



Cost variance analysis of ACE-Inhibitors available in the Indian Pharmaceutical Market between May 2025 and July 2025

Ashish Danane^{*1}, Aparna Chincholkar¹, Ganesh Pentewar¹

1. Department of Pharmacology, MIMER Medical College, Talegaon Dabhade

*Corresponding Author: mailto:ashishd8787@gmail.com

Use your device to scan and read



Citation Danane A, Chincholkar A, Pentewar G. Cost variance analysis of ACE inhibitors available in the Indian pharmaceutical market between May 2025 and July 2025. Journal of Pharmacoeconomics and Pharmaceutical Management. 2025;11(3):4-8.

Running Title ACE Inhibitor Cost Variance in India, May–Jul 2025

Article Type Original article

Highlights

- This study analyzed cost variations of ACE inhibitors in the Indian pharmaceutical market.
- The highest price variation and cost ratio were seen in Lisinopril 5mg tablet (4731.8% and 48.31).
- High price variation can lead to patient noncompliance, necessitating regulatory control on drug pricing.

Article info

Received:

14.10.2025

Accepted:

16.03.2026

License Statement

This work is licensed under a Creative Commons Attribution NonCommercial 4.0 International license (<https://creativecommons.org/licenses/by-nc/4.0/>). Non-commercial uses of the work are permitted, provided the original work is properly cited
Copyright © 2026 The Authors.
Publisher
Tehran University of Medical Sciences

ABSTRACT

Background: ACE-Inhibitors are commonly used to treat hypertension which is a chronic disorder requiring life-long treatment. There are numerous brands of ACE-Inhibitors available in the Indian pharmaceutical market. There is huge cost variation among different brands of ACE-Inhibitors hence the present study.

Methods: Cost of all ACE-Inhibitors (tablets/capsules) available in India was obtained per unit from <http://www.medguideindia.com> between May to July 2025. For each formulation percentage price variation, mode price and cost ratio were calculated and analysed.

Results: Among all ACE-Inhibitors, the highest percentage of price variation and cost ratio was seen in tablet Lisinopril 5mg of 4731.8% and 48.31% respectively, followed by tablet Enalapril maleate 5mg with price variation of 1214.28% and cost ratio of 13.14%. Furthermore, Ramipril 5mg tablet with percentage of price variation and cost ratio of 1098% and 11.98% respectively.

Conclusion: There is a lot of price variation among the various brands of ACE-Inhibitors available in India. This can lead to noncompliance by the patient. The regulatory authorities should use their jurisdiction in controlling the price variation of such branded drugs.

Keywords: Ace-Inhibitors, Cost Ratio, Mode Price, Percentage Price Variation



Introduction

Hypertension is one of the most common cardiovascular disease leading to morbidity and death.[1] Hypertension is often referred to as the 'silent-killer' as it is often symptomless. Antihypertensive drugs have to be continued through-out life.[1] Angiotensin-converting enzyme inhibitors (ACEIs) are commonly used in the treatment of cardiovascular, renal diseases, including diabetes, and hypertension.[2]

In 2014, the Eighth Joint National Commission (JNC8) published ACE inhibitors as initial therapy for hypertension in adults. The American Heart Association/American College of Cardiology (AHA/ACC) and the European Society of Cardiology (ESC) have recommended ACE inhibitors as first-line antihypertensive therapy, in patients with diabetes mellitus and cardiovascular diseases [3] [4][5]

Medication cost plays a crucial role in patient's care in developing countries.[6]

Huge variation has been found in the cost same generic drugs of different brands available in India. Increase in the patient medication cost is associated with decreased adherence to prescription medication.[7]

Ultimately, it leads to poor patient compliance, especially in drugs requiring chronic therapy as in case of ACE-Inhibitors [8](chart1 & chart2)

Availability of various ACE-Inhibitor drugs under different dosage forms with different brands with large cost variation in India creates lot of problems for the physicians in choosing the less costlier drug for individual patients.[9] (chart1 & chart2)

Kaiser family foundation survey in 2015 found that nearly 25% of those taking prescription medications have reported that they have not filled a prescription in past 12 months due to cost concerns.[10,11]

There is scarcity of literature on cost effective analysis of ACE-Inhibitors which reinforces the need for cost analysis of available formulations of ACE-Inhibitors in the practice of medicine and hence the above study was designed.

