mechanisms for controlling treatment costs. Our investigation could raise people's eyes to the large range in the price of the same medicine for both makers and customers^{32,33}.

Conclusion: The price comparison of different antihypertensive medication brands in Pakistan offers important information on the accessibility and cost characteristics of these drugs. The research findings can help patients and healthcare professionals choose affordable choices that can effectively control their hypertension. For the sake of the patients, the biggest discrepancy in antihypertensive medicine price variance has to be closed. Therefore, the authorities and recommending physicians should consider the enormous cost differential and cooperate to the patient's advantage. The findings highlight the need for prescribers to consider cost variation when selecting antihypertensive brands to improve affordability and adherence.

Limitations: This study was restricted to eight oral (tablet) antihypertensive drug classes, and the analysis included 213 brands obtained from a single online drug information portal at one-time point. Retail prices may vary across pharmacies and regions, and injectable formulations or fixed-dose combinations were not included. Prices were accessed from one drug information portal and not validated by means of field visits; hence, actual retail prices could have differed across pharmacies as well as across regions. This is an acknowledged limitation to pave the way for interpretation of results and in planning future studies.

Future recommendations: Future studies should concentrate on carrying out comparable studies in different brands of other classes of drugs to evaluate the generalizability of these conclusions and take into account additional factors beyond cost that affect medicine choice and adherence.

Conflict of interest: The authors declare no conflicts of interest.

Funding: No funding was received for this study.

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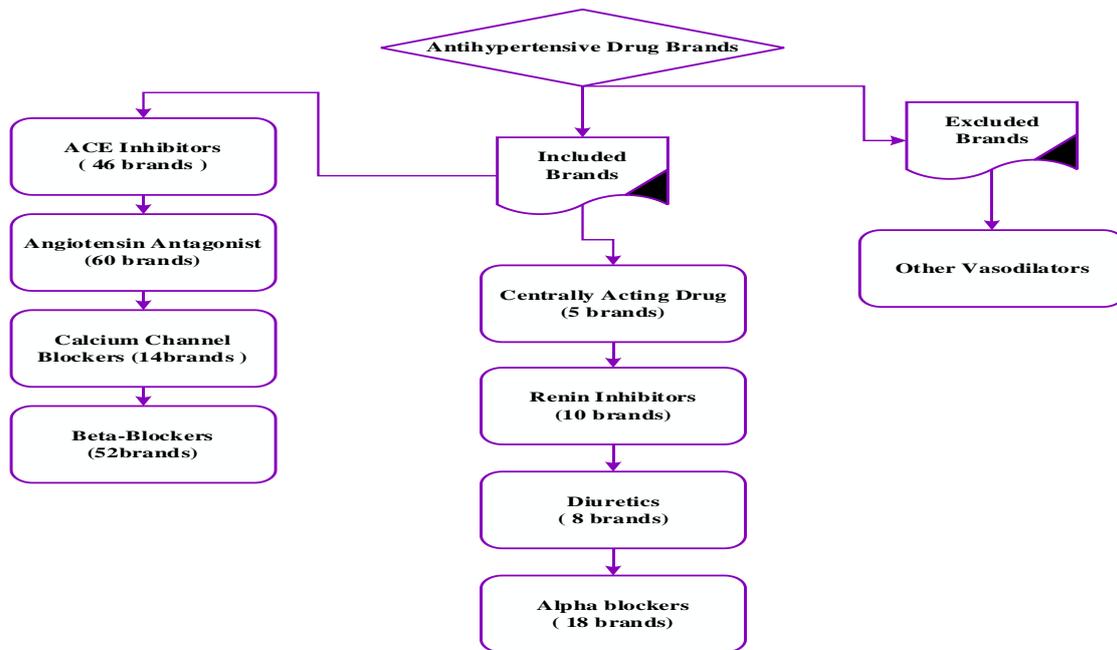


Fig 1. A schematic presentation of Inclusion and Exclusion Brands of Anti-hypertensive Drugs (Out of 250 identified brands, 213 oral formulations were included, while 37 were excluded due to non-oral forms, combinations, or unavailability)

