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Cost variation analysis of commonly prescribed drugs in dentistry available in the Indian market

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ABSTRACT

Context: Access to healthcare stands as fundamental to human rights under the UN charter. Pharmaceutical costs are the fastest-growing healthcare expense. There is a significant variation in the cost among different brands of the same drug. Various economic evaluation techniques are used to analyze the cost of medicines. **Aim:** The present study aims to analyze the cost variation of commonly prescribed drugs manufactured by various pharmaceutical companies under different brand names.

Materials and Methods: The minimum and maximum cost in rupees (INR) of drugs used in dentistry manufactured by various pharmaceutical companies of the same strength were recorded. The cost of 10 tablets or capsules was calculated. The cost ratio and percent cost variation were determined for each drug.

Results: A significant variation was found in the cost of different brands of the same drugs. A percent cost variation of 1300% was found for Metronidazole 500mg, followed by 520% for Ibuprofen 400mg. Significant percent price variations were also observed for Tramadol 50 mg (477.7%), Levocetirizine 10mg (354.5%), Diclofenac 50 mg (260%), Cefixime 200 mg (224%), and Tetracycline 500 mg (218%).

Conclusion: Since there is a significant cost variation among different brands of the same drug, clinicians need to consider drug costs while prescribing medication to patients.

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1. Introduction

The Indian population is largely affected by oral health problems such as dental caries, periodontal diseases, oral cancer, etc. According to the Ministry of Health and Family Welfare, dental caries affects over 60% of Indians, while periodontal disease affects nearly 85% of them. India is considered the global capital for oral cancer. Due to the COVID-19 pandemic, drug usage has surged, highlighting the need for further research into the reasons behind the rapidly rising prices of essential medicines. The high cost of dental care significantly impacts household budgets, particularly in lower-income countries like India, where comprehensive insurance coverage is lacking. Apart

from the cost of dental treatment, the uncontrolled and unregulated pricing of various brands of medications plays a major role in determining accessibility and affordability. General practitioners and dentists must be mindful of the cost factor, which is subject to periodic change.¹

Medications account for 60–70% of gross healthcare expenditure in India. Drugs commonly used in dentistry include antibiotics, analgesics, corticosteroids, muscle relaxants, and others. Most drugs are available under different well-known brand names, often with significant variations in prices. The cost variation of these drugs affects the oral health care of patients. To help ensure that the average consumer has access to affordable medicines, the Indian government formulated the National List of Essential Medicines (NLEM).²

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One of the areas of healthcare expenditures with the greatest growth is pharmaceutical costs, which are rising more quickly than other healthcare-related expenses.³ The global pharmaceutical market is projected to exceed \$1.5 trillion by 2023, with a compound annual growth rate of 36%.⁴ Affordable drug prices play a crucial role in ensuring equitable access to quality healthcare services in developing nations like India. Besides the safety and efficiency of the drugs, affordability and availability are also considered when including drugs in the National List of Essential Medicines. The global market is saturated with drugs manufactured by numerous pharmaceutical companies under different brand names, resulting in substantial variations in their cost despite having the same formulation and composition. This is attributable to the rapid expansion of the pharmaceutical industry.⁵

Patients typically purchase the amount of drugs they can afford rather than the amount required for total treatment. Prescribing more affordable and cost-effective drug brands can help reduce pharmaceutical expenses and overall healthcare expenditures. While expecting a physician to know the exact cost of every brand of drug on the market is unrealistic, it would be beneficial if they had some idea of how much different brands of the same medication can cost.³ The physicians and dentists should follow rational prescriptions and provide the patient with the medication they need in the required amount and with the right formulation—all for a price they can afford.

The objective of this study is to evaluate the difference in cost of similar formulations of drugs manufactured by various pharmaceutical companies under different brand names and find their cost ratio and percent cost variation.

2. Materials and Methods

The maximum retail price of various brands of drugs commonly used in dentistry was obtained from official pharmaceutical price lists and drug databases.

1. The minimum and maximum cost in rupees (INR) of drugs with the same strength, manufactured by various pharmaceutical companies, were recorded.
2. The cost of 10 tablets or capsules of each drug was calculated and rounded off to the nearest whole number.
3. The cost ratio, i.e., the ratio of the cost of the most expensive to the cheapest brand of the same drug, was calculated. This indicates how many times the cost of the most expensive brand exceeds the cost of the cheapest brand within each generic group.
4. The percentage cost variation was calculated as follows: $\text{Percent cost variation} = (\text{Maximum Cost} - \text{Minimum Cost}) / \text{Minimum Cost} * 100$.
5. The cost ratio was calculated as follows: $\text{Maximum} / \text{Minimum Price}$.

