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Assessing the economic value of oral antifungals: A comparison of branded and generic options in India

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Abstract: **Introduction**: India's pharmaceutical market is characterized by a significant presence of both generic and branded drugs, particularly for common ailments like fungal infections, which pose a substantial public health and economic burden. In tropical countries like India, superficial fungal infections are quite common, and frequent relapses after treatment have increased the need for long-term therapy, significantly increasing the cost of treatment, so the treatment of fungal infections can raise the economic burden on the patient. Given the high variability in drug pricing and the imperative for cost-effective healthcare, a pharmacoeconomic analysis comparing generic and branded oral antifungals in India is crucial to inform prescribing practices and optimize resource allocation. **Methods**: The cost of different brands of commonly used oral antifungals was sorted out by referring latest "Current Index of Medical Specialties" February- April 2025, and 1mg online pharmacy and the Janaushadhi website. The cost of 10 dosage forms (Tablets/capsules) in INR of each brand, Cost Ratio, and Percentage Cost Variation for individual drug brands was calculated. At last, the cost ratio and percentage cost variation of various brands were compared with generic drugs. **Results**: The data analysis showed a significant variation in the costs of different brands of oral antifungals in the Indian market. Percentage variation in cost for oral preparations of proton pump inhibitors marketed in India was found to be griseofulvin 500mg (886.2%), ketoconazole 200mg (3214.2%), fluconazole 200mg (1763%), itraconazole 200mg (38438%), terbinafine 250mg (3789.6%), posaconazole 100mg (8772.8%), voriconazole 200mg (8335.2%) and clotrimazole 100mg (856.9%). **Conclusion**: There is a wide variation in the prices of oral antifungals available in the market. Regulatory authorities, pharma companies, and physicians should maximize their efforts to reduce the cost of drugs. There is a need for strict actions for cost policy regulation and sensitization of doctors for the selection of appropriate drugs.

Keywords: Oral antifungals; Pharmacoeconomics; Cost variation; Branded drugs; Generic drugs; Cost analysis.

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INTRODUCTION

Fungal infections have been one of the most common clinical problems faced by humankind for decades in our country. Hot and humid conditions, dense population, and increasing burden of immunocompromising conditions have been major contributors to the incidence of superficial fungal infections like dermatophytosis, tinea infections, cutaneous mycoses, and fungal dermatoses, etc. Immunocompromised as well as healthy individuals are prone to develop fungal infections, and the mortality among infected patients may be as high as 75-100% [1], which continues to challenge clinicians in both diagnosis and management. In the recent COVID-19 pandemic, too, there was an increased number of Mucormycosis (also known as black fungus) for up to 28,000 cases from 2019 to June 2021 [2].

They can be broadly classified into superficial, subcutaneous, and systemic fungal infections, of which Cutaneous Tinea infection (superficial) accounts for the highest number of cases [3]. The provisional estimate of the incidence of serious fungal diseases in India accounts for about 57 million cases annually [4]. Quality of life of the patients is compromised because of the skin disorders, as they are not individually associated with increased physical, psychological, and social suffering, whereas they also elevate the financial burden [5].

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India, with an approximate total population of 1.4 billion implies to consume 1.26 million defined daily doses (DDD) per day approximates 460 million DDDs per year, showing an increased economic burden due to the antifungal medications [6]. Oral antifungal drugs available in the Indian market include fluconazole, itraconazole, ketoconazole, terbinafine, and griseofulvin in various strengths[7]. A wide range of branded as well as generic formulations of aforementioned drugs are available, reflecting the status of the Indian pharmaceutical industry as one of the largest in the world [8].

Considering all the above-mentioned problems in the present day and insufficient information regarding the cost, quality variations between various brands and generic formulations, it complicates the prescribing decisions for clinicians. The objective of this study remains in analysing the price differences across brands of the same generic antifungal medications available in India.

Objectives of the study

To analyse the cost variation of oral anti-fungal medications for fungal infections of various brands available in Indian market.

METHODOLOGY

The present study was conducted over a period of three months, from February to April 2025, and involved a comprehensive market-based analysis of the pricing patterns of oral antifungal drugs available in India. Data on drug prices were collected from multiple reliable and regularly updated sources, including the January 2025 edition of the *Current Index of Medical Specialties (CIMS)*, the 1mg online pharmacy platform, and the official Pradhan Mantri Bhartiya Janaushadhi Pariyojana (PMBJP) website. Among these, 1mg was considered the primary source due to its extensive database and wide representation of available pharmaceutical brands. As the study did not involve any human or animal subjects or clinical intervention, it was exempted from review by the Institutional Ethics Committee.