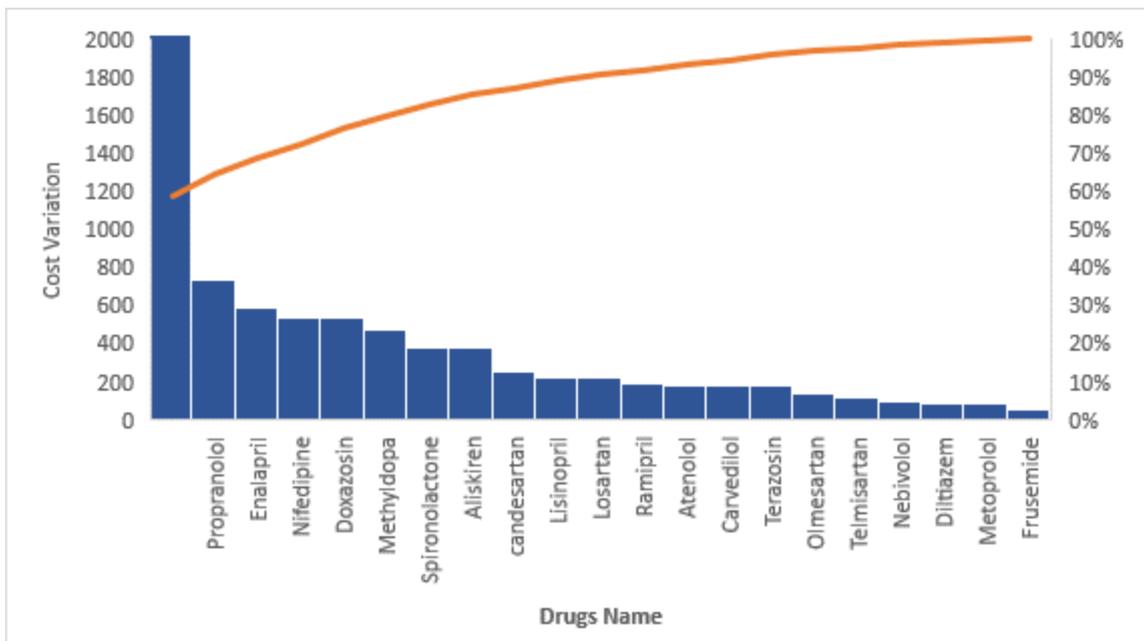


Fig 2. Variation in per-tablet costs (PKR) across all included antihypertensive formulations Cost (The figure illustrates the range of retail prices (PKR per tablet) across all brands, showing minimum, maximum, and average costs for each drug class)

Table 1. Price variation among branded oral antihypertensive formulations (n = 213) available in Karachi, Pakistan

Drug names	Strengths	Brands name	Company names	Low price per Tablet	High price per Tablet	%Cost variation	Cost ratio (PKR)
ACE Inhibitors							
Ramipril	1.25mg	Tritace	Sanofi Aventis pk Ltd	7.14	20.8	191	2.91
		Normipril	Stand Pharma Pakistan				
		Lipra	Pfizer Laboratories Ltd				
	2.5mg	Ramipace	Pharm EVO	12.5	69.0	452	5.52
		Tritace	Sanofi Aventis Pk Ltd				
		Ramipace	Pharm Evo Pvt Ltd				