2.1. Inclusion criteria

The most commonly prescribed drugs in dentistry are oral preparations of various classes of antibiotics, analgesics including NSAIDs and opioids, corticosteroids, antiviral, antifungal, antihistamines, muscle relaxants and mouthwash (chlorhexidine). Only adult drug formulations were considered in the study.

The brands of drugs selected were based on most commonly available and prescribed drugs by the dental practitioners in India. The brands used are Mankind, Sunpharma, Microlabs, Cipla, Abott, Dr. Reddy, Cadila healthcare, ICPA, Safron, Alkem etc. Certain selected drug formulations have only limited brands available; therefore other not so common brands were also included in determining cost variations.

2.2. Exclusion criteria

1. Drugs not commonly prescribed by dental practitioners were not included.
2. Rarely used brands and newer drugs were excluded.
3. Drug formulations manufactured by a single pharmaceutical company were excluded.
4. Generic (non-proprietary) brands were excluded.
5. Paediatric formulations, injectable drugs, and topical preparations were excluded from the analysis.

3. Results

This study reveals a significant variation in the prices of different brands of the same drug, as shown in Table 1. The highest cost ratio of 14 and a percent cost variation of 1300 were found for Metronidazole 500mg Tab, followed by the cost ratio of 6.2 and a percent cost variation of 520 for Ibuprofen 400mg.

Tramadol 50mg (477.7%), Levocetirizine 10mg (354.5%), Diclofenac 50mg (260%), Cefixime 200mg (224%), Tetracycline 500mg (218%), Amoxicillin 250mg (200%), Fexofenadine 120mg (193.3%), Ketoconazole 200mg (188.8%) were other significant percent cost variations.

4. Discussion

Pharmaceutical costs are the fastest-growing health-care expense.⁶ It is evident from our study that there is a significant price disparity among the frequently prescribed brand names of medications in dentistry. These medications, marketed by various drug manufacturers in similar formulations, showed cost ratios ranging from 2 to 126 for a single drug. An increase in the number of manufacturers producing a certain drug formulation often leads to the availability of generic (non-brand) drugs, which are generally more affordable than their branded counterparts.⁷

Table 1: Cost ratio and percent cost variation along with maximum and minimum cost of various commonly prescribed drugs in dentistry

Group	Drug	Strength	Max cost	Min cost	Cost ratio	Percent cost variation (%)
Antibiotics	Amoxicillin	250 mg	75	25	3	200
		500 mg	144	69	2.1	108.7
		625 mg	201	123	1.6	63.4
	Amoxicillin + Clavulanic Acid					
	Azithromycin	500 mg	240	120	2	100
	Erythromycin	250 mg	53	45	1.17	17.7
	Metronidazole	500 mg	140	10	14	1300
	Amoxicillin + Lactic Acid Bacillus	500 mg	196	140	1.4	40
	Cefixime	200 mg	350	108	3.2	224
	Ciprofloxacin	250 mg	34	21	1.6	61.9
	Levofloxacin	500 mg	100	75	1.3	33.3
Antifungals	Tetracycline	500 mg	35	11	3.1	218.1
	Doxycycline	100 mg	43	8	5.3	43.7
	Ketoconazole	200 mg	468	162	2.8	188.8
Antifungals	Fluconazole	150 mg	200	110	1.8	81.8
	Itraconazole	100 mg	237	118	2	100.8
Antivirals	Acyclovir	800 mg	594	308	1.9	92.8
	Famciclovir	500 mg	1095	946	1.15	15.7
Analgesics	Ketorolac tromethamine	10 mg	88	46	1.9	91.3
	Diclofenac	50 mg	72	20	3.6	260
	Aceclofenac + Paracetamol	425 mg	112	41	2.7	173.1
	Ibuprofen	400 mg	31	5	6.2	520
	Celecoxib	200 mg	253	128	1.9	97.6
	Tramadol	50 mg	52	9	5.7	477.7
Antiepileptics	Carbamazepine	200 mg	21	15	1.13	40
	Gabapentin	100 mg	162	75	2.16	116
Corticosteroids	Prednisolone	10 mg	16	12	1.3	33.3
	Dexamethasone	0.5 mg	2.3	2	1.15	15
Antihistamines	Cetirizine	10 mg	19	18	1.05	5.5
	Levocetirizine	10 mg	200	44	4.5	354.5
	Fexofenadine	120 mg	220	75	2.9	193.3
Muscle relaxants	Aceclofenac + Paracetamol + Chlorzoxazone	675 mg	100	70	1.4	42.8
Mouthwash	Chlorhexidine	200 ml	206	115	1.79	79.1

In India, a study by Das M. et al. in 2017⁸ reported that over 90% of patients believed generic drugs were as effective as branded drugs. However, in another study by Ahire K. et al., 80% of the participants showed concerns about their potency and greater side effects.⁹ It was also found that despite the belief that generics are inferior and less potent than branded medications, patients from low socio-economic backgrounds prefer them due to their low therapeutic cost. Generic drug use in India remains limited due to the limited availability of quality formulations, despite economic benefits.