A systematic approach was followed for data collection and analysis. Initially, all available brand names and generic versions of selected oral antifungal drugs, including their fixed-dose combinations (FDCs), were identified for specific strengths and dosage forms (tablets and capsules). The total number of brands and generic formulations for each drug was recorded by cross-verifying information across the selected sources. Subsequently, the cost of each formulation was standardized by considering the price of 10 tablets or capsules for uniform comparison. The minimum and maximum prices for each drug formulation were identified by sorting the collected data. These values, along with the number of brands and generics available, were systematically tabulated separately for individual drugs and combination formulations.

To evaluate price variability, the cost ratio was calculated as the ratio of the maximum price to the minimum price for the same drug and strength across different manufacturers, including both branded and generic versions. In addition, the percentage cost variation was computed using the formula:

Percentage Cost Variation = *(Maximum Cost−Minimum Cost)/ Minimum Cost × 100*

Furthermore, a comparative analysis of cost ratios between branded and generic formulations was performed to assess the extent of price differences and identify potential disparities in affordability across different categories of manufacturers.

Statistical analysis

The collected data was entered in Microsoft excel 2021 and analysed for percentage cost variation and cost difference of individual drugs. The findings expressed in number and percentages.

RESULTS

We tabulated the price of 8 oral antifungal drugs available in different formulations and strengths from Current Index of Medical Specialties (CIMS), the 1mg online pharmacy, and the Janaushadhi website over three months (February-April 2025). Table 1 shows number of companies manufacturing oral antifungal drugs in India, maximum cost, minimum cost, cost ratio and % cost variation of 10 tablets/capsules.

Table-1: Cost variation of oral antifungal agents in India

Drug	Strength	Formulations	Manufacturing companies	Min cost (Rs)	Max cost (Rs)	Cost ratio	% cost variation
Griseofulvin	125mg	5	5	7.9	19	2.4	140
	150mg		1	14.4	14.4	1	0
	250mg		21	13.37	19.2	1.4	43.6
	375mg		8	17.9	40.66	2.27	127.1
	500mg		44	29.1	287	9.86	886.2
Ketoconazole	200mg	1	236	17.5	580	33.14	3214.2
Fluconazole	50mg	5	57	9.2	120	13.04	1204.3
	100mg		5	45.25	85.25	1.88	88.3
	150mg		751	110	131	1.19	19.1

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	200mg		126	7.3	136	18.63	1763
	400mg		75	53.25	330	6.19	519.7
Itraconazole	100mg	3	2	58.25	101.75	1.74	74.6
	200mg		140	9.75	3757.5	385.38	38438
	400mg		20	290	2665	9.18	818.9
Terbinafine	250mg	3	805	14.14	550	38.89	3789.6
	500mg		121	53.3	511.4	9.59	859.4
	1000mg		1	360	360	1	0
Posaconazole	100mg	2	19	118	10470	88.7	8772.8
	300mg		3	135	7755	57.4	5644.4
Voriconazole	50mg	3	15	287.5	7925	27.56	2656.5
	100mg		1	497	497	1	0
	200mg		84	235.25	19844	84.35	8335.2
Clotrimazole	100mg	2	22	20.2	193.3	9.56	856.9
	200mg		9	101.8	210	2.06	106.2

Cost variation of oral antifungal agents available in India, showing the number of brands and generics, minimum and maximum cost (per 10 tablets/capsules), cost ratio, and percentage cost variation.

