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Original Research Article

Cost variation analysis of different brands of commonly prescribed antihypertensive drugs, available in Indian market: a pharmacoeconomic study

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ABSTRACT

Background: Worldwide, Hypertension is estimated to cause 7.5 million deaths, about 12.8% of the total of all deaths. This accounts for 57 million disability adjusted life years (DALYS) or 3.7% of total DALYS. Globally, the overall prevalence of hypertension in adults aged 25 and over was around 40% in 2008.Despite its benefits, treatment of hypertension is costly. Direct medical spending to treat hypertension totalled $42.9 billion in 2010, with almost half ($20.4 billion) in the form of prescription medications. Being, a silent disease, adherence to antihypertensive drugs is poor. One of the important factors of poor adherence to antihypertensives is the cost of the drugs. There is wide cost variation among different brands of the same antihypertensive drug. Clinician's awareness of cost of therapeutics is poor. The costly brand of same generic drug is proved to be in no way superior to its economically cheaper counterpart.

Methods: The minimum and the maximum cost in Rupees (INR) of a particular antihypertensive agent manufactured by various pharmaceutical companies in the same strength were noted. The cost of 10 tablets/capsules was calculated. The cost ratio and percent cost variation were calculated for each brand.

Results: The cost variation observed in the present study was as high as 2337.50 % for Hydralazine. Other significantly high cost variations found in the present study were: 1315.25% (Telmisartan+Hydrochlorthiazide), 870.58% (Amlopdipine), 558.34% (Amlodipine+Atenolol), 537.68% (Valsartan), 394.44% (Metoprolol), 344.44% (Enalapril), 316.22% (Propranolol), 300% (Lisinopril), 290.90% (Carvedilol), 289% (Cilnidipine), 271.99% (Labetolol), 268.04% (Indapamide), 256.31% (Losartan), 255.19% (Irbesartan), 226% (Methyldopa), 223.04% (Frusemide), 209.78% (Nitrendepine), 192.08% (Terazosin), 189.25% (Atenolol), 142.42% (Bisoprolol) and 120.51% (Felodipine).

Conclusions: Financial constraints are a reality in almost all aspects of medicine. Doctors must consider drug costs to their patients. Increasing pharmaceutical costs negatively impacts patients. Given the increasing healthcare costs, there is growing interest in rational prescribing, which takes costs of medication into account.

Keywords: Antihypertensives, Adherence, Branded drugs, Cost analysis, Hypertension

INTRODUCTION

During last few decades the demand for healthcare has increased rapidly resulting in high expenditure. To spend financial resources as efficiently as possible, cost containment has assumed significant importance.[1] The consideration of cost of treatment is an important aspect of health economics. The cost of drug is an important factor, especially in developing countries.[2] The most basic cost of a drug is reflected in the acquisition price from a supplier. There are three types of costs associated with medicines in health care system: direct, indirect and intangible. These

three types of costs when taken collectively, give most comprehensive assessment of actual medicine cost. Acquisition cost is one of the most important aspects in calculating a medicine`s cost.[3] In India most of the drugs are available in brands and these are prescribed by clinicians mostly in brand names. This may affect the patients finance adversely if costly brand is prescribed especially in chronic diseases. Many chronically ill patients frequently cut back on medications owing to cost. Patients are selective about the treatments they forgo. Out-of-pocket costs and inadequate prescription coverage may lead to adherence problems for many important medication types.[4]

Hypertension is the most common chronic medical problem prompting visits to primary health care providers. The medical, economic, and human costs of untreated and inadequately controlled high blood pressure are enormous. Controlling blood pressure with medications is one of the most cost-effective methods of reducing premature cardiovascular morbidity and mortality. As the treatment of hypertension often requires the use of more than a single medication, antihypertensive drug therapy is a common target of cost-cutting efforts.[5]

Cost related poor patient compliance is a worldwide problem. Poor or noncompliance affects clinical outcome and increases healthcare costs.[6] Adherence is of particular concern in hypertension, with about half of the patients prescribed an antihypertensive drug stopping taking it within 1 year. Persistence with antihypertensive treatment significantly reduces long-term cardiovascular risk.[7]

The present study was aimed at investigating the cost differences in various brands of same antihypertensive drug, so that whenever possible, a cheaper effective brand can be prescribed to ensure better patient adherence and reduce drug cost as well as total healthcare costs.

