



(RESEARCH ARTICLE)



Use of cefpodoxime in ENT infections in Indian patients in the real-world setting

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Abstract

Background: Cefpodoxime has good antimicrobial activity against aerobic gram-positive, gram-negative and anaerobic organisms. This study was conducted to understand the preference for use of cefpodoxime in the treatment of ear, nose and throat infections and their patient outcomes by Indian health care providers (HCPs).

Methods: This questionnaire-based study was conducted among Indian HCPs. A questionnaire comprising 20 questions explored preferences of HCPs for the use of cefpodoxime in the last 10 patients for managing ENT conditions.

Results: A total of 131 HCPs were included in the study. Recurrent cases were reported by 71% of HCPs in at least 3 out of 10 patients. Non-response to antibiotics in 2 out of 10 patients was noted by 32.82% of HCPs, 27.48% of HCPs saw non-response in more than 3. Most patients had moderate to severe pain before treatment, and after cefpodoxime administration, 94% of HCPs reported symptom improvement. No fever was observed by 88.85% of HCPs after treatment, while 62.6% saw resolution within 2 days. Cough resolved more slowly, with some sputum persisting beyond 4 days. Before treatment, 92.36% of HCPs described cases with moderate to severe erythema, but post-treatment, 71.76% of HCPs observed only mild erythema, and severe cases dropped significantly to just 4.58%. The majority of HCP (77.86%) used cefpodoxime before surgery, and 94.66% used it post-surgery. It was also prescribed at the highest rate by 96.95% of HCPs in otitis media management. Overall efficacy of cefpodoxime was rated as excellent by 70.99% of HCPs.

Conclusion: Indian HCPs are adapting cefpodoxime sensibly in improving patient outcomes in ENT infections.

Keywords: Organisms; Antibiotics; Tonsillar pharyngitis; Erythema; Otitis media

1. Introduction

Upper respiratory tract infections (RTI) or ear, nose and throat (ENT) infections are commonly occurring in children [1]. Common cold, sore throat, whooping cough, pneumonia, bronchitis, pharyngitis, laryngitis and otitis media are among the most widespread infections. They spread through inhalation of pathogenic organisms from the air and by direct contact [2]. Most common agents responsible for ENT are *Streptococcus pneumoniae*, *Streptococcus aureus*, *Haemophilus influenzae*, *Moraxella catarrhalis*, and *Pseudomonas aeruginosa*.

First-line treatments usually administered in the management of ENT infections are analgesia and control of symptoms [3]. Commonly used antibiotics like penicillin, erythromycin and azithromycin have proved insufficient in treatment of

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infections like recurrent acute pharyngo-tonsillitis due to antibiotic resistance [4]. To overcome antibiotic resistance third-generation antibiotics can be explored.

Cefpodoxime is known to have antimicrobial activity against gram-positive and gram-negative bacteria. It also works against anaerobic microbes [5]. It demonstrates a more balanced spectrum of activity against key bacterial pathogens responsible for outpatient respiratory tract and other infections compared to commonly used amoxicillin or earlier-generation oral cephalosporins [6].

Healthcare practitioners (HCPs) are increasingly recognizing the importance of judicious use of antibiotics in the treatment of ENT. In managing conditions such as pharyngeal erythema, tonsillar erythema, otitis media, and their associated symptoms the choices made by HCPs regarding drug selection play a pivotal role in determining patient outcomes.

Exploring the selection of drugs by HCPs can offer valuable insights for improving upper respiratory tract care strategies in Indian context. Despite its widespread use, real-world data on the effectiveness and prescribing patterns of cefpodoxime among Indian HCPs remain limited. Therefore, the present study was conducted to understand the preference of drug choice and their outcomes by Indian HCPs in ENT infection.

2. Methods

2.1. Study design

This questionnaire-based study was designed to evaluate the real-world use of cefpodoxime in managing ENT infections among HCPs across India. Participation in the study was completely voluntary. All study-related information, including the questionnaire, was thoroughly explained to participants and verbal consent was obtained before participation. The study process, along with the data analysis, ensured the confidentiality and anonymity of the HCPs.

2.2. Study questionnaire

The study questionnaire was designed based on existing literature, clinical guidelines, and expert opinions. It consisted of 20 questions focusing on ENT infections, occurrence of infection, use of antibiotics, grade of different infections, patient response to treatment and ease of symptoms. The questionnaire focused on last 10 patients with ENT infections, treated with cefpodoxime. The study protocol was approved by the independent ethics committee (ACEAS-Independent Ethics Committee, Ahmedabad, Date of approval: 12 Aug 2024).