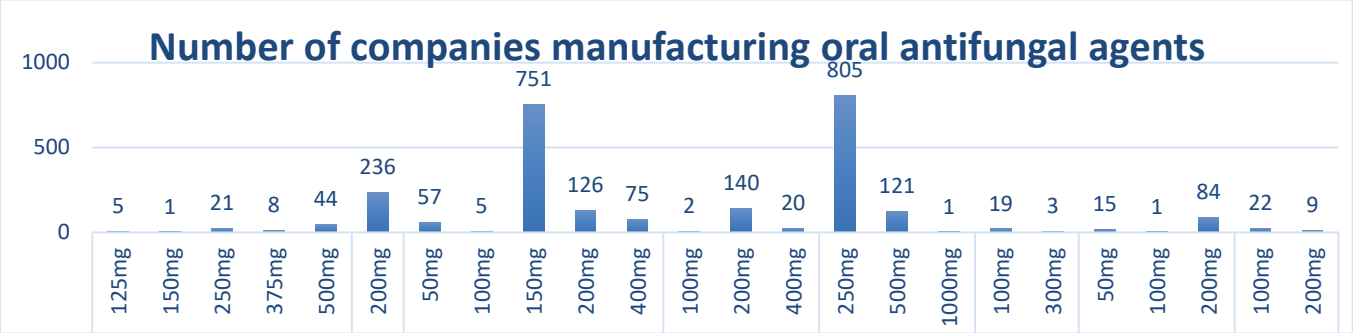

Fig-1: Bar graph of oral antifungals manufactured by companies.

Bar graph showing the number of oral antifungal formulations manufactured by different pharmaceutical companies included in the study.

Terbinafine 250mg was found to be highest manufactured by pharmaceutical companies with over 805 different companies. Griseofulvin 150mg, Tebinafine 1000mg, and Voriconazole 100mg were manufactured the least, each of them by 1 manufacturing company. Itraconazole 200mg showed highest % cost variation of **38,438** showing its high demand and higher rate of prescription by clinicians.

We have compared the minimum cost, maximum cost and cost difference between generic antifungal agents and branded antifungal agents which has been tabulated in Table 2.

Table-2: Comparison between prices of generic and branded oral antifungal agents in India

Drug	Strength	Generic price (A)	Min cost(Rs)	Max cost(Rs) (B)	Cost difference
Ketoconazole	200mg	28	17.5	580	552
Fluconazole	150mg	50	110	131	81
Terbinafine	250mg	38	14.14	550	512
Itraconazole	100mg	55	58.25	101.75	46.75

Comparison of generic and branded oral antifungal agents in India, presenting differences in pricing along with minimum and maximum cost per 10 tablets/capsules, cost ratio, and percentage cost variation.

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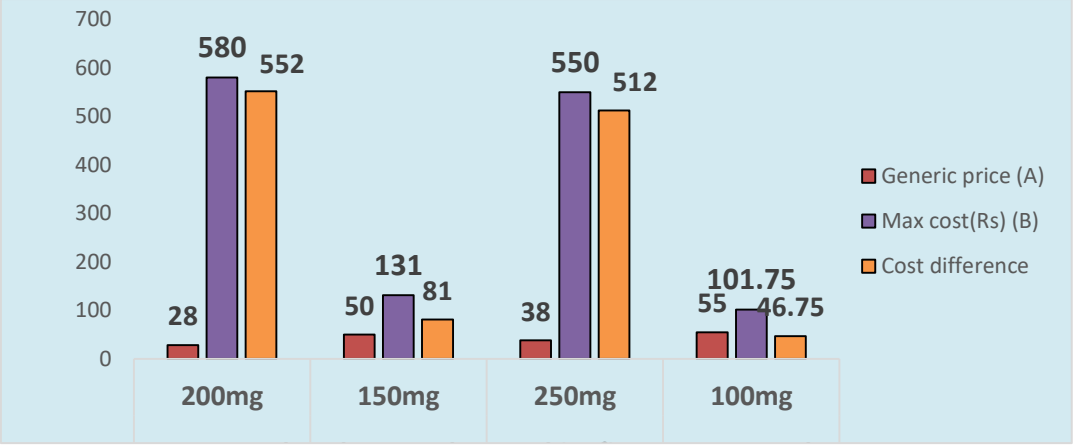

Fig-2: Cost variation of generic and branded oral antifungals

Graph illustrating the cost variation between generic and branded oral antifungal agents, highlighting differences in pricing across formulations.

After comparing generic and branded oral antifungal medications we found that there was a high price difference of Rs. 552 for 10 tablets of Ketoconazole 200mg and a least difference of Rs. 46.75 for 10 tablets of Itraconazole 100mg. The results point towards the increased variation of cost among the generic and branded oral antifungal medications.

We also analysed the number of oral antifungal agents available in the market under Rs. 100 from which we found that all the 4 generic formulations (Ketoconazole 200, Fluconazole 150, Terbinafine 250 and Itraconazole 100) were priced below Rs. 60 for 10 tablets and only 2 branded oral antifungals(maximum cost) were available below Rs. 100 which are Griseofulvin 125mg, 150mg, 250mg, 375mg, and Fluconazole 100mg.Figure 3 shows the price range of generic and branded oral antifungal medications ranging from Rs. 1- Rs. 100 for 10 tablets.

