

## PHARMACOECONOMIC ANALYSIS OF VARIOUS BRANDS OF COMMONLY PRESCRIBED ORAL ANTIHYPERTENSIVE MEDICINES IN INDIAN MARKET

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### ABSTRACT

**Objectives:** The objective of the study was to analyze the percentage cost variations among various brands of the commonly prescribed antihypertensive medicines in India.

**Methods:** Cost of a particular medicine (cost per 10 tablets) in the same strength and dosage forms being produced by various pharmaceutical companies was taken from Current Index of Medical specialties and Drug Today. Difference between the highest and lowest cost of the same drug manufactured by various pharmaceutical industries was obtained and percentage cost variation was calculated.

**Results:** The percentage variation in the price was above 100% with almost all of the commonly prescribed antihypertensive medicines. The cost of a total of 23 drugs (14 single and nine combination preparations), available in forty nine different formulations were studied. Overall, Amlodipine (5 mg) shows highest price difference of 982.3%, while Nifedipine (5 mg) shows lowest price difference of 39%. Telmisartan + Hydrochlorothiazide (80+12.5 mg) combinations shows highest price variation of 318.9%, while Amlodipine + Losartan (5+50 mg) shows lowest price difference of 50%.

**Conclusion:** The average percentage price difference of the same antihypertensive medicine manufactured by various pharmaceuticals company in India is very huge. Hence, Government, Pharmaceutical companies, prescribing health care workers should educate themselves about huge variation in price of brand drugs in comparison with their cheap generic counterpart to provide maximum benefits with minimum financial burden to the patients receiving antihypertensive drugs.

**Keywords:** Antihypertensives, Pharmacoeconomic, Price variation, Current index of medical specialties, Indian market.

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### INTRODUCTION

Hypertension (HTN) is one of the most common chronic diseases causing high morbidity and mortality. Prices of drugs are one of the major factors of poor control of HTN in India, and it can result in development of various heart disease, cerebral stroke and chronic renal failure. Worldwide nearly one billion people had HTN in 2012 and medical scientist predicted that it will increase to two billion by 2030. The prevalence of hypertensive patients in India is reported to vary from 17 to 21% [1-3]. Reviews of various studies show that the prevalence of HTN in the past few decades has gone from 2% to 25% among urban people and from 2% to 15% among villagers in India [4]. Acquisition cost is very important factor in calculating a drug cost [5]. Drug compliance by patients directly depends on acquisition cost.

Antihypertensive drug treatment is generally prescribed for long duration, may be for years or lifetime which cause drastic financial burden to patients [6]; a limitation that has not always taken care of by health care workers [7]. Strict adherence to treatment protocol is very important in HTN, with about 50% of the patients taking antihypertensive drug stopped taking it within 1 year. The implementation of the National Pharmaceutical Pricing Authority in 2012 and the Drugs Prices Control Order (DPCO) in 2013 encourage both the manufacturing companies and the patients by ensuring the availability of essential drugs at reasonable cost. They fixed the ceiling cost of 848 formulations of drugs written in the National List of Essential Medicines. Once medicine comes under regulation of DPCO, it cannot be sold at cost higher than that mentioned by the government. Also not a single antihypertensive drugs combinations are mentioned in DPCO list 2018 [8]. Many chronic hypertensive patients require fixed dose combination drug treatment to control or cure their disease. Therefore, it is duty of the government to bring all important drugs and their combinations under strict price control [9].

A very few studies are available in India, which highlight comparison of cost of drugs of various brands of antihypertensive. Hence, our present study focuses on cost-effectiveness analysis on various available brands of antihypertensive drugs in India.

### METHODS

Price of a particular antihypertensive drug (price per 10 tablets/capsules) in the same dose and dosage forms being produced by various pharmaceutical companies was analyzed in rupees (INR) from "Current Index of Medical Specialties (CIMS)" July-October 2021 [10] and "Drug Today" Jan-April 2021. The price of drugs were also cross checked at various pharmacy stores of Jhalawar district located at south eastern Rajasthan.