2.3. Data collection method

Participants in the study were provided with a concise overview of the study's nature and the process for completing the questionnaire. The questionnaire was given to the HCP either in person, via phone calls, or through online platforms, as per the HCP's convenience.

2.4. Data analysis

Responses to questions were entered into Microsoft excel. Descriptive analysis was performed and outcome was presented as percentages.

3. Results

A total of 131 HCP were included in this study. Majority of HCP (71%) reported that occurrence of recurrent tonsillar pharyngitis was 3 or more than 3 out of 10 patients in their practice while 9.92% of HCP reported single occurrence.

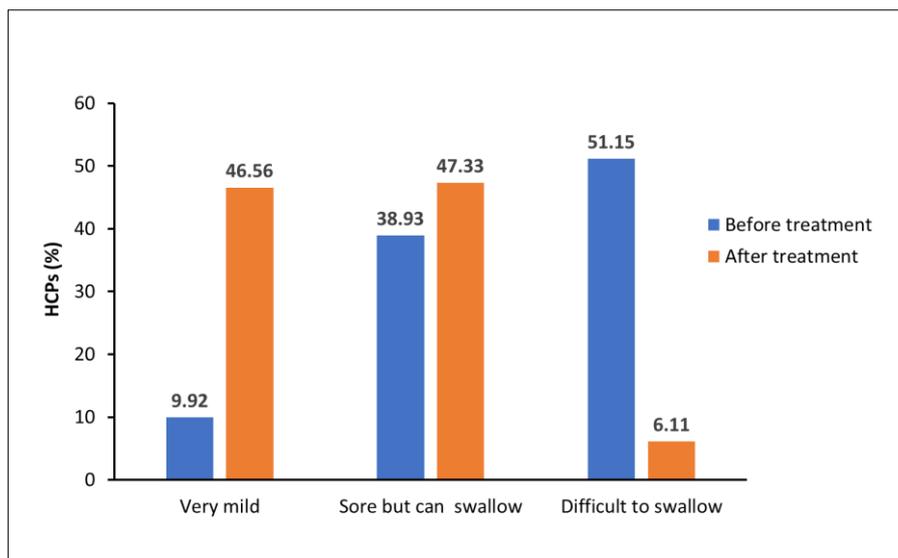
Clinicians shared their experience with 10 patients who had been treated with antibiotics and did not respond. A total of 32.82% of HCPs reported that 2 out of 10 patients had been treated with other antibiotics or amoxicillin- clavulanate earlier but had not responded. Additionally, 27.48% of HCPs encountered cases where more than 3 out of 10 patients experienced antibiotic non-response (Table 1).

Table 1 Response of HCPs to recurrent tonsillo pharyngitis and antibiotic non response

Option	Response of HCPs (N=131)
Patients with recurrent tonsillo pharyngitis	
1/10 patients	13 (9.92)
2/10 patients	25 (19.08)
3/10 patients	46 (35.11)
>3 patient	47 (35.88)
Patients had been treated with other antibiotics earlier and had not responded	
1/10 patients	18 (13.74)
2/10 patients	43 (32.82)
3/10 patients	34 (25.95)
>3 patient	36 (27.48)
Patients had been treated with amoxicillin clavulanate earlier and had not responded	
1/10 patients	26 (19.85)
2/10 patients	43 (32.82)
3/10 patients	30 (22.90)
>3 patient	32 (24.43)

Data represented as n (%). HCPs, health care providers.

According to 90.08% of HCPs, most patients experienced moderate to severe sore throat pain before starting cefpodoxime. A majority (51.15%) reported severe pain with difficulty swallowing, while 38.93% noted moderate pain. Only 9.92% observed very mild or no pain. Following treatment, 94% of HCPs observed improvement, with 46.56% reporting very mild or no pain and 47.33% noting only mild residual symptoms (Figure 1).



HCPs, health care providers.

Figure 1 Grade of sore throat noted by HCPs before and after treatment with cefpodoxime

Before treatment moderate fever (100–102°F) was most commonly observed by 55.73% of HCPs, mild fever (99–100°F) was noted by 25.19% of HCPs, while 15.27% observed cases with fever in the 101–102°F range and only 3.82% of HCPs reported cases with high fever exceeding 102°F. After treatment significant improvement in fever was observed; 88.85% of HCPs reported no fever, while others reported fever in the range of 100–101°F.

