

# Prescriptions audit for antibiotics among outpatients in the department of periodontics

## ABSTRACT

**Aims:** The aim of this study was to audit prescriptions for antibiotics for cost optimization in outpatients undergoing periodontal treatment.

**Study design:** A prospective cross-sectional study.

**Place and Duration of Study:** This study was done at a dental college in Himachal Pradesh from August 2020 to July 2021.

**Methodology:** 849 patients agreed to share their data, 614 of whom received antibiotics. The demographic information, the name of the given antibiotic, dosage form, dose, strength, frequency, and the reason for prescribing were gathered. Antibiotic monotherapy and multitherapy prescriptions were evaluated. Antibiotics prescribed by the NLEM 2015 were calculated. For cost minimization evaluation, the price of prescribed antibiotics in branded and generic names was calculated in INR. The results were calculated using descriptive statistics and presented in frequency and percentage.

**Results:** This finding shows irrationality and out-of-pocket expenses in antibiotic prescribing. The most common diagnosis was periodontitis. Only 74.5% of all antibiotics prescribed were from the NLEM 2015. The most often recommended antibiotic was a fixed-dose combination of Amoxicillin + Clavulanic acid (61.2%) and accounts for 87.80% of the total cost of 146669.82 INR. Only 9.7 % of antibiotics were prescribed with a generic name.

**Conclusion:** Generic names and prescribing from essential drug lists play a critical role in the treatment and prevention of a wide variety of diseases on a worldwide scale by providing cost-effective healthcare coverage.

**Keywords:** antibiotics, prescription, NLEM, generic medicine, cost

## INTRODUCTION

Health is an outcome, a way of life, that society values.<sup>[1]</sup> WHO defined it as "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity".<sup>[2]</sup> There is a link between oral diseases and general health.<sup>[2,3]</sup> It is a basic right that is not enjoyed by everyone, and the global burden of oral diseases continues to be high.<sup>[4]</sup> It is estimated that more than 3.5 billion people worldwide suffer from oral diseases and related conditions.<sup>[3]</sup>

Periodontal diseases affect 90 percent of the world's adult population.<sup>[5]</sup> It is an inflammatory microbial infection of the periodontal apparatus that causes the degeneration of connective tissue and dental bone support.<sup>[6]</sup> The two primary types are gingivitis and periodontitis. People of all ages have gingivitis, which is a condition that affects the gums and can be cured. Periodontitis, on the other hand, affects the entire structure of the gums and can cause the loss of a tooth.<sup>[7]</sup>

The periodontal diseases present a challenge in terms of antibiotic regimen selection due to the fact that it is a mixed microorganism infection. Antibiotics are targeted against specific components of the oral biofilm. Tetracycline, metronidazole, penicillin, macrolides, ciprofloxacin, and clindamycin are the

most commonly used antimicrobials in periodontal treatment.<sup>[7]</sup> Antimicrobials can be used locally to achieve concentrations not attainable systemically. However, systemic antibiotics affect all microbes of the oral cavity. This may be useful when the periodontopathogens are spread throughout the mouth.<sup>[8]</sup>

Antibiotics save lives by preventing the spread of life-threatening infections.<sup>[9]</sup> Antibiotics are frequently prescribed by dentists for a variety of infectious conditions. But the overuse and misuse lead to antibiotic resistance, which makes it more difficult for the public health care system to treat people.<sup>[10]</sup> About 10% of antibiotics are prescribed by dentists.<sup>[9]</sup> Antibiotic overuse by dentists has been extensively documented in the number of nations.<sup>[9]</sup> Overuse and misuse of antibiotics is also linked to a rise in the cost of health care.<sup>[11]</sup>

Drug use studies are critical for estimating disease prevalence and spending on drugs.<sup>[12]</sup> In the National Health Policy 2017, it is mandated that prescriptions, including antibiotics, be audited in hospitals and the community.<sup>[13]</sup> As part of the government's effort to make medication more affordable and accessible to the general population, NLEM is a vital component.<sup>[14]</sup>

There is a lack of data on pharmacoeconomics in dentistry. There have been no pharmacoeconomic evaluations of antibiotics provided to outpatients in the periodontics department. As a result, it is critical to understand the justification for its use and expenditure. The purpose of this study was to evaluate prescriptions in order to analyse and optimise the cost of antibiotic therapy.

