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Original Research Article

Pharmaco-economic study of oral anti-hypertensive drugs available in Indian pharmaceutical market

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ABSTRACT

Background: Hypertension is a global public health problem. To decrease its morbidity and mortality it needs life-long treatment. There is a wide range of variation in the prices of antihypertensive drugs marketed in India. Thus, a study was planned to evaluate the difference in cost of different brands of same active drug by calculating percentage variation of cost.

Methods: The cost of different brands of commonly used anti-hypertensive drugs was sorted out by referring latest CIMS, MIMS and drug today. The cost of 10 dosage forms (tablets/capsules) in INR of each brand, cost ratio and percentage cost variation were calculated and evaluated.

Results: The cost of different anti-hypertensive drugs were analysed and minimum and maximum cost of the drugs in a particular dosage are tabulated. The cost variation is analysed with SPSS software 2.0 version with tools of median and interquartile range. The variation in cost of most of the anti-hypertensive drugs is more than 100%. It's found maximum in amlodipine (5 mg) with cost variation of 625%, atenolol 100 mg with cost variation of 413%.

Conclusions: The average percentage cost variation of the same molecules of antihypertensive drugs manufactured by different pharmaceuticals company in India is very wide. So, government, pharmaceutical company, marketing manager and prescribing doctors should think about variation of cost and do needful for providing maximum benefits to the patients receiving antihypertensive drugs.

Keywords: Hypertension, Pharmacoeconomics, Diabetes mellitus

INTRODUCTION

Hypertension is one of the major chronic diseases resulting into high mortality and morbidity. Cost of drug is one of the factors of poor control of HTN in our country and it can lead to development of ischemic heart disease, stroke and chronic renal failure. Worldwide nearly 1 billion adults (more than a quarter of world's population) had hypertension in 2010 and this is predicted to increase 1.56 billion by 2025. Prevalence of hypertension in India is reported to vary from 17-21%.¹⁻³

Reviews of epidemiological studies suggest that the prevalence of hypertension in the last six decades has increased from 2% to 25% among urban residents and from 2% to 15% among the rural residents in India.⁴

Hypertension is ranked as the third most important risk factor for attributable burden of disease in South Asia (2010).⁵ Hypertension is directly responsible for 57% of all stroke death and 24% of all coronary heart disease (CHD) in India.⁶ Hypertension as one of the most important cause of premature death worldwide.⁷

Hypertension accounts for 10% of worldwide healthcare expenditure underlining the considerable economic implications to resource constrained health systems.⁸

Anti-hypertensive drug treatment often has elevated cost, a limitation that has not always been taken into account in clinical practice.^{9,10} High cost of medicines has economic burden for the patients. Prices of prescription can affect users, suppliers and most importantly payers in health care system.¹¹

Several studies have indicated that therapeutic compliance is influenced by drug prices.¹² In developing country like India cost of drugs play an important role in compliance of treatment of any chronic disease.

Pharmaceutical industry has many branded formulation of the same drug with large difference in selling price.

This may affect the patient's economic condition adversely if costly brand is prescribed specially in disease like hypertension which needs treatment for longer duration.^{13,14}

Aim

The aim of the study was to assess the cost effectiveness of anti-hypertensive drugs in hypertensive patients.

METHODS

Study type

This study was a cross-sectional observational study.

Study place

The study was carried out at Amlatas Hospital Dewas (a tertiary hospital) in Madhya Pradesh, India.

Study period

The study was carried out over 2 months from 1 Oct 2022 to 31 November 2022.

Selection criteria of the sample

The particular anti-hypertensive drug (cost per 10 tablets/capsules) in the same strength and dosage forms being manufactured by different companies was selected as sample in the present study.