	5mg	Lipra	Pfizer Laboratories Ltd	14.2	43.1	203	3.03
		Ramiproz	Fozan Pharmaceutical Industries				
		Normipril	Stand Pharma Pakistan				
		Ramy	Getz Pharma PK Ltd				
		Tritace	Sanofi Aventis PK Ltd				
		Ramiproz	Fozan pharmaceutical Industries				
	10mg	Lipra	Pfizer Laboratories Ltd	12.9	44.8	247	3.47
		Ramipace	Pharma Evo				
		Ramipace	Pharma Evo				
		B.P Ace	Poly Chem Pharma Pvt Ltd				
		Tritace	Sanofi Aventis PK Ltd				
		Normipril	Stand Pharma Pakistan				
Lisinopril	5mg	Ramy	Getz Pharma Pk Ltd	4.45	14.3	221	3.21
		Zestril	ICI Pakistan Ltd				
		Lopress	Davis Pharmaceutical Laboratories				
		Ziscar	Tabros Pharma				
	10mg	Sinopril	Obsons Pharmaceutical	8.2	31.9	289	3.89
		Zestril	ICI Pak Ltd				
		Lopress	Davis Pharmaceutical Laboratories				
		Ziscar	Tabros Pharma				
	20mg	Sinopril	Obsons Pharmaceutical	7.5	53.3	610	7.10
		Lisopril	GlaxoSmithKline				
		Zicar	Tabros Pharma				
		Zestril	ICI Pak Ltd				
Enalapril	5mg	Nazipril	Nenz Pharmaceutical Pvt Ltd	1.45	10.0	589	6.89
		Lisna	Zafa Pharmaceutical Laboratories				
		Lispril	Werrick Pharmaceutical				
		Acelar	Pharm EVO				
		Japril	Java Pharmaceutical Pvt Ltd				
	10mg	Hipril	Razee Therapeutics Pvt Ltd	1.95	18.8	864	9.64
		Napril	Caylex Pharmaceutical Pvt Ltd				
		Renitec	OBS				
		Acelar	Pharm Evo				
		Japril	Java Pharmaceutical Pvt Ltd				
	20mg	Hipril	Razee Therapeutics Pvt Ltd	10.5	20.8	98.0	1.98
		Napril	Caylex Pharmaceutical Pvt Ltd				
		Renitec	OBS				
		Stadelant	Meezab International				
		Zepress	Continental Chemical Company Pvt Ltd				
Angiotensin Antagonist							
Losartan	25mg	A2A	Wilson's Pharmaceuticals	5.0	16.0	220	3.2
		Bepsar	Nabi Qasim Industries				
		Losartan	Don Valley Pharmaceutical Pvt Ltd				
		Lostress	Acto Laboratories				
		Sar K	Robins' Pharmaceutical Industries				
	50mg	A2A	Wilson's Pharmaceuticals	4.95	20.1	306	4.06
		Bepsar	Nabi Qasim Industries				
		Blaze	Mass Pharma Pvt Ltd				
		Cardive	Olive Laboratories				
		Corik	Razee Therapeutics				
	100mg	A2A	Wilson's Pharmaceuticals	10	80	700	3.1
		Cozaar	OBS				
		Lopec	Askari Pharmaceuticals				
		Tansin DS	PharmEVO				
		Sar K	Robins' Pharmaceutical Industries				