MATERIALS AND METHODS

This was an analytical study.

The study was conducted in a teaching hospital in Western Maharashtra.

Cost of all ACE-Inhibitors (tablets/capsules) available in India was obtained per unit from <http://www.medguideindia.com> between May to July 2025. For each formulation percentage price variation, mode price and cost ratio were calculated and analysed.

Cost of the same drug with same dose and dosage form was compared with different brands from different companies.

Exclusion criteria

The drug with single brand and no comparative group were excluded from the study for example- Trandopril 1mg, 2mg, Imidapril 5mg, 10mg, Quinapril 40mg, Perindopril 80 mg.

Percentage cost variation of the costliest to the cheapest brands of the same class of ACE-Inhibitors was calculated. From this, we can know how many times the costliest brand costs more than the cheapest brands in each generic group.

Cost ratio = Maximum cost/Minimum cost

Percentage cost variation [12] was calculated by

$$\text{Cost variation (\%)} = \frac{\text{Maximum cost} - \text{Minimum cost}}{\text{Minimum cost}} \times 100$$

Statistical Analysis

Microsoft Excel 2013 was used for data analysis. Percentage cost variation and cost ratio were calculated. Data is represented in the form of table and charts.

Results

Tables 1 shows percentage cost variation of various ACE-Inhibitors. Wide variation in the prices of several brands of same ACE-Inhibitor was found in Indian pharmaceutical market. Among all ACE-Inhibitors, the highest percentage of price variation and cost ratio was seen in tablet Lisinopril 5mg of 4731.8 and 48.31 respectively, followed by tablet Enalapril maleate 5mg with price variation of 1214.28 and cost ratio of 13.14. Furthermore, Ramipril 5mg tablet with percentage of price variation and cost ratio of 1098 and 11.98 followed by Captopril 25mg(335.1, 4.35), Perindopril 2mg(217, 3.17), Quinapril 5mg(113, 2.13) and with the least Fosinopril 10mg(.1666, 1.001).

Table 1- Percentage cost variation of ACE-Inhibitors

Drug	Formulation	Strength in mg	Least expensive (INR)	Most expensive(INR)	Cost ratio	% cost variation	Mode	No. of brands
Enalapril maleate	Tablet	2.5mg	.6	2.5	4.16	316	.9	43
Ramipril	Tablet	5mg	.28	3.68	13.14	1214.28	1.50	54
	Tablet	10mg	1.20	5.80	4.833	383.33	3.90	35
	Tablet	20mg	3.20	5.53	1.72	72.81	nil	2
	Tablet	1.25mg	1.28	6.98	5.45	445.31	2.5	27
	Capsule	1.25mg	1.20	4.24	3.53	253.3	2.5	27
	Tablet	2.5mg	0.81	7.30	9.01	801.23	3.5	73
	Capsule	2.5mg	2.30	7.50	3.26	226.08	4.20	36
	Tablet	5mg	1.20	14.38	11.98	1098	7.2	78
	Capsule	5mg	3.00	11.22	3.74	274	7.50	37
	Tablet	10mg	6.35	17.04	2.68	168	8, 10	22
	Capsule	10mg	7.50	17.04	2.272	127	nil	14
Lisinopril	Tablet	2.5mg	1	5.31	5.31	431	2	31
	Tablet	5mg	0.22	10.63	48.31	4731.8	3.60	46
	Tablet	10mg	5	28.54	5.708	470.8	7	28
	Tablet	20mg	9.64	19	1.97	97	nil	3
Fosinopril	Tablet	10mg	6.00	6.01	1.001	.166	nil	2
	Tablet	20mg	11	11	1	0	11	2
Captopril	Tablet	12.5mg	1.58	2.60	1.645	64.55	nil	2
	Tablet	25mg	0.91	3.96	4.35	335.1	nil	4
Perindopril	Tablet	2mg	3.50	11.10	3.17	217	nil	5
	Tablet	4mg	6.50	13.07	2.01	101.07	nil	5
Quinapril	Tablet	5mg	1.95	4.16	2.13	113	nil	3
	Tablet	10mg	3.71	7.25	1.95	95.4	nil	3
	Tablet	20mg	7.04	12.30	1.747	74.7	nil	3