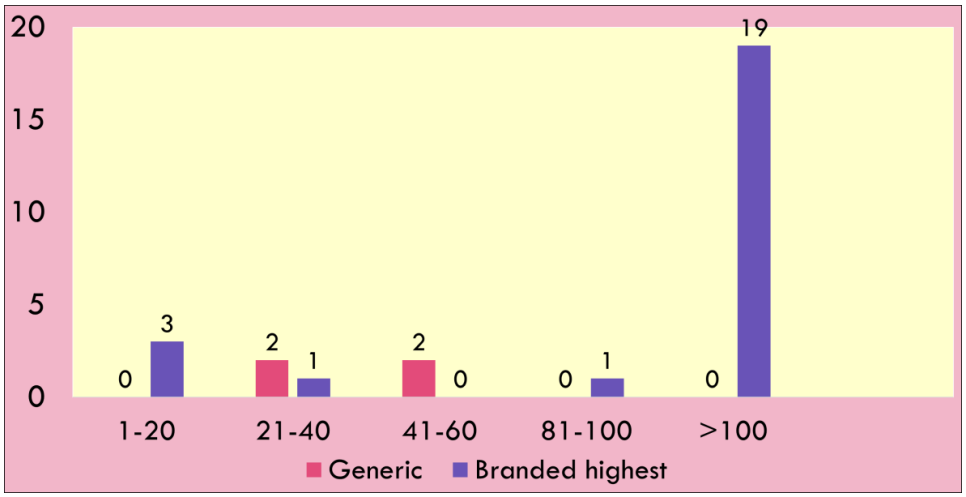

Fig-3: Price range of generic and branded oral antifungal agents within a price range of Rs. 1- Rs. 100

Distribution of prices of generic and branded oral antifungal agents within the range of ₹1 to ₹100.

DISCUSSION

Higher price ranges of the medications are not only a problem for patients but also for the policy makers and service providers. Price of the medications prescribed plays an important role in compliance to the treatment by the patients and indirectly adds up to the healthcare burden of the country. The trust of patients on several brands drives them to purchase the expensive medications but a standard price range has to be setup so that it is equally accessible to all the socio-economic class of patients.

This study has shown a high cost ratio and percentage cost variation of most of the branded oral antifungal agents. Cost ratio of the drugs varies from 1 to 385.38 which shows a huge price difference when compared to generic drugs. Similarly percentage variation cost variation also ranges from as low as 0 to as high as 38438%.

In a cost analysis study of various topical and oral antifungal medications for supficial fungal infections in India by Spoorthy HV et al, also showed that Itraconazole 200mg (805%) had maximum percentage

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cost variation which is in consistent with the findings of present study [7].

It has become a difficult task for physicians to decide among the various formulations of oral antifungal agents available in the market as there are many manufacturing companies marketing the same drug in different price brackets. Increased number of manufacturing companies with wide price range leads irrational prescription of the drugs and an economic burden to the patient. A systematic review done by Alan et al has confirmed that the awarness about cost variation would help the physicians in improving the prescription pattern and would rationalise them [9].

Generic oral antifungal agents are markedly lower when compared to branded drugs and are also equally effacious to that of branded oral antifungal agents [10]. Lack of trust on the efficacy of generic drugs due to quality hindrance becomes one of the major reasons for not prescribing them widely and preferring branded drugs over them [11].

Government issued an order called Drug price control order (DPCO) to fix prices of drug which cannot be sold at a price higher than that fixed by the government.Hence strict actions have to be taken so as to adhere to the guidelines and set the price range rationally.

Pharmacoeconomic analysis plays an important role as it helps in programme justification, drug policy decisions, treatment guidelines and therapeutic decision making directly benefitting the society, patients and physicians [12].

Limitations

The limitation of our study is that it includes only references of brands which are available only in CIMS, 1mg website and Jan Aushadi website so it misses out many other brands which are available locally in stores and have not been updated on the websites. Other limitation also includes that fixed dose combination (FDC) of oral antifungals and other class of drugs has not been included even though they are very commonly prescribed by physicians in today's date.

CONCLUSION

From this study we found that there was a wide variation in cost of generic and branded oral antifungal agents in Indian market. As they are very commonly prescribed, compliance of it plays a crucial role in the improving the health care burden of our country, so strict actions are needed to be taken by cost policy regulation (DCGI) to reduce the economic burden on the patients and improve the compliance to treatment.

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Ethical Statement: None

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