Candesartan	4mg	Kandi	Webros Pharmaceutical	4.0	14.0	255	3.55
		Treatan	Pharm EVO				
		Quartz	Wilshine Laboratories Pvt Ltd				
		Prosartan	Helix Pharma Pvt Ltd				
	8mg	Candes 3H	Hamza Pharmaceuticals Pvt Ltd	9.0	37.0	311	4.11
		Canrec	Merck private Ltd				
		Blopress	Hilton Pharma Pvt Ltd				
		Advant	Getz Pharma				
		Carac	Macter International Pvt Ltd				
	16mg	Cansaar	Pharmatech Pakistan Pvt Ltd	15.3	58.0	279	3.79
		Canrec	Merck private Ltd				
		Blopress	Hilton Pharma Pvt Ltd				
		Advant	Getz Pharma				
		Carac	Macter International Pvt Ltd				
	32mg	Cansaar	Pharmatech Pakistan Pvt Ltd	16	90	462	5.62
		Carac	Macter International Pvt Ltd				
Quartz		Wilshine Laboratories Pvt Ltd					
Canditensin		Martin Dow pharmaceutical PAK Ltd					
Candes 3H		Hamza Pharmaceuticals Pvt Ltd					
Telmisartan	20mg	Mesartin	SHROOQ Pharmaceuticals	9.9	21.4	116	2.16
		Misar	Highnoon Laboratories				
		Normisar	Nabi Qasim Industries				
		Pressurex	Pfizer Laboratories Ltd				
		Cresar	Tabros Pharma				
	40mg	Ezitab	Werrick Pharmaceutical	12	27	125	2.25
		Mesartin	SHROOQ Pharmaceuticals				
		Misar	Highnoon Laboratories				
		Cresar	Tabros Pharma				
		Mictel	Bosch Pharmaceutical Pvt Ltd				
	80mg	Mesartin	SHROOQ Pharmaceuticals	21.4	41.1	92.0	1.92
		Pressurex	Pfizer Laboratories Ltd				
Cresar		Tabros Pharma					
Normisar		Nabi Qasim Industries					
Tsartan		Maple Pharmaceutical Pvt Ltd					
Olmesartan	20mg	Olmicar	Rasco Pharma	17.5	42	140	2.4
		Orion	Ferozsans Laboratories				
		Omsana	Hilton Pharma Pvt Ltd				
		Oscord	Hilton Pharma Pvt Limited				
		Olesta	Searle Pakistan Pvt Ltd				
	40mg	Olmicar	Rasco Pharma	28.5	50	140	1.75
		Orion	Ferozsans Laboratories				
		Omsana	Hilton Pharma Pvt Ltd				
		Oscord	Hilton Pharma Pvt Ltd				
		Olesta	Searle Pakistan Pvt Ltd				
Calcium channel blockers							
Nifedipine	30mg	Adalat LA	Bayer Healthcare	6.5	41.5	538	6.38
		Nifine C.C	Tread Pharmaceutical Pvt Ltd				
		Nifedil -XI	Zafa Pharmaceuticals				
		Nifecard XI	Novartis Pharma PK Ltd				
Diltiazem	30mg	Anigzem	Macter International Pvt Ltd	2.34	4.33	85.4	1.85
		Anglozem	Euro Pharma International				
		Deltazem	Delta Pharma Pvt Ltd				
		Desbon	Evron Pvt Ltd				
	60mg	Dilzem	Pfizer Laboratories	4.32	7.9	82.6	1.82
		Anigzem	Macter International Pvt Ltd				
		Anglozem	Euro Pharma International				
		Desbon	Evron Pvt Ltd				
		Dilzem	Pfizer Laboratories				
		Calcard	Abbot Laboratories				
Beta-blockers							
Atenolol	25mg	Totamol	Bio pharma	2.2	6.21	182	2.82
		Tenormin	ICC Pakistan Ltd				
		Qunoten	Novartis Pharma Pak Ltd				