The noise level in the news regarding drug prices has been at an all-time high. The entire system, including patients, the insurance sector, legislators, boards of directors, CEOs, and stockholders of companies associated with the production and retailing of pharmaceuticals, is to blame. Each of these has a direct or indirect negative impact on the problem. Patients who pay for prescription drugs in cash or those without insurance coverage who do not benefit from prescription drug discounts are the ones most affected by the high cost of medications.¹⁰

Patient compliance is critical for the complete resolution of the ailment. When patients take their prescription medications at the doses and frequencies advised by their doctor, they are considered medication compliant. However, the cost of medication is a key determinant of patient adherence to therapy.¹¹ Other factors that may contribute to non-compliance aside from the cost of medication include side effects, treatment complexity, and a lack of understanding of the treatment regimen. Though a lot is known about the efficacy, safety, and suitability of drugs, the cost factor is often ignored. Patients from wealthier sectors of society may overlook the cost factor, but for many individuals, the high cost of medicine poses a significant challenge. Non-compliance is often driven by the patient's financial limitations, and practitioners' insufficient awareness of drug costs can exacerbate this issue.^{12,13} In the absence of knowledge of comparative prices, it becomes difficult for the practitioner to provide the treatment as per the patient's needs, particularly financially. To ensure patient compliance, practitioners should be aware of treatment expenses and prescribe the most economical medication without compromising safety, efficacy, or efficiency.¹⁴

The significant price discrepancies between affordable and costlier medications are consistently underappreciated and ignored by practitioners, leading to the prescription of more expensive medications with well-known brand names when more affordable alternatives are available. This can result in patient non-compliance. Clinicians must prioritize cost-effectiveness when writing prescriptions, as the superiority of expensive brands over affordable ones has never been scientifically demonstrated. Providing patients with more affordable options can improve adherence to treatment.¹⁵

The high cost of prescription drugs can be attributed to various factors, including the high cost of drug development, pharmaceutical company monopolies, and strong lobbying power. To address this issue, policy changes have been proposed, such as limiting the duration of patent protection, expediting the approval of generics and biosimilars, implementing price increase caps, establishing nonprofit generic manufacturing managed by the government or philanthropic organizations, value-based pricing, and compulsory licensing.¹⁶

The WHO adopted a resolution in May 2019 to improve transparency in medicine markets to expand access. The resolution calls for the public sharing of information on prices, pharmaceutical patents, and clinical trial results. It urges governments to support transparency efforts and monitor their impact on affordability and availability.¹⁷

The physicians can generate specific treatment guidelines that take cost into account. Ensuring the prescription of the most affordable and economical brand requires proper training, especially for interns who may be unaware of cost variability.¹⁸ Pharmacoeconomics education should

be integrated into the undergraduate medical curriculum, and training should be provided to interns and residents. By doing so, we may foster cost-conscious prescribing practices among healthcare professionals and increase awareness of the economic implications of treatment choices without compromising patient care.¹⁹

By implementing these changes, we can work toward a more cost-effective and accessible healthcare system for patients, providing them with essential medications at affordable prices.

5. Conclusion

The study concludes that the price of common prescriptions and formulations sold under different brand names vary markedly. When prescribing drugs for treatment, clinicians must consider the cost of medications, which is essential for promoting patient adherence and ensuring access to treatment for patients from different socioeconomic backgrounds and opt for alternative, cheaper brands are available. Therefore, it is crucial to provide proper training and education to dental practitioners on pharmacoeconomics. By raising awareness of cost variations, clinicians can make informed and cost-effective decisions, benefitting both patients and the healthcare system.

6. Limitations

This study offers a general overview of the cost variance across various popular medicine brands in dentistry. However, the importance of cost-conscious prescribing extends beyond this study's scope. Further research is warranted to examine the impact of cost variation on patient compliance and to explore interventions that can enhance healthcare professionals' awareness of drug costs. By continuing to investigate these areas, we can contribute to more sustainable and efficient healthcare systems that prioritize patient well-being and affordability.

7. Source of Funding

None.

8. Conflict of Interest

None.


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