Notable reduction in pharyngeal erythema after cefpodoxime treatment was observed by HCPs. Before treatment 92.36% of HCPs accounted for cases with moderate to severe erythema, but post-treatment, 71.76% of HCPs observed only mild erythema and response of HCPs dropped to 4.58% in the case of severe cases. Substantial reduction in tonsillar erythema after cefpodoxime treatment was seen. Before treatment, nearly half (48.85%) of HCPs reported severe tonsillar erythema, but after treatment just 4.58% of HCPs recorded it. Additionally, mild cases rose dramatically from 9.16% to 73.28%, indicating that most patients had near-complete resolution of inflammation (Figure 2).

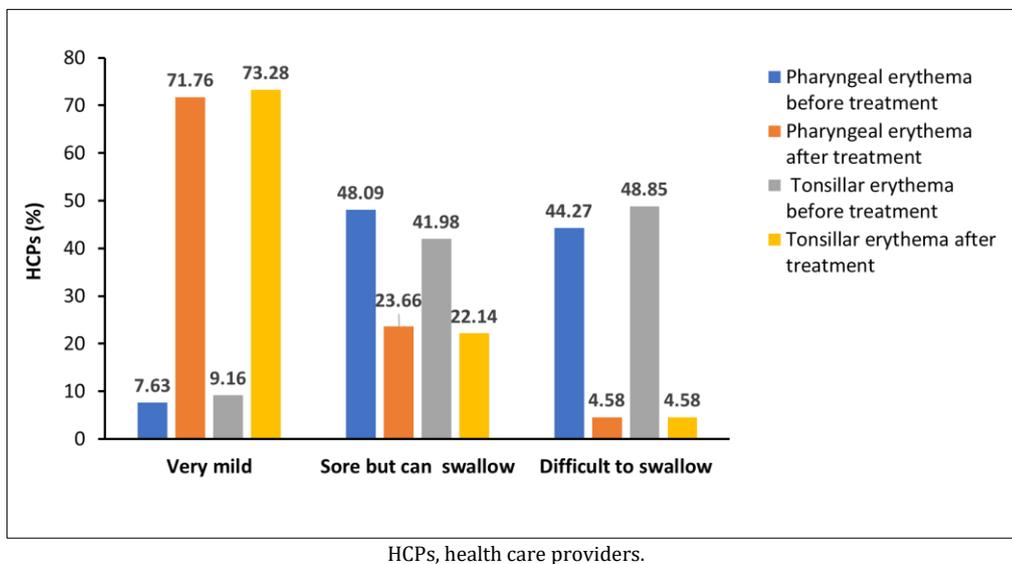


Figure 2 Grade of pharyngeal and tonsillar erythema noted by HCPs before and after treatment

A majority of HCPs (91.6%) noted that patients had moderate to severe exudates before treatment but post-treatment, 73.28% HCPs observed no visible exudates, suggesting a strong response to cefpodoxime (Figure 3).