Procedure

The cost of 10 tablets (pack size) was calculated. Cost of a particular anti-hypertensive drug (cost per 10 tablets/capsules) in the same strength and dosage forms being manufactured by different companies was obtained from latest 'Current index of medical specialties' July-

October 2022. Drug today, July-October 2022 and 'Indian drug review' April 2022.¹⁴

The cost of drugs was also crosschecked at pharmacy or retail drug store. From the above two ratios, we assessed how many times more does the costliest brand cost, compared to the cheapest brand. All detailed data was entered in MS excel and values expressed in counts, percentages and ratios. Cost ratio between the maximum and minimum cost of the same drug manufactured by different pharmaceutical companies was calculated as follows:

$$\text{Cost ratio} = \frac{\text{Maximum cost}}{\text{Minimum cost}}$$

Percentage cost variation was calculated as follows:

$$\begin{aligned} \text{Percent cost variation} \\ &= \frac{\text{Maximum cost} - \text{Minimum cost}}{\text{Minimum cost}} \\ &\times 100 \end{aligned}$$

Exclusion criteria of the study

The drug formulation being manufactured by only one company was excluded.

Ethical approval

Ethical approval not required. Further, the study adhered to the tenets of Declaration of Helsinki.

Statistical analysis

The cost variation was analysed with SPSS software 2.0 version with tools of median and interquartile range.

RESULTS

The prices of a total of 28 drugs (in different strength), available in 64 different formulations were analysed. These 64 formulations are manufactured by different pharmaceutical companies. Table 1 shows the price variation of a few commonly used anti-hypertensives used as a single drug therapy.

Overall amlodipine (5 mg) shows maximum price variation of 625.4%, atenolol 100 mg with cost variation of 413% while nifedipine (5 mg) shows minimum variation of 3.60%.

The maximum and minimum percentage price variation respectively for CCBs: amlodipine (5 mg) 625% and nifedipine (5 mg) 3.60%, ACE inhibitors: enalapril (10 mg) 213.20% and ramipril (10 mg) 82.06%, ARBs: olmesartan (20 mg) 309.3% and telmisartan (20 mg) 54.10%, and beta blockers: atenolol (25 mg) 207.30 % and nebivolol (5 mg) 121.4%.

Table 1: Variation in cost of single drug therapy of anti-hypertensive drug.

S. no.	Drug	Dose (mg)	Minimum price (INR)	Maximum price (INR)	Cost ratio	Percentage cost variation
A	ACE inhibitors					
1	T. enalapril	2.5	6.00	30.23	5.03	403.20
		5	12.23	51.34	4.10	319.70
		10	32.00	100.23	3.10	213.20
2	T. lisinopril	2.5	14.20	51.50	3.60	262.20
		5	28.00	102.00	3.60	264.20
		10	53.20	120.40	2.30	126.30
3	T. ramipril	1.25	12.50	35.20	2.80	181.60
		2.5	27.00	59.20	2.10	119.20
		5	52.00	100.20	1.90	92.60
		10	78.6	143.10	1.80	82.06
4	T. perindopril	2	-	120	NA	NA
		5	-	134	NA	NA
		10	-	187	NA	NA
B	Angiotensin antagonist					
5	T. losartan	25	18.20	45.40	2.40	149.40
		50	30.30	88.90	2.90	193.30
6	T. candesartan	4	29.60	38.50	1.45	30.80
		8	47.30	64.20	1.30	36.30
7	T. olmesartan	20	45.00	184.20	4.10	309.30
		40	58.00	168.00	2.80	189.60
8	T. telmisartan	20	29.20	45.00	1.50	54.10
		40	29.00	86.00	2.90	196.70
		80	79.50	121.00	1.50	52.20
C	Calcium channel blockers					
9	T. nifedipine	5	10.90	11.30	1.09	3.60
		10	14.40	20.40	1.40	41.60
		20	19.00	32.10	1.60	68.90
10	T. felodipine	2.5	-	24.00	NA	NA
		5	-	42.00	NA	NA
		10	-	71.00	NA	NA
11	T. amlodipine	2.5	7.80	28.20	3.60	261.50
		5	10.20	74.00	7.20	625.40
		10	32.00	54.20	1.60	69.30
12	T. clinidipine	5	23.00	50.40	2.10	119.10
		10	27.00	82.00	3.03	203.70
		20	48.40	121.00	2.50	150.00
13	T. diltiazam	30	16.70	24.40	1.46	46.10
		60	28.20	38.20	1.30	35.10
D	B-blockers					
14	T. atenolol	25	8.20	25.20	3.07	207.30
		50	5.90	24.30	4.11	310.10
		100	6.98	35.40	5.10	413.00
15	T. carvedilol	3.125	8.90	31.20	3.50	250.50
		6.25	16.40	45.40	2.70	177.40
		12.5	29.00	78.50	27.70	170.60
		25	56.00	124.00	2.20	121.40
16	T. labetalol	100	116.00	135.00	1.16	16.30
17	T. metoprolol	25	18.10	47.30	2.60	154.30
		50	30.10	65.40	2.10	117.20
18	T. nebivolol	2.5	36.40	111.20	3.05	205.40
		5	52.10	115.40	2.20	121.40
19	T. propranolol	10	7.00	19.00	2.70	171.40
		20	17.40	23.40	1.50	40.20