Cost ratio between highest and lowest cost of the same drug manufactured by various pharmaceutical companies was calculated as follows:

Cost ratio= highest cost/lowest cost

Percentage price variation was calculated as follows:

$$\% \text{price variation} = \frac{(\text{Highest cost} - \text{Lowest cost})}{\text{Lowest cost}} \times 100$$

### Exclusion criteria

1. The medicine being manufactured by only one company or being manufactured by different companies; however, in different dose.
2. Injectable formulations.

### Ethics

Institutional Ethics Committee permission was obtained before starting our study.

**Statistical analysis**

All the data collected were analyzed, noted, and compiled into a Microsoft excel worksheet. Descriptive statistics number and percentages were calculated.

**RESULTS**

The percentage variation in the price was above 100% with almost all of the commonly prescribed antihypertensive medicines. The cost of a total of 23 drugs (14 single and nine combination preparations), available in forty nine different formulations were studied. These formulations are manufactured by different pharmaceutical companies Table 1 shows the price variation of a few commonly used antihypertensive used as a single drug therapy. Overall, Amlodipine (5 mg) shows highest price difference of 982.3%, while Nifedipine (5 mg) shows lowest price difference of 39%. Maximum number of brands for losartan (50 mg) followed by Amlodipine (5 mg).

Table 2 shows price variation in combination of antihypertensive drugs. Out of 8 combination therapies, commonly used drugs like Telmisartan + Hydrochlorothiazide (80+12.5 mg) combination shows highest variation up to 318.9%, while Amlodipine + Losartan (5+50 mg) shows lowest price variation of 50%. Maximum number of brands for Telmisartan+ Hydrochlorothiazide (40+12.5 mg) followed by Amlodipine + Atenolol (5+50 mg).

**DISCUSSION**

Indian market is mainly a branded generic hub, that is, more than one manufacturer sells a particular drug under various brand names apart from the primary producer company. Hence, the number of medicines available in the country is also very high in the range of 90,000-100,000 products. This situation has led to greater cost variation among medicines marketed.

In our study, result highlighted very high differences in the lowest and highest price of antihypertensive drugs and the price ratio was also observed to be very high. The percentage variation in the price was above 100% with almost all of the commonly prescribed antihypertensive drugs and also with fixed dose combination formulations of antihypertensive drugs. Similar study done by Laxminarayana *et al.* in 2015, Chattar *et al.* in 2014 and Limaye *et al.* in 2017 also showed significant higher cost variations in various brands of the similar antihypertensive drug [11-13]. In such scenario, patients have to pay more prices if costly brands are prescribed. As the costly brand of same generic medicine is scientifically proved to be no way superior rather equal or sometimes inferior to its economically cheaper counterpart.

Indian people have to pay everything from their pockets due to less awareness of mediclaim policies as compared to developed countries [14]. The reason behind this huge cost difference could be as follows [15-19].