## METHODOLOGY

A prospective cross-sectional study was carried out among outpatients in the Department of Periodontics in Himachal Pradesh from August 2020 to July 2021 after getting the approval of the institutional ethics committee, vide no. [hdc/ethical/pharma/2019/28](#). Following the purposive sampling technique, the study included all patients undergoing periodontal treatment and being prescribed antibiotics. Prescriptions for outpatients were used to extract the information after the consent of the patient. A total of 849 patients agreed to share their information, of which 614 patients were prescribed antibiotics. Demographic information, the name of the prescribed antibiotic, dosage form, dose, strength, frequency, and the reason for prescribing were collected. Prescriptions with monotherapy and with multiple therapies of antibiotics were scrutinized. The percentages of antibiotics prescribed in generic names and prescribed from the National List of Essential Medicine (NLEM) 2105 were calculated. Antibiotic costs were calculated and presented in INR for pharmacoeconomic analysis. CIMS was used to find out the price of branded drugs, and the website of the Pharmaceutical and Medical Devices Bureau of India was used to find out the price of generic drugs. The data were collected and entered into Microsoft Excel. The results were calculated using descriptive statistics and presented in frequency and percentage.

## RESULTS

Periodontitis was the most commonly diagnosed disease (46.5%). The cases of the tooth and prosthesis-related factors were the second most common, with 34.8% of patients receiving treatment for partial edentulism. (Table 1)

A total of 614 patients have been prescribed 689 antibiotics. Males have prescribed 400 antibiotics, of which 297 were for systemic route and 103 for local oral use. In the case of females, 289 antibiotics were prescribed, of which 244 were for systemic route and 45 for local oral use.

Out of total prescriptions, single antibiotics were prescribed in 87.7% of prescriptions. Two antibiotics were prescribed only in 12.2% of the prescriptions, with the majority of those prescriptions being for gingival recession, mucogingival deformities, and conditions. The majority of systemic antibiotics were prescribed for periodontitis, followed by partial edentulism. The majority of local oral use antibiotics were also prescribed for periodontitis, followed by a gingival recession in mucogingival deformities and conditions. (Table 1)

**Table 1 Description of Antibiotics prescribed with a diagnosis**

Category of Disease	Diagnosis	no. of prescription	Systemic Antibiotics	Non-Systemic Antibiotics	Total Antibiotics
Periodontal Health, Gingival Diseases and Conditions	Gingivitis	1	0	1	1 (0.1%)
	Gingival Diseases	12	12	0	12 (1.7%)
Periodontitis	Necrotising Periodontal Diseases	5	5	0	5 (0.7%)
	Periodontitis	286	214	96	310 (44.9%)
Other conditions affecting periodontium	Systemic diseases/conditions affecting periodontal supporting tissues	5	5	0	5 (0.7%)
	periodontal abscesses and endodontic periodontal lesions	16	16	0	16 (2.3%)
	Mucogingival deformities and conditions	51	51	46	97 (14.0%)
	Tooth and prosthesis related factors	214	214	0	214 (31.0%)
Peri-implant Diseases and conditions	Peri-implant mucositis	9	9	4	13 (1.8%)
	peri-implantitis	15	15	1	16 (2.3%)
<b>Total</b>		<b>614</b>	<b>541</b>	<b>148</b>	<b>689</b>

A total of eight antibiotics were prescribed for systemic use and one local oral formulation containing an antibiotic. Only 74.5% of antibiotics prescribed were from the NLEM 2015. The two prescribed antibiotics named ofloxacin, the fixed-dose combination of Ofloxacin + Ornidazole, and a local oral formulation containing the antibiotic Metronidazole were not on the list.

The most common antibiotic was a fixed-dose combination of Amoxicillin + Clavulanic acid (61.2%), followed by Metronidazole (5.8%) and Ofloxacin +Ornidazole (3.77%) (Table 2).

**Table 2 Antibiotics with prescription frequency**

Sr.No.	Systemic antibiotics	Frequency (N)	Percentage (%)
1	Amoxicillin + Clavulanic Acid	422	61.24
2	Metronidazole	40	5.8
3	Ofloxacin + Ornidazole	26	3.77
4	Amoxicillin	18	2.61
5	Clindamycin	18	2.61
6	Doxycycline	14	2.03

7	Ofloxacin	2	0.29
8	Cefixime	1	0.14
	<b>Local oral formulation containing antibiotic</b>		
1	Chlorhexidine gluconate + Lidocaine + Metronidazole	148	21.48

Only 9.7% of antibiotics and local oral formulations containing antibiotics were prescribed with generic names. A fixed-dose combination of Amoxicillin + Clavulanic Acid was mostly prescribed in brand names with a price range of 295.35 INR to 343.50 INR and accounts for 87.80% of the total cost of 146669.82 INR of prescribed antibiotics. Local formulations containing Metronidazole account for 6.3% of the total cost following Ofloxacin + Ornidazole (2.4%) and Clindamycin (2.2%). (Table 3)