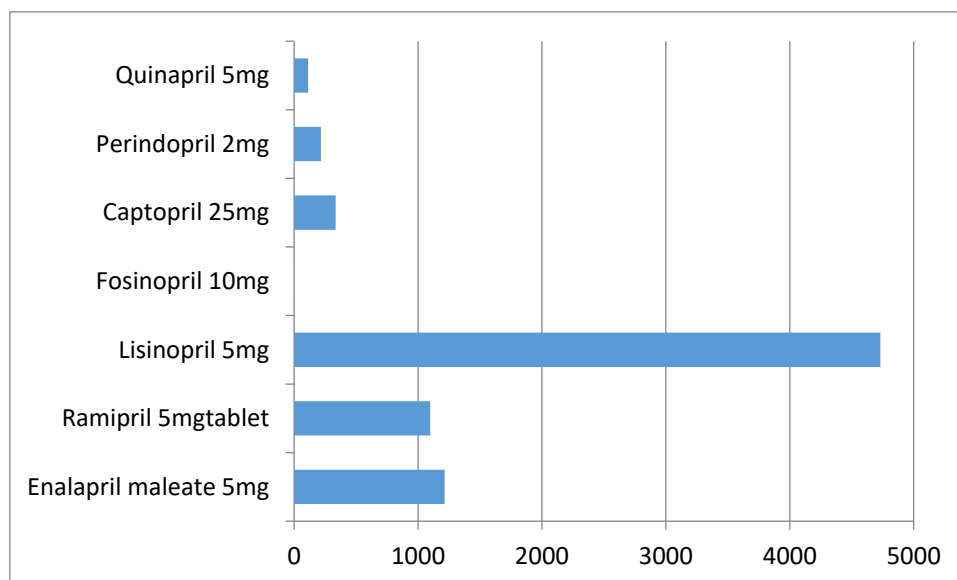


Figure 1 Percentage cost variation of ACE-Inhibitors

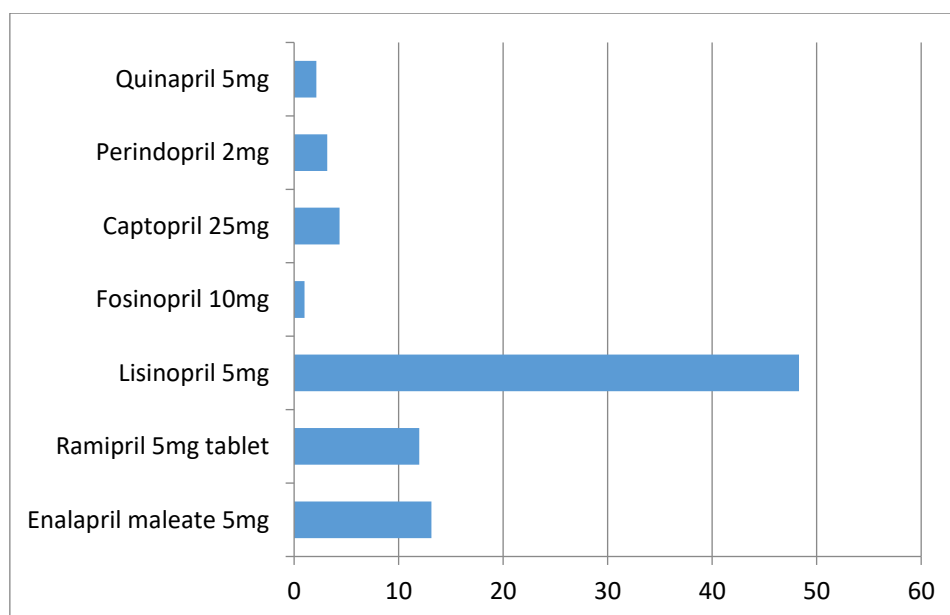


Figure 2 Cost-ratio of ACE-Inhibitors

Discussion

ACE-Inhibitors are used in hypertension which is a chronic disease and requires life-long treatment. [13]