METHODS

Prices of various antihypertensive drugs were obtained from various offline and online sources. Offline sources utilized were: latest issues of drug today, CIMS and MIMS**,** and online sources utilized were: "Pharma Sahi Dam" of National Pharmaceutical Authority of Government of India, "G-Dawa" of Health and family Welfare Department of Government of Gujarat, "India Drug Index" and "Drug Brands".[8]

1. The minimum and the maximum cost in Rupees(INR) of a particular antihypertensive drug manufactured by various pharmaceutical companies in the same strength were noted.
2. The cost ratio, the ratio of the cost of the costliest to cheapest brand of the same antihypertensive drug was calculated. This tells, how many times costliest brand costs more than the cheapest one in each generic group.
3. Percentage cost variation was calculated as follows:[8]

$$\% \text{ cost variation} = \frac{\text{Maximum cost-minimum cost}}{\text{Minimum cost}} \times 100$$

RESULTS

The Latest prices of various antihypertensive drugs were obtained from various offline and online sources. All the commonly prescribed groups of antihypertensive drugs were included in the present study. Wide cost variation was found in most of the antihypertensive drugs studied.

The cost variation observed in the present study was as high as 2337.50% for Hydralazine. Other significantly high cost variations found in the present study were: 1315.25% (Telmisartan+Hydrochlorthiazide), 870.58% (Amlopdipine), 558.34% (Amlodipine+Atenolol), 537.68% (Valsartan), 394.44% (Metoprolol), 344.44% (Enalapril), 316.22% (Propranolol), 300% (Lisinopril), 290.90% (Carvedilol), 289% (Cilnidipine), 271.99% (Labetolol), 268.04% (Indapamide), 256.31% (Losartan), 255.19% (Irbesartan), 226% (Methyldopa), 223.04% (Frusemide), 209.78% (Nitrendepine), 192.08% (Terazosin), 189.25% (Atenolol), 142.42% (Bisoprolol) and 120.51% (Felodipine).

Table 1: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands of Angiotensin Converting Enzyme Inhibitors (ACEIs).

Drug	Strength	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
Captopril	25mg	10 tabs	35.00	35.70	0.70	1:1.02	02
Enalapril	5mg	10 tabs	9.00	40.00	31.00	1:4.44	344.44
Lisinopril	5mg	10 tabs	25.00	100.00	75.00	1:40	300
Perindopril	4mg	10 tabs	85.25	123.00	37.75	1:1.44	44.28
Ramipril	5mg	10 tabs	43.00	128.80	85.80	1:2.99	199.53
Fosinopril	10mg	10 tabs	60.12	68.53	8.41	1:1.13	13.98

Table 2: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands of Angiotensin Receptor Blockers (ARBs).

Drug	Strength	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
Losartan	50mg	10 tabs	19:00	67.70	48.70	1:3.56	256.31
Candesartan	8mg	10 tabs	38.00	61.80	23.80	1:1.62	62.63
Irbesartan	150mg	10 tabs	69.30	246.15	176.85	1:3.55	255.19
Telmisartan	40mg	10 tabs	43.50	85.33	41.83	1:1.96	96.16
Valsartan	80mg	10 tabs	69.00	440.00	371.00	1:6.37	537.68

Table 3: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands of sympatholytics.