**Table 1: Cost variation of single drug formulations of antihypertensive drugs**

Drugs	Formulation	Dose (mg)	Total Brands	Lowest price (Rs)	Highest price (Rs)	Price variation (%)
Calcium channelblockers						
Amlodipine	3	2.5	41	6	48	700
		5	55	8.5	92	982.3
		10	30	13.8	96	595.6
Nifedipine	3	5	6	7.4	10.3	39
		10	8	8.6	17.5	103.4
		20	8	9.5	16.5	73.6
Diltiazem	3	30	15	17.3	38	119.6
		60	12	30.3	66	121
		90	4	49	80	63.3
Beta bloklers						
Atenolol	3	25	28	4.7	26.3	459.6
		50	42	6.7	39.2	485
		100	16	22	58.8	167
Metoprolol	3	25	12	11.5	43	273.9
		50	12	19	59	210.5
		100	6	52	90.5	74
Carvedilol	2	12.5	17	24	62	158
		50	13	44	93.3	112
ACE inhibitors						
Enalapril	3	2.5	22	7	23	228.6
		5	22	10	36	260
		10	18	13	62.5	380.7
Ramipril	3	2.5	23	26	78	200
		5	20	48	120	150
		10	7	90.3	175.6	94.5
Captopril	1	25	5	26.2	46.6	77.8
ARBs						
Losartan	2	25	50	13	47	261.5
		50	56	26	95.2	266
Telmisartan	3	20	34	19	71.1	274
		40	45	29	92	217
		80	17	91.5	160	74.8
Diuretics						
Hydrochlorothiazide	2	12.5	8	7.12	24.2	239.8
		25	12	11.24	42	273.6
Furosemide	1	40	22	8.5	45	429.4
Spironolactone	1	25	31	18	61	238.8

ACE: Angiotensin converting enzyme, ARBs: Angiotensin receptor blockers

Table 2: Cost variation of combination drug formulations of antihypertensive drugs

Drugs	Formulation	Dose (mg)	Total brand	Lowest price (Rs)	Highest price (Rs)	Price variation (%)
Amlodipine + atenolol	2	5+25	28	25	85.5	242
		5+50	45	33	97.3	194.8
Amlodipine + lisinopril	1	5+5	17	32	82	156.3
		5+25	7	21.8	77.5	255.5
Amlodipine + losartan	2	5+50	18	32	48	50
		5+40	15	53	97	83
Amlodipine + telmisartan	2	5+80	5	82	153	86.6
		40+12.5	47	26.7	102	282
Telmisartan + hydrochlorothiazide	2	80+12.5	11	37	155	318.9
		25+12.5	4	28.5	62	117.5
Losartan + hydrochlorothiazide	2	50+12.5	32	32	66.3	107.2
		5+12.5	3	25	41.8	67.2
Enalapril + hydrochlorothiazide	2	10+12.5	7	35	66.2	89
		5+12.5	3	61	141	131
Ramipril + hydrochlorothiazide	1	5+12.5	3	27.35	67	145
Metoprolol + hydrochlorothiazid	2	100+12.5	4	21	41.5	97.6
		50+12.5	3			

- Weak policies of government in terms of regulations and price control.
  - Competition between different pharmaceutical industry.
  - No control on cost of raw supplies, distribution and promotion cost.
  - Asymmetrical and imperfect information.
  - Less awareness of rational prescription by health care workers.
  - Economic goals of the parent company, target return on investment.
- At present, very few medicines are under DPCO. Hence, it is mandatory that the Government should bring all lifesaving and essential medicines under price control. Fixed dose combinations of antihypertensive medicines are not included in essential drug list (EDL) which must be included without delay while revising the list. Some regulations must be placed on the pricing of medicines in the EDL to increase their accessibility to community. DPCO will be an effective tool to keep in control the drug cost which should be implemented for each and every drugs included in EDL.

#### Limitations

The major limitation of our study is that it is observational study in which only CIMS and Drug today were analyzed as there are many other sources of drug information like Monthly index of medical specialties, Drug update, Journals. Sample size of drugs selected for cost evaluation were also less as only few most commonly used antihypertensive drugs were analyzed.

#### CONCLUSION

This study highlights that there is big price difference between various antihypertensive drugs manufactured by various companies. Some strict measures and guidelines must be prepared and imposed by the government to bring uniformity and substantial reduction in the price. It will definitely reduce the financial burden on the patients to major extent. There is a strong need to create awareness among health care workers to prescribe rational and cheap generic medicines to give maximum benefit to patients. This awareness can be achieved through regular tutorials, seminars, conferences, workshops, distributing study materials to healthcare workers.

#### AUTHORS CONTRIBUTION

The author compiled the data and after analyzing it the article was structured.

#### CONFLICT OF INTEREST

The author hereby declares that there is no conflict of interests.

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