In the present study it was found that there is a gross variation in percentage cost variation and cost ratio among ACE-Inhibitors with highest being Lisinopril 5mg(4731.8, 48.31) and least with Fosinopril 10mg(.1666, 1.001).

Study by Singal et al comparing branded and branded generic versions of drugs has found that both versions of drugs are identical in quality and that they fulfilled all criteria prescribed by regulatory authorities.[14]. In India majority of patients are paying out of their pockets for their medical bills and are not covered by insurance schemes therefore prescribing doctors should pay due importance to the drug prices in a country like India where more than 80% health financing is borne by patients. [15]

Drug Price Control Order (DPCO) and the National Pharmaceutical Pricing Authority (NPPA) are effective tools for regulation of drug prices.[16-18]

Drug regulatory authorities such as the National Pharmaceutical Pricing Authority (NPPA) through their schemes such as the Drug Price Control Order (DPCO) and Pradhan Mantri Jan Aushadhi Scheme monitor and regularize the prices of various brands of drugs.

Pradhan Mantri Jan Aushadhi Scheme ensures the availability of effective generic formulations at their centers all the time.[19] DPCO sets up a maximum price for the drugs included in their list marketed by various pharmaceutical companies.[20] However current scenario requires more regularization of drug pricing. In India, in 1979, 80–85% of the drugs in the market were under price control. The number has slowly decreased, and by 2002, only 15–20% of drugs were under price control.[8]

Limitations of the study

Limitation of this study is that the price variations of parenteral formulations of ACE-Inhibitors were not analysed.

Drug combinations are not included which is another drawback of this study.

Conclusion

There is a lot of price variation among the various brands of ACE-Inhibitors available in India. This can lead to partial or noncompliance by the patient as treatment of hypertension is prolonged in nature. The regulatory authorities should use their authority in controlling the price variation of such branded drugs. Also the physician should be aware of such differential pricing of medicines when prescribing different brands and generic drugs.

Expanding and regularly updating the NLEMI, Pradhan Mantri Jan Aushadhi Scheme, and DPCO would be considered beneficial for the same.

Ethical clearance- The study did not involve any human/animal subjects, and therefore, no ethical clearance was required.

Financial support and sponsorship- Nil.