Drug	Strength	Formulation	Min Cost (INR)	Max. Cost (INR	Cost difference	Cost ratio	%cost variation
Clonidine	100mcg	10 tabs	7.00	11.50	4.50	1:1.64	64.28
Methyldopa	250mg	10 tabs	15.29	32.84	17.55	1:2.14	226
Propranolol	40mg	10 tabs	9.37	39.00	29.63	1:4.16	316.22
Atenolol	50mg	10 tabs	8.00	23.14	15.14	1:2.89	189.25
Metoprolol	50mg	10 tabs	18.00	89.00	71.00	1:4.94	394.44
Bisoprolol	2.5mg	10 tabs	16.50	40.00	23.50	1:2.42	142.42
Nebivolol	5mg	10 tabs	52.00	70.00	18.00	1:1.34	34.61
Labetolol	100mg	10 tabs	29.57	110.00	80.43	1:3.71	271.99
Carvedilol	12.5mg	10 tabs	22.00	86.00	64.00	1:3.90	290.90
Prazosin	2.5mg	10 tabs	72.00	86.66	14.66	1:1.20	20.36
Terazosin	2mg	10 tabs	69.50	203.00	133.50	1:2.92	192.08

Table 4: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands of Calcium Channel Blockers (CCBs).

Drug	Strength	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
Nifedipine	10mg	10 tab/cap	6.01	37.17	31.16	1:6.18	518.46
Verapamil	40mg	10 tabs	5.02	8.86	3.84	1:1.76	76.49
Diltiazem	30mg	10 tabs	10.02	29.27	19.25	1:2.92	192.11
Felodipine	5mg	10 tabs	39.00	86.00	47.00	1:2.20	120.51
Amlodipine	5mg	10 tabs	6.80	66.00	59.20	1:9.70	870.58
Cilnidipine	10mg	10 tabs	29.50	115.00	85.50	1:3.89	289.00
Nitrendipine	10mg	10 tabs	9.20	28.50	19.30	1:3.09	209.78

Table 5: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands of diuretics.

Drug	Strength	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
HCT	12.5mg	10 tabs	6.00	13.00	7.00	1:2.16	116.66
Indapamide	2.5mg	10 tabs	24.10	88.70	64.60	1:3.68	268.04
Torsemide	10mg	10 tabs	19.50	36.74	17.24	1:1.88	88.41
Furosemide	40mg	10 tabs	4.21	13.60	9.39	1:3.23	223.04
Acetazolamide	250mg	10 tabs	16.60	58.00	41.40	1:3.49	249.39

Smaller cost variation was found in some drugs like: 02% (Captopril), 13.98 % (Fosinopril), 18.34% (Perindopril+Indipamide), 20.36% (Prazosin), 22.58% (Lisinopril+Hydrochlorthiazide), 29.31% (Metoprolol+Amlodipine), 34.61% (Nebivolol), 36.36% (Telmisartan+Amlodipine).

Table 6: Minimum and maximum, cost difference, cost ratio and percent cost variation in different brands of Fixed Dose Combinations (FDCs).

Drug	Strength (mg)	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
Lisn+HCT	5+12.5	10 tab	42.50	52.10	9.60	1:1.22	22.58
Perin+Indi	4+1.25	10 tab	109.00	129.00	20.00	1:1.18	18.34
Rami+HCT	5+12.5	10 tab	48.00	93.00	45.00	1:1.93	93.75
Amlo+Losar	5+50	10 tab	27.30	77.00	49.70	1:2.82	182.05
Irbe+HCT	150+12.5	10 tab	79.64	269.00	189.36	1:3.37	237.76
Temi+Amlo	40+5	10 tab	55.00	75.00	20.00	1:1.36	36.36
Temi+HCT	40+12.5	10 tab	5.90	83.50	77.60	1:14.15	1315.25
Spiro+Furo	50+20	10 tab	25.20	38.81	13.61	1:1.54	54.00
Spiro+Torse	50+10	10 tab	18.51	52.70	34.19	1:2.84	184.71
Amlo+Aten	5+50	10 tab	12.41	79.70	67.29	1:6.42	558.34
Meto+Amlo	50+50	10 tab	58.00	75.00	17.00	1:1.29	29.31
Olme+HCT	20+12.5	10 tab	69.00	98.91	29.91	1:1.43	43.34
Captop+HCT	25+15	10 tab	24.13	41.00	16.87	1:1.69	69.91

Lisn= Lisinopril, HCT= Hydrochlorthiazide, Perin= Perindopril, Indi= Indapamide, Rami=Ramipril, Amlo=Amlodipine, Losar=Losartan, Irbe=Irbesartan, Temi=Temisartan, Spiro=Spironolactone Furo=Furosemide, Torse= Torsemide, Aten= Atenolol, Olme= Olmesartan, Captop=Captopril

Table 7: Minimum and maximum cost, cost difference, cost ratio and percent cost variation in different brands hydralazine (miscellaneous group).