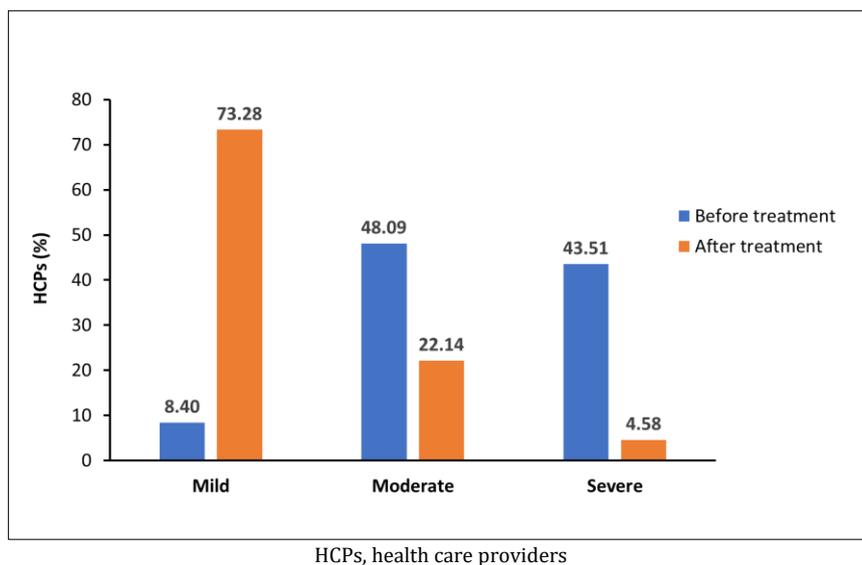
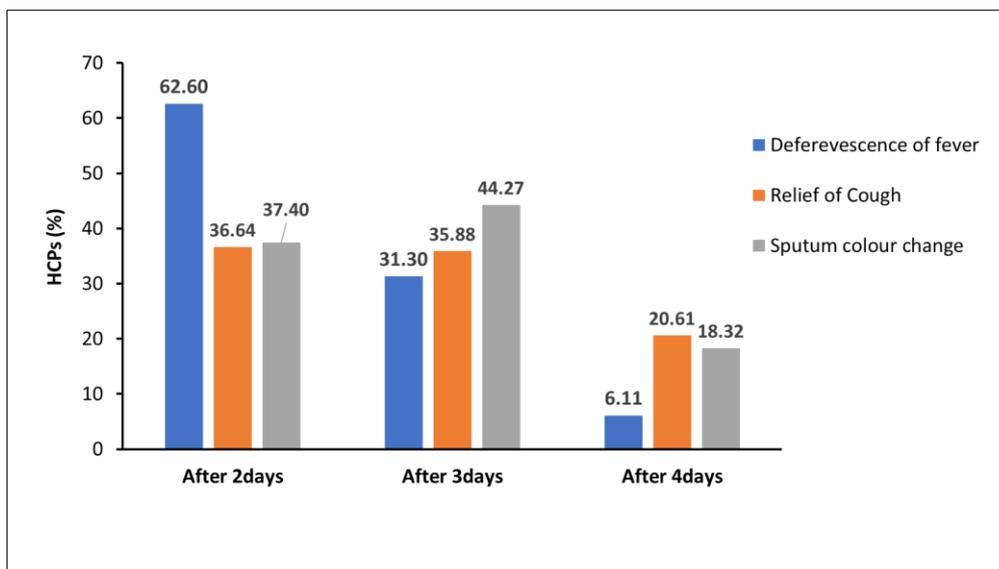


Figure 3 Grade of tonsillar exudates and plugs noted by HCPs before and after treatment with cefpodoxime

The majority (62.6%) of HCP experienced fever resolution in patients within 2 days, while 31.30% of HCPs noted fever reduction in 3 days. Only a small proportion (6.1%) had a fever persisting beyond 4 days, indicating a generally rapid response to cefpodoxime treatment. Cough resolution was more gradual compared to fever. By day 2, 36.64% of HCP noted relief in patients, which increased to total of 72.52% of HCP observing a reduction by day 3. However, 6.87% of HCPs noted continued cough beyond 4 days in patients, suggesting that cough symptoms take longer to resolve than fever. Sputum clearance took longer, with 18.32% of HCPs experienced purulent sputum beyond 4 days (Figure 4).



HCPs, health care providers.

Figure 4 Resolutions of symptoms noted by HCPs

A majority (77.86%) of HCP use cefpodoxime as prophylaxis before ENT surgery. However, 22.14% of HCP did not prescribe it. Postoperatively, cefpodoxime use was even higher, with 94.66% of HCP prescribing it to prevent infections after surgery. The highest prescription rate of cefpodoxime (96.95%) by HCPs was observed in otitis media management. The majority of HCPs (70.99%) rated cefpodoxime as excellent, while 29.01 rated it as good (Figure 5).

