Section: Pharmacology

Original Research Article

PHARMACOECONOMIC ANALYSIS OF VARIOUS ANTI-FUNGAL DRUG BRANDS CURRENTLY AVAILABLE IN INDIAN MARKET

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Received : 30/03/2025
Received in revised form : 18/05/2025
Accepted : 05/06/2025

Keywords:
Anti-fungal agents, Pharmacoeconomic analysis, Percentage cost variation, Cost ratio, Generic prescribing.

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DOI: 10.47009/jamp.2025.7.3.126

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2025; 7 (3); 652-655

ABSTRACT

Background: Incidence of both superficial and systemic fungal infections has increased significantly in India, placing financial burden on patients in addition to healthcare systems. The high variability in antifungal drug prices further complicates treatment accessibility. The objective is to evaluate the cost variation of antifungal drugs available in the Indian market by: (a) Compiling an exhaustive inventory of available antifungal drug strengths and dosage forms. (b) Assessing inter-brand cost variation and cost ratios. (c) Highlighting affordability issues and recommending corrective strategies. **Materials and Methods:** Data on drug prices were collected from the most recent (2024) editions of the Current Index of Medical Specialties (CIMS) and Indian Drug Review (IDR), along with market validation from local pharmacies. Cost ratio as well as percentage price fluctuation were computed for every formulation. Single-drug antifungal medications in oral, injectable, and topical forms were included. Fixed-dose combinations and drugs with incomplete data were excluded. **Result:** Among systemic formulations, Itraconazole 100 mg capsules showed the highest price variation (2000%) and cost ratio (21.0). Amphotericin B 50 mg injection showed the greatest disparity among injectables (1150.00% variation, cost ratio 12.50). Terbinafine 1% (15 g) cream exhibited the highest cost variation among topical formulations (823%, cost ratio 9.23). In contrast, some formulations showed minimal variation (e.g., Itraconazole 130 mg capsule, cost ratio 1.08). **Conclusion:** Considerable price variability exists among antifungal drugs sold in India, potentially compromising affordability and treatment adherence. Regulatory oversight and promotion of generic prescribing are recommended. Our analysis reveals that several antifungal medication brands have extremely wide pricing variations. By raising awareness and putting appropriate regulatory rules into place, generic prescribing should be encouraged nationwide.

INTRODUCTION

Fungal infections, both superficial and systemic, are increasingly reported across India due to environmental, behavioural, and treatment-related factors.[1,2] Superficial mycoses, commonly involving skin, nails, and mucosa, are particularly prevalent.[3,4] Deep mycoses are less common, but they can be difficult to diagnose and treat.[5]

Inappropriate topical corticosteroid use, a humid environment, inadequate hygiene, and subpar compliance are some of the contributing factors to this rise.[6–8] These infections have a major negative influence on patients' quality of life and place a financial strain on families and healthcare systems.[9] A study at AIIMS, New Delhi, revealed that antifungal treatments for 100 patients cost approximately ₹67 lakh (USD 80,350), with non-optimal therapies adding an additional ₹11 lakh (USD 13,800). Such data highlight the need to rationalize antifungal drug pricing.[10]

In India, there are multiple brands of antifungal drugs, which can result in significant price differences, making it challenging for doctors to select one and limiting patient access. In order to promote cost-effective prescribing, such variances are evaluated in this study.

Thus, the current study was designed to analyze the prices of several antifungal medication brands that are sold in India. The following objectives served as the basis for our study: (a) To create an exhaustive inventory of antifungal medication dosage forms and strengths that are offered in the Indian market. (b) To determine how much each formulation sold by different pharmaceutical businesses costs as a percentage. (c) To determine affordability by calculating the cost ratios among various formulas.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

MATERIALS AND METHODS

Investigation was performed at Department of Pharmacology of tertiary care teaching hospital of Madhya Pradesh. The "Current Index of Medical Specialties"(oct-jan.2025) and the "Indian Drug Review"(2024 issue 6) were used to find the price per unit of drug that was produced by various companies in same strength as well as dosage forms. The price of the tablets, capsules, injections and topical formulations was determined at pharmacy or drug stores nearby to our hospital.

The study did not include fixed dose combinations of antifungal drugs.

For injections, dose was taken as mg per ml of the solution. We computed the cost ratio and the percentage price difference for each formulation.