**Table 3 Cost of antibiotics prescribed**

Sr. No.	Drug prescribed	Prescribing frequency	Unit Size (Tab)	Frequency of prescribing generic name	No. of brand name	Single-dose price of branded drugs (INR)	The total cost of prescribed drugs (INR)	Single-dose price of generic drugs
1	Amoxicillin + Clavulanic Acid	422	15	0	3	20.05, 19.69, 22.9	128776.35	8.7
2	Ofloxacin + Ornidazole	26	10	1	1	14.32	3605.5	2.5
3	Clindamycin	18	20	18	1		3240	9
4	Amoxicillin	18	15	18	1		864	3.2
5	Metronidazole	40	15	13	2	1.43, 1.42	692.97	0.6
6	Cefixime	1	10	1	1		50	5
7	Doxycycline	14	5	14	1		91	1.3
8	Ofloxacin	2	10	2	1		26	1.3
9	Chlorhexidine gluconate + Lidocaine + Metronidazole	148	1*	0	1	63	9324	
	<b>Total</b>	<b>689</b>		<b>67</b>			<b>146669.82</b>	

\*Local oral preparation

## DISCUSSION

Irrational drug usage is a worldwide problem that involves a variety of actions, such as prescribing medications under brand names, polypharmacy, and over-prescribing of antibiotics.<sup>[15]</sup> Drug usage studies and pharmacoconomics are beneficial for determining drug use trends and identifying high-cost medications.<sup>[16]</sup> In this study, we evaluated the prescriptions, including antibiotics, for rationality and cost-effectiveness. We found irrationality and out-of-pocket expense in prescribing antibiotics.

The most prevalent diagnosis was periodontitis, followed by partial edentulism. Periodontitis is a chronic inflammatory disease and the contributing factors include bacterial infections, destructive host immunological responses, and environmental variables like smoking.<sup>[17]</sup> Shrestha et al., also found periodontitis as the most prevalent.<sup>[18]</sup> The common causes of partial edentulism are caries, periodontal problems, impactions, traumatic injuries, cystic and neoplastic lesions.<sup>[19]</sup> Dental caries and periodontal disease are two of the leading causes of tooth loss.<sup>[20]</sup> The fixed-dose combination of Amoxicillin + Clavulanic acid was most commonly prescribed to patients with periodontitis and partial

edentulism. Soares et al., also found the combination of Amoxicillin + Clavulanic acid to be more effective than Amoxicillin alone in odontogenic infections.<sup>[19]</sup> Abukaraky et al., Camachoet., and Sanchez et al., also reported this combination as the best option for partial edentulism when an implant is placed.<sup>[20-22]</sup>

Two antibiotics were prescribed to individuals diagnosed with gingival recession, one of which was intended for systemic usage and the other was for local oral use. This may be due to the complicated nature of the subgingival microbial habitat.<sup>[8]</sup>

Around 75% of antibiotics were from NLEM 2015. In different studies, Patel et al., reported 85.03% of drugs<sup>[23]</sup> and Shrestha et al., found 32.36 % of drugs<sup>[24]</sup> were prescribed from the essential medicine list in dental outpatient departments. According to WHO, it should be 100%.<sup>[25]</sup> The drugs on this list were chosen for their public health relevance, efficacy, safety, and comparative cost effectiveness.<sup>[14,23]</sup> Prescribing from the list should be promoted for rational use of drugs.

A fixed-dose combination of amoxicillin + clavulanic acid was the most recommended antibiotic in this study. Similar findings were reported by El-Kholey et al.,<sup>[26]</sup> and Shrestha et al.,<sup>[24]</sup> in different studies. The cost of a fixed-dose combination of Amoxicillin + Clavulanic acid could be reduced by prescribing the generic name from 128776.35 INR to 55071INR. The cost of Ofloxacin could be reduced from 3605.5 INR to 650 INR and for Metronidazole from 692.97 to 360. There was a total cost of 146669.82 INR for the antibiotics that were prescribed. If generics had been used, the cost would have been 60352 INR.

In this study, only 9.7% of the antibiotics that were prescribed had generic names. It is very low when compared to the other studies by Shrestha et al., who reported 63.26 %<sup>[24]</sup> and Rachmawati et al., who reported 79.5%.<sup>[27]</sup> Generic medicines are critical in the treatment and prevention of several diseases all over the world since they lower the cost and increase affordability.<sup>[28,29]</sup>

## CONCLUSION

Generic drugs are essential in providing cost-effective healthcare coverage. Physicians need to be encouraged to prescribe more generics and from EDLs. The promotion of generic pharmaceuticals should be based on evidence-based information on generic medications' quality, efficacy, and cost-effectiveness.

## RECOMMENDATION

Janaushadhi Kendra should have sales representatives for the promotion of generic medicine like pharmaceutical companies.

## COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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