Conflicts of interest- There are no conflicts of interest

References

- [1] Wadagbalkar, P., et al. "Cost Variation Analysis of ACE Inhibitors in India." *International Journal of Basic and Clinical Pharmacology*, vol. 6, 2017, pp. 1522–25.
- [2] Nasution, S. A. "The Use of ACE Inhibitor in Cardiovascular Disease." *Acta Medica Indonesiana*, vol. 38, no. 1, Jan.–Mar. 2006, pp. 60–64.
- [3] James, Paul A., et al. "2014 Evidence-Based Guideline for the Management of High Blood Pressure in Adults: Report from the Panel Members Appointed to the Eighth Joint National Committee (JNC 8)." *JAMA*, vol. 311, no. 5, 5 Feb. 2014, pp. 507–20.
- [4] Whelton, Paul K., et al. "2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines." *Journal of the American College of Cardiology*, vol. 71, no. 19, 15 May 2018, pp. e127–e248.
- [5] Williams, Bryan, et al. "2018 ESC/ESH Guidelines for the Management of Arterial Hypertension." *European Heart Journal*, vol. 39, no. 33, 1 Sept. 2018, pp. 3021–104.
- [6] Kuruvilla, A., et al. "Prescription Patterns and Cost Analysis of Drugs in a Base Hospital in South India." *National Medical Journal of India*, vol. 7, no. 4, 1994, pp. 167–68.
- [7] Eaddy, M. T., et al. "How Patient Cost-Sharing Trends Affect Adherence and Outcomes: A Literature Review." *P & T*, vol. 37, 2012, pp. 45–55.
- [8] Deepak, K. R., and A. Geetha. "Cost Variation Analysis of Various Brands of Anticoagulants, Fibrinolytics, and Antiplatelet Drugs Currently Available in Indian Pharmaceutical Market." *National Journal of Physiology, Pharmacy and Pharmacology*, vol. 9, no. 5, 2019, pp. 368–72.
- [9] Paunekar, A. P., and K. A. Bhav. "Cost Analysis of Oral Antidepressant Drugs Available in India." *National Journal of Physiology, Pharmacy and Pharmacology*, vol. 5, no. 5, 2015, pp. 1–5.
- [10] Kaiser Family Foundation. "The Burden of Medical Debt: Results from the Kaiser Family Foundation/New York Times Medical Bills Survey." KFF, 2015, [www.kff.org/health-costs/report/the-burden-of-medical-debt-results-from-the-kaiser-](http://www.kff.org/health-costs/report/the-burden-of-medical-debt-results-from-the-kaiser-family-foundation-new-york-times-medical-bills-survey/)
- [family-foundation-new-york-times-medical-bills-survey/](http://www.kff.org/health-costs/report/the-burden-of-medical-debt-results-from-the-kaiser-family-foundation-new-york-times-medical-bills-survey/).
- [11] Kennedy, J., and S. Morgan. "Cost-Related Prescription Nonadherence in the United States and Canada: A System-Level Comparison Using the 2007 International Health Policy Survey in Seven Countries." *Clinical Therapeutics*, vol. 31, no. 1, 2009, pp. 213–19.
- [12] Shankar, P. R., et al. "Ambiguous Pricing of Nepalese Medicines." *Journal of Institute of Medicine*, vol. 28, 2006, pp. 35–38.
- [13] Gujjarlamudi, Hima Bindu, et al. "Cost Analysis of ACE Inhibitors and ARBs Used in Essential Hypertension." *Asian Journal of Pharmacy and Pharmacology*, vol. 4, no. 3, 2018, pp. 275–79.
- [14] Singal, G. L., et al. "A Comparative Evaluation of Price and Quality of Some Branded versus Branded-Generic Medicines of the Same Manufacturer in India." *Indian Journal of Pharmacology*, vol. 43, no. 2, 2011, pp. 131–36.
- [15] World Health Organization. "Essential Drugs and Medicines: Drug Finance." *WHO India*, n.d., www.whoindia.org/EN/Section2/Section/Section16_0_959.html. Accessed 2 Oct. 2026.
- [16] Sakthivel, S. "Access to Essential Drugs and Medicines." *National Commission on Macroeconomics and Health*, edited by P. G. Lal, Ministry of Health, 2005, pp. 185–210.
- [17] Kumar, V., et al. "A Comparison between Old and Latest Systems in DPCO." *International Journal of Pharmacy and Pharmaceutical Sciences*, vol. 6, no. 2, 2014, pp. 19–20.
- [18] National Pharmaceutical Pricing Authority. *Compendium of Notified Ceiling Prices of Scheduled Drugs*. NPPA, 2015, www.nppaindia.nic.in/ceiling-price.
- [19] Bureau of Pharma PSUs of India. "Product List." Jan Aushadhi, 2020, janaushadhi.gov.in/ProductList.aspx. Accessed 26 Apr. 2023.
- [20] *Drugs (Prices Control) Order, 2013*. National Pharmaceutical Pricing Authority, 2019, www.nppaindia.nic.in/wp-content/uploads/2018/12/DPCO2013_03082016.pdf. Accessed 16 Apr. 2023.