	50mg	Kvik	Webros Pharmaceuticals	2.34	5.97	157	2.57						
		Diolit	Medicaid's Pakistan Pvt Ltd										
		Adonax	Evron Pvt Ltd										
		Atecard	Medizan Pvt Ltd										
		Atelor	Pharmedic Pvt Ltd										
	100mg	Atenorm	Ferzonsons Laboratories	3.75	9.1	142	2.42						
		Cardi	Benson Pharmaceuticals										
		Adonax	Evron Pvt Ltd										
		Atecard	Medizan Pvt Ltd										
		Atelor	Pharmedic Pvt Ltd										
Nebivolol	2.5mg	Atenorm	Ferzonsons Laboratories	14.6	28.3	93.8	1.93						
		Cardi	Benson Pharmaceuticals										
		Byscard	Searle Pakistan Pvt Ltd										
	5mg	Nebil	Getz Pharma Pakistan Pvt Ltd	8.68	16	86.0	1.84						
		Nebix	Highnoon laboratories										
Carvedilol	3.125mg	Byscard	Searle Pakistan Pvt Ltd	4	8.6	115	2.15						
		Xicard	Getz Pharma Pakistan Pvt Ltd										
		Vedicar	Barret Hodgson Pakistan										
		Vadil	Tabros Pharma										
	6.25mg	Carlov	Hilton Pharma Pvt Ltd	4	11	175	2.75						
		Vedicar	Barret Hodgson Pakistan										
		Vadil	Tabros Pharma										
	12.5mg	Tacar	Bryon Pharmaceuticals Pvt Ltd	6	22.7	278	3.78						
		vasocare	Heal pharmaceuticals										
		Vadil	Tabros Pharma										
		Carlov	Hilton Pharma Pvt Ltd										
	25mg	Carveda	Ferozsons Laboratories	20	37.1	85.5	1.85						
		Cavidol	Indus Pharma Pvt Ltd										
		Vadil	Tabros Pharma										
		Carlov	Hilton Pharma Pvt Ltd										
Metoprolol	100mg	Carveda	Ferozsons laboratories	3.0	5.5	83.3	1.83						
		Cavidol	Indus pharma PVT Ltd										
		Toprol	Razee Therapeutics PVT Ltd										
		Refit	Mass Pharma Pvt Ltd										
		Metsu XI	Genix Pharma Pvt Ltd										
Propranolol	10mg	Meprol	OBSONS Pharmaceuticals	0.34	2.83	732	8.32						
		Metcard	Batala Pharmaceuticals										
		Propranolol	Siza Pharmaceuticals Pvt Ltd										
		Propranolol	Umersons										
		Oprinol	Abbot Laboratories Pakistan Ltd										
	40mg	Inderal	ICI Pakistan	0.47	5.4	1250	11.4						
		Cardinol	Spencer pharma										
		Propranolol	Siza Pharmaceuticals Pvt Ltd										
		Propranolol	Umersons										
Methyldopa	250mg	Oprinol	Abbot Laboratories Pakistan Limited	2.15	12.2	467	5.67						
		Inderal	ICI Pakistan										
		Cardinol	Spencer Pharma										
		Aldomet	OBS										
		Aldopa	Irza Pharma Pvt Ltd										
Centrally acting drug													
	250mg	Bimet	Bio Labs Pvt Ltd	2.15	12.2	467	5.67						
		Dopa met	Neo medix										
		Normet	Valor Pharmaceuticals										
		Renin Inhibitors											
		Aliskiren	150mg					Skiren	Getz Pharma	24.5	117	377	4.77
Rasilez	Novartis Pharma												
Masilez	Maple Pharmaceuticals Pvt Ltd												
Easrin	Don Valley Pharmaceuticals Pvt Ltd												
300mg	Alevia		Atco Laboratories	70	117	67.1	1.67						
	Skiren		Getz Pharma										
		Rasilez	Novartis Pharma										

		Masilez	Maple Pharmaceuticals Pvt Ltd				
		Easrin	Don Valley Pharmaceuticals Pvt Ltd				
		Alevia	Atco Laboratories				
Diuretics							
Spironolactone	100mg	Aldactone	Searle Pakistan Pvt Ltd	4.8	24	380	5.0
		Diuton	Medera Pharmaceuticals Pvt Ltd				
		Spirone	Wilson's Pharmaceuticals				
Furosemide	40mg	Urolax	P.D.H Pharmaceuticals Pvt Ltd	0.5	1.5	50	3.0
		Uremide	Spencer Pharma				
		Orex	Rex Pharmaceutical Pakistan				
		Odenil	Bosch Pharma Pvt Ltd				
		Losamide	Pharmedic pvt Ltd				
Alpha blocker							
Doxazosin	2mg	Cardura	Pfizer Laboratories	6.25	39.8	536	6.36
		Caydor	Caylex Pharmaceuticals				
		Dozax	Wilshire Laboratories				
		Oxiz	Noa Hemis Pharmaceuticals				
	4mg	Proalpha	Obsons Pharmaceutical	17.5	78.4	348	4.48
		Cardura	Pfizer Laboratories				
		Dozax	Wilshire Laboratories				
		Oxiz	Noa Hemis Pharmaceuticals				
		Uripas	Searle Pakistan Pvt Ltd				
Terazosin	1mg	Hyrox	Pancea pharmaceuticals	6	16.5	175	2.75
		Hytrin	Abbot Laboratories				
		Lopros	Standpharm Pakistan Pvt Ltd				
	2mg	Hyrox	Pancea pharmaceuticals	8.4	33	292	3.92
		Hytrin	Abbot Laboratories				
		Lopros	Stand Pharm Pakistan Pvt Ltd				
	4mg	Hyrox	Pancea Pharmaceuticals	12.7	23.1	81	1.81
Hytrin		Abbot Laboratories					
Lopros		Stand Pharm Pakistan Pvt Ltd					