Using the formula below, the percentage difference in the medicine prices was determined.[1]

$$\text{Percentage cost variation} = \frac{\text{Price of most expensive brand} - \text{Price of least expensive brand}}{\text{Price of least expensive brand}}$$

Dividing highest cost by lowest cost yielded cost ratio. It's useful to know how many times most expensive formulation of identical drug costs more than least expensive one. Drugs manufactured merely by one company and drugs without cost information were excluded from current investigation.

Acquired data was entered into Microsoft Excel 2021. Calculations were made for cost ratio as well as percentage cost fluctuation.

Inclusion criteria

Drugs of same and varying strengths as well as antifungal medications from reputable manufacturers were included. Included were dosage formulations for antifungals in tablet, capsule, and injection form.

Exclusion criteria

Antifungal medications in fixed-dose combinations, in combination with other drug classes, and without price information were not included in the study.

RESULTS

A significant range in price was found when the prices of Systemic (oral and parenteral) and topical formulations were examined. A total of 15 antifungal drugs were studied. These included 6 systemic (oral/parenteral) and 9 topical agents.

- Systemic drugs: The oral medication with the largest price difference (2000%) was the 100 mg capsule of itraconazole.
- Amphotericin B 50 mg injection showed the highest variation among injectables (1150.00%).
- Topical drugs: Terbinafine 1% (15 g) exhibited the highest price variation (823%). Ketoconazole 2% (30 g) cream exhibited very little change (13.21%).

[Tables 1 and 2] include detailed information on cost ratios and price fluctuations for every formulation.

Table 1: The different available strength, maximum and minimum prices of each available strength, percentage price variations, and cost ratios for Oral and injectable antifungal drugs

Drug	No. of formulation	Name of formulation	Dose (mg or mg/ml)	No. of manufacturing companies	Min. price (INR) per unit	Max. price (INR) per unit	Cost ratio	%price variation
Amphotericin B	1	INJ	50	2	280	3500	12.50	1150.00
			5mg/ml	1	1253	7276	5.81	480.69
Clotrimazole	1	TAB	100	3	3.33	9.52	2.86	185.89
Fluconazole	4	INF	2mg/ml	2	108	119.44	1.11	10.59
	4	TAB	50	4	3.37	12.22	3.63	262.61
			150	50	3.20	64.65	20.20	1920.31
			200	15	7.80	42.20	5.41	441.03
			300	2	19.50	21.45	1.10	10.00
			400	8	23	34.85	1.52	51.52
		DIS-TAB	50	4	5.04	9.99	1.98	98.21
			150	3	10.30	22.31	2.17	116.60
		CAP	150	6	13.29	28.00	2.11	110.68
			200	4	9.50	35	3.68	268.42
Itraconazole	6	CAP	50	2	2.60	10.89	4.19	318.85
			100	44	9	189	21.00	2000.00
			130	2	23.20	25	1.08	7.76
			200	48	18	306	17.00	1600.00
		TAB	100	8	7.20	42.50	5.90	490.28
			200	16	13	76.50	5.88	488.46
			400	5	22	34.85	1.58	58.41
		SR-TAB	400	2	37	53.90	1.46	45.68
Ketoconazole	1	TAB	200	7	15	46.80	3.12	212.00
Terbinafine	1	TAB	250	35	9.79	89.07	9.10	809.81
			500	3	17	29.14	1.71	71.41

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 2: The various strengths of topical antifungal medicines that are available, along with the maximum and minimum prices for each strength, percentage price changes, and cost ratios.