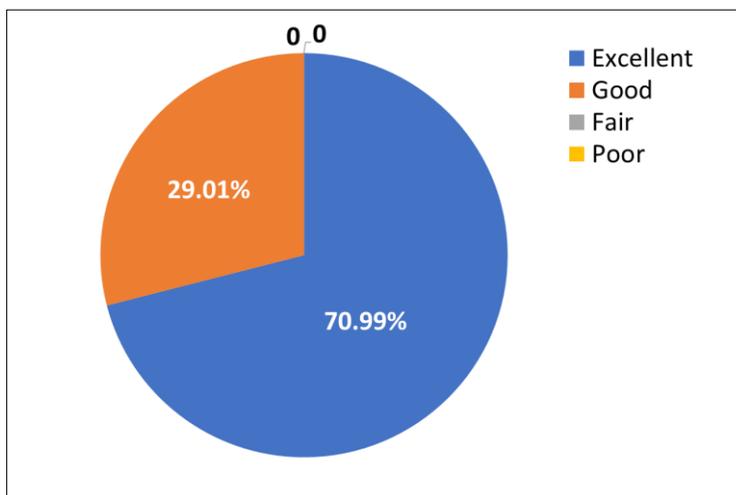


Figure 5 Overall clinician's global impression of cefpodoxime

4. Discussion

The present study successfully obtained insights into use of cefpodoxime in ENT infections by Indian HCPs. The high recurrence rate (71%) suggests that tonsillar pharyngitis is a persistent issue among patients, potentially due to incomplete eradication of infections, reinfection, or underlying conditions. Antibiotic resistance is a growing concern in the treatment of tonsillar pharyngitis, with over 32.82% of HCPs reporting antibiotic non-response in at least 2 out of 10 patients. This showed considerable level of treatment failure due to antibiotic resistance or suboptimal drug selection. Earlier study employing penicillin and erythromycin have also reported recurrence of acute pharyngo-tonsillitis [4]. Treatment failure underscores need of alternative treatment strategies.

Following treatment with cefpodoxime 94% of HCPs observed improvement in sore throat pain and 88.85% HCPs reported fever resolution. A study by Hamid et al. reported, in Egyptian adults cefpodoxime was effective in managing

acute maxillary sinusitis and pharyngotonsillitis [2]. Cefpodoxime has shown to be effective in treatment of typhoid fever in children with 86% efficacy [7].

The study indicates a significant reduction in both pharyngeal and tonsillar erythema following cefpodoxime treatment. Drop in severe cases of pharyngeal erythema was observed by HCPs, 92.36% of HCPs reported cases with moderate to severe erythema before treatment while 71.76% of HCPs observed only mild erythema after treatment. In tonsillar erythema 48.85% of HCPs reported severe erythema before treatment while severe cases decreased to 4.58% and mild cases increased from 9.16% to 73.28% after treatment. Thus, cefpodoxime acts as a potent option for managing upper respiratory tract infections [2].

The study data clearly demonstrates a considerable decrease in presence of severe tonsillar exudates from moderate and severe to mild thus highlighting its effectiveness in managing pharyngotonsillitis.

Resolution of fever was observed within 2 days by 62.6% HCPs whereas cough relief was gradual, with 36.6% of HCPs observing improvement by day 2 and 72.5% by day 3. Sputum clearance was the most prolonged, with 18.3% of HCPs observing purulent sputum beyond 4 days. Cefpodoxime proves strong effectiveness in reducing fever associated with ENT infections. However, attention to the management of lasting cough and sputum is vital for comprehensive patient care.

In the present study, majority of HCPs (77.86%) opted to use cefpodoxime prophylactically, which aligns with guidelines recommending antibiotics for infection prevention in surgeries with a higher risk of postoperative complications [8]. A smaller percentage (22.83%) chose not to prescribe it, possibly due to low-risk calculations or substitute treatments. This equilibrium reflects both adherence to clinical guidelines and individualized patient care. In the current study, the majority of HCPs (94.66%) followed common clinical practice by prescribing cefpodoxime post-operatively in last 10 patients to prevent infections.

Most clinicians (96.95%) used cefpodoxime to treat otitis media, reflecting adherence to guidelines and its effectiveness in managing moderate or severe bacterial middle ear infections [9].

Cefpodoxime was rated excellent by 70.99% of HCP reflecting its effectiveness and safety, positioning with clinical guidelines and studies supporting its use in treating various bacterial infections.

5. Conclusion

Cefpodoxime has shown significant efficacy in addressing tonsillitis, pharyngitis, otitis media, and other related conditions. In this study cefpodoxime was mainly used for patients with severe conditions. This aligns with guidelines of clinical research that recommend antibiotics like cefpodoxime for more severe cases of bacterial infection. It's high effectiveness, favorable clinician impressions, and widespread use suggest that it is a reliable choice for treating ENT conditions. However, continued monitoring for antibiotic resistance and judicious use are essential to maintain its efficacy.

Compliance with ethical standards

Disclosure of conflict of interest

All authors have no conflict of interest to declare.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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