Continued.

S. no.	Drug	Dose (mg)	Minimum price (INR)	Maximum price (INR)	Cost ratio	Percentage cost variation
		40	22.30	76.20	3.40	241.70
E	A-blocker					
20	T. prazosin	2.5	75.80	112.60	1.40	48.90
		5	103.50	122.40	1.10	18.30
F	Centrally acting sympatholytic agents					
21	T. methyldopa	250	20.50	25.30	1.20	24.60
G	Vasodilator					
22	T. cinnarizine	25	15.50	38.90	2.50	150.90
		75	31.00	45.10	1.40	45.40
		10	13.90	24.50	1.70	76.20
23	T. isoxsuprine	20	26.70	35.30	1.30	32.30
		40	46.30	58.20	1.20	25.70
	Diuretics					
24	Hydrochlorthiazide	12.5	6.00	9.53	1.59	58.83
25	Hydrochlorthiazide	25	11.00	16.50	1.50	50.09
26	Chlorthalidone	12.5	13.25	49.00	3.70	269.81
27	Furosemide	20	18.00	42.00	2.68	133.30
28	Spironolactone	25	16.00	51.00	3.40	218.75
28	Torsemide	10	23.52	48.20	2.82	182.05

DISCUSSION

Pharmaceuticals company in Indian market commonly sells a particular drug under different brand names apart from the innovator company. Hence, the number of products available in the market is very high in the range of 60,000-70,000. This situation has led to greater price variation among drugs marketed.¹⁴ In our study findings showed a very high fluctuation in the minimum and maximum price of anti-hypertensive drugs. The cost ratio was also observed to be very high (Table 1). The percentage variation in the cost was above 100% with most of the commonly used anti-hypertensive drugs and also with combination form of anti-hypertensive drugs. Similar study done by other researcher also showed significant higher price variations in different brands of the same anti-hypertensive drug.¹⁵⁻¹⁷ In such situation patients have to pay more price if costly brands are prescribed. Whereas the costly brand of same generic drug is scientifically proved to be in no way superior to its economically cheaper counterpart.¹⁸ In India patients have to pay from their pockets due to very less use of mediclaim policies in comparison to developed countries. The reason behind this price variation could be as follows (a) government regulation and pricing policies; (b) the existing market structure of pharmaceutical industry; (c) cost of raw supplies, distribution and promotion; (d) asymmetry of information or imperfect information; and (e) economic goals of the parent company, target return on investment.¹⁹⁻²⁴

Under NMLM 2015 the prices of a total 376 drugs and 857 formulations are under price control. IN the DPCO list 2015 only few anti-hypertensive drugs (amlodipine, atenolol, enalapril, losartan, methyldopa, nifedipine and hydrochlorothiazide) were included.^{25,26}

Limitation

The study was limited to oral anti-hypertensive formulation available in Indian market. Also, the drug formulation being manufactured by only one company was excluded.

CONCLUSION

According to result of our studies and previous various studies over cost analysis; there is a strong need to create awareness in public, healthcare providers and even in prescriber regarding huge cost variation of same molecules of different brands. It should also highlighted among concerned government agencies, policy makers, pharmaceuticals company for taking appropriate consideration and action to reduce the huge cost variation of anti-hypertensive drugs.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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