Drug	Formulation	Strength & dose	No. of brands	Min. price (INR) per unit	Max. price (INR) per unit	Cost ratio	%price variation
Clotrimazole	Powder	1%-100gm	13	79	142	1.80	79.75
	Lotion	15ml	8	40	155	3.88	287.50
		30ml	7	36	225	6.25	525.00
	Cream	1%-15gm	4	36	94.5	2.63	162.50
		10mg -15gm	3	24	45.78	1.91	90.75
	Topical Solution	1%-15ml	3	30	60.88	2.03	102.93
	Gel	1%-10gm	2	37.2	78	2.10	109.68
		1%-15gm	2	63	120	1.90	90.48
Ketoconazole	Cream	1%-20gm	2	68.4	89	1.30	30.12
		2%-15gm	3	54.7	155	2.83	183.36
		2%-20gm	2	155	189	1.22	21.94
		2%-30gm	4	175	265	1.51	51.43
		2%-50gm	3	159	180	1.13	13.21
	Soap	2%-75gm	12	70	190	2.71	171.43
	Solution	2%-50ml	5	87	325	3.74	273.56
	Shampoo	2%-50ml	10	99.7	476	4.77	377.43
		2%-100ml	9	144	350	2.43	143.06
	Lotion	2%-50ml	6	198	312	1.58	57.58
		2%-100ml	8	189	494	2.61	161.38
	Ointment	2%-15gm	7	69.2	186	2.69	168.79
		2%-30gm	6	125	220	1.76	76.00
Luliconazole	Cream	1%-10gm	14	70	169	2.41	141.43
		1%-20gm	10	120	315	2.63	162.50
		1%-30gm	8	150	330	2.20	120.00
	Lotion	1%-10ml	8	28	208	7.43	642.86
		1%-15ml	2	175	250	1.43	42.86
		1%-20ml	18	170	422	2.48	148.24
		1%-30ml	5	220	304	1.38	38.18
Miconazole	Gel	2%-15gm	2	19	99	5.21	421.05
Butenafine	Cream	1%-15gm	2	50.05	109	2.18	117.78
Terbinafine	Cream	1%10gm	15	42	108.47	2.58	158.26
		1%15gm	16	13	120	9.23	823.08
		1%30gm	34	43.6	204	4.68	367.89
	Powder	1% 50gm	19	50	185	3.70	270.00
		1%100gm	7	92	299	3.25	225.00
Tolnaftate	Cream	10mg/g-10gm	2	11.5	31.1	2.70	170.43
Sertaconazole	Cream	2%-15gm	35	74.1	313	4.22	322.40
		2%-20gm	8	120	223	1.86	85.83
		2%-30gm	40	61.8	411	6.65	565.05

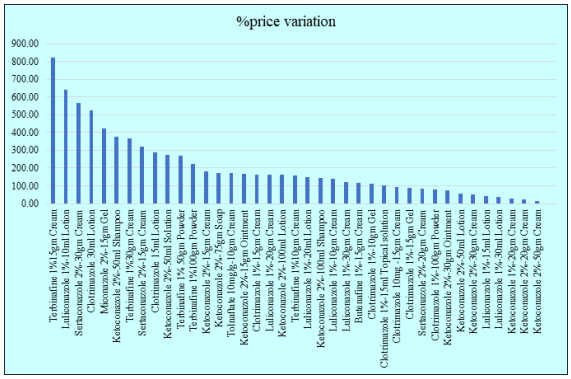

Figure 1: Price variation (%) among Topical anti-fungal drugs in descending order.

DISCUSSION

After analysing the result of our study, we found magnificent variation in cost of medicines. Among oral group, Itraconazole 100mg capsule had highest cost ratio while the lowest cost ratio was of Itraconazole 130mg capsule at 1.08. The results of the current analysis are similar to cost variation research performed by Tiwari et al exclusively on oral antifungal medications, which revealed that fluconazole 150mg (10214%) exhibited highest percentage cost variance.[11] This was also consistent with research done by Vegada et al.[12]

Among injectable group, Amphotericin B 50mg exhibited highest cost ratio of 12.50 and 1150.00 percentage price variation while Fluconazole infusion 2mg/ml have 10.59 percentage price variation and cost ratio of 1.11(lowest).

Our analysis shows that different antifungal drugs manufactured by distinct pharmaceutical companies in our country (India) had high-cost variations. This can be a major reason for lower compliance of the patients to the drugs which makes the disease longer lasting and difficult to treat. Patients are financially burdened by their long-term care. Additionally, it adds to the nation's economic burden.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Although generic medicines are available under the aegis of Pradhan-mantri Bhartiya Jan-aushadhi Pariyojna,[13] and are available at a cheaper rate, still doctors prefer to prescribe branded medicines.[14]
Cost-conscious prescribing should be encouraged through continuous medical education and integration of pharmacoeconomics into the medical curriculum. Regulatory bodies must consider capping price margins and monitoring price fluctuations.

CONCLUSION

There is considerable price variation among antifungal drugs marketed in India. These discrepancies can impede access to essential therapies, contribute to treatment non-adherence, and increase the financial burden on patients. Generic prescribing, improved awareness among physicians, and regulatory interventions are crucial to addressing these issues.
The medical curriculum must include a review of prescription drug expenditures, and by offering current and comprehensive details to the physicians about the pharmaceutical preparations' quality, pricing, and bioequivalence.
Based on the study's findings, it is imperative that the cost differences between the various brands of antifungal medications be controlled.

Limitations of the study

Our analysis contains brand references that are only accessible through the CIMS and IDR; many local brands aren't yet updated in these 2 sources. Single-manufacturer drugs and fixed dose combinations of both oral and topical were excluded from the study. Drug quality and therapeutic equivalence were not assessed.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556