Drug	Strength (mg)	Formulation	Min cost (INR)	Max. cost (INR)	Cost difference	Cost ratio	%cost variation
Hydralazine	25mg	10 tabs	0.80	19.50	18.70	1:24.37	2337.50

DISCUSSION

In this study, noticeable cost variation was found in different brands of same antihypertensive drug. The cost variation observed in the present study was as high as 2337.50 % for Hydralazine. Other significantly high cost variations found in the present study were: 1315.25% (Telmisartan+Hydrochlorthiazide), 870.58% (Amlopdipine), 558.34% (Amlodipine+Atenolol), 537.68% (Valsartan), 394.44% (Metoprolol), 344.44% (Enalapril), 316.22% (Propranolol), 300% (Lisinopril), Similar results were found in other studies. Gupta RK et al in a study on the cost of antiepileptic drugs, observed substantial variation in the cost of different brands of same generic drugs.[9] Andayani TM et al also found cost variation in different brands of anti-diabetic drugs.[10] Nathan RR et al found wide variation in the cost of Glaucoma medication.[11] Akila L et al also found cost variation in different brands of antianginal drugs.[12] Similar results were found by Mir SA in two different cost analysis studies.[8,13]

The treatment of chronic illnesses commonly includes the long-term use of drugs. Although these medications are effective in combating disease, their full benefits are often not realized because approximately 50% of patients do not take their medications as prescribed. Barriers to medical adherence are complex. One of the important factors is the cost of the prescribed drug, especially among the patients with low socioeconomic status.[14]

There is consistent lack of appreciation of the large differences in cost between inexpensive and expensive drugs. Clinician's ignorance of drug costs result in prescription of costly drugs, when cheaper alternatives are available. This often causes non-compliance or nonadherence.[15] Being a chronic medical condition, management of hypertension requires continuous medical care. Because of the silent nature of hypertension, long-term adherence to therapy is one of the major issues. It is well recognized that many patients interrupt their antihypertensive treatment completely after 1 year, and this lack of persistence has a major impact on our ability to control blood pressure in the hypertensive population.[16] Indians consume about Rs. 56,000 crore worth medicines through private chemists.[17] The same drug being sold at different cost by different manufacturers.[18] Patients have to pay more unnecessarily if costly brands are prescribed. The costly brand of same generic drug is scientifically proved to be in no way superior to its economically cheaper counterpart. It has been observed that doctors have suboptimal awareness of drug cost.[19] When drug cost is affordable, patient compliance will improve.

CONCLUSION

Because of population growth and ageing, the number of people with uncontrolled hypertension rose from 600 million in 1980 to nearly 1 billion in 2008. Despite increased awareness, poor adherence to treatments for chronic diseases remains a global problem. Adherence issues are common in patients taking antihypertensive therapy and associated with increased risks of coronary and cerebrovascular events. To gain the maximal benefits of their antihypertensive therapy, it is important for the clinicians to support adherence to prescribed drugs. Because hypertension is so common, and its treatment often requires the use of more than one medication, antihypertensive drug therapy is a common target of cost-cutting efforts.

While patients may assume that their doctors know the cost of the drugs they are prescribing, that's often not the case. Doctors in clinics seeing patients don't necessarily know how much the drugs cost. Doctors must prescribe rationally. Rational Prescribing implies using the right drug for the right patient at the right time in the right dose and manner of administration, at affordable cost and with right information. They need to be educated about the cost variation in different brands of same drug.

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