Expert opinion on the prescription practice of cefpodoxime in the management of respiratory tract infections in Indian settings

ABSTRACT

Background Cefpodoxime's prodrug form was absorbed and de-esterified by enterocytes to release the active metabolite, and it shows good in vitro activity against bacterial pathogens causing common RTIs. It was unknown, nevertheless, how clinicians considered about cefpodoxime.
Objective:To gather expert opinion on the use of cefpodoxime in the management of respiratory tract infections (RTIs) in Indian settings.
Methodology: The cross-sectional survey utilized a 19-item, multiple-response questionnaire to gather expert opinions from specialists with expertise in managing RTIs. The survey encompassed questions about current prescription practices, clinical observations, preferences, and experiences related to the use of cefpodoxime in routine settings for RTI management. The data were analyzed using descriptive statistics.
Results: Approximately 53% of the clinicians reported prescribing cefpodoxime in cases of upper respiratory tract infections (URTIs), while 44% of them indicated using it for lower respiratory tract infections (LRTIs). Cefpodoxime emerged as the most commonly prescribed antimicrobial agent for treating URTIs, as reported by 86% of the clinicians. Majority (86.02%) of the clinicians favored cefpodoxime as the oral drug of choice for treating acute otitis media. More than half (68.34%) of the clinicians indicated prescribing cefpodoxime for approximately 5 to 7 days in cases of URTIs. The advantages of cefpodoxime, including its broad spectrum, favorable pharmacokinetic profile, and good bacteriological and clinical efficacy, were acknowledged by 65% of clinicians.
Conclusion: The survey findings corroborated cefpodoxime as a widely used antibiotic in Indian settings for managing URTIs and acute otitis media. Clinicians reported that its broad-spectrum coverage, favorable pharmacokinetic profile, and clinical efficacy contribute to its popularity in the management of RTIs.

Keywords: Cefpodoxime, Upper respiratory tract infections, Lower respiratory tract infections, Acute otitis media

1. INTRODUCTION

Respiratory tract infections (RTIs) pose a significant global health challenge, especially among children and the elderly, given their substantial impact on morbidity and mortality. According to the 2016 assessment of the global burden of disease, RTIs were responsible for approximately 336.5 million infections and 2.4 million deaths, ranking fourth among the leading causes of death worldwide [1-3]. By 2019, RTIs claimed the lives of about 2.6 million individuals globally, highlighting their persistent threat to public health across different regions [4].

In 2019, the global incidence of upper respiratory tract infections (URTI) reached 17·2 billion, accounting for 42.83% of all cases [5]. Lower respiratory tract infections (LRTI) are the third leading cause of death worldwide, following cardiovascular and cerebrovascular diseases [6]. The COVID-19 pandemic has further worsened the situation, with over 567 million confirmed cases and 6.3 million deaths reported worldwide. In India, severe acute respiratory infection (SARI) is the leading cause of mortality in children over 5 years of age, affecting 18% of the global population [7]. Otitis media was a significant secondary complication of URTIs, with the highest global incidence of 61 new cases per 100 children per year.

According to the World Health Organization (WHO), otitis media was the primary cause of hearing impairment in 42 million individuals aged above 3 years globally [8]. RTIs were also the most common reason for individuals to seek medical attention or be admitted to healthcare facilities. This has a significant impact on the increasing number of medical examinations, emergency visits, and antimicrobial prescriptions [9].In developed countries, acute respiratory infections (ARI) account for the majority of antibiotic prescriptions and 20% of all medical consultations [10,11]. Cefpodoxime, a third-generation cephalosporin, was well-suited for treating RTIs due to its broad-spectrum antibacterial properties and favorable pharmacokinetic characteristics, making it a valuable choice for empirical therapy [12,13]. Cefpodoxime, marketed as cefpodoxime proxetil, is an oral cephalosporin that exhibits superior activity against major bacterial pathogens responsible for RTIs compared to earlier generations of oral cephalosporins or amoxicillin. It was highly resistant to degradation by plasmid-mediated β-lactamases commonly found in bacteria [14].Cefpodoxime demonstrates good *in vitro* activity against bacterial pathogens causing common RTIs, and its prodrug form was absorbed and de-esterified by enterocytes to release the active metabolite [15-16]. However, the perspectives of cefpodoxime among clinicians was not well known. The present cross-sectional survey aims to gather expert opinions on the prescription practice of cefpodoxime for the management of RTIs in Indian settings.

2. MATERIALS AND METHODS

We carried out a cross sectional, questionnaire based survey among clinical experts specialized in managing RTIs in the major Indian cities from June 2023 to December 2023.

2.1 Questionnaire

The questionnaire booklet titled ACTION (Antibiotics in Respiratory Tract Infections) study was sent to the physicians who were interested to participate in this study. The 19-item survey primarily focused on current practices, clinical observations, and experiences related to antibiotic use in routine settings, specifically cefpodoxime, for managing RTIs.

2.2 Participants

An invitation was sent to leading doctors in managing RTIs in the month of March 2023 for participation in this Indian survey. About 379 physicians from major cities of all Indian states representing the geographical distribution shared their willingness to participate and provide necessary data. They were allowed to skip any questions they did not wish to respond to. Written informed consent was obtained from all the study participants before the initiation of the study, and they were required to complete the survey questionnaire on their own without consulting any other study participants.

2.3 Statistical Methods

Descriptive statistics were used to analyze the data, with percentages representing categorical variables. The distribution of each variable was illustrated using both frequency and percentage distributions. Furthermore, bar and pie charts were generated using Excel 2013 (version 16.0.13901.20400) to represent the data findings visually.

3. RESULTS

The survey included 379 clinicians, with 55% of them reporting URTI as the most commonly encountered infection among patients, while 42% categorized it as RTI. According to 35% of the clinicians, more than 75 patients are treated for RTIs every month, while 33% opined that about 25 to 50 patients receive treatment. Approximately 53% of the respondents prescribed cefpodoxime for URTI cases, and 44% indicated its use for LRTI (Table 1). As reported by 43% of clinicians, pharyngitis was the most prevalent URTI in clinical practice. Approximately 62% of the clinicians reported bacterial etiology as the most common cause of URTI.

Table 1: Distribution of responses to the common clinical conditions prescribed with cefpodoxime

Clinical conditions	Response rate (%)
Lower respiratory tract infections	44.06%
Upper respiratory tract infections	52.51%
Urinary tract infections	2.37%
Skin and soft tissue infections	0.53%
All of the above	0.26%
Not attempted	0.26%

As reported by 45% of the respondents, approximately 11 to 30% of patients require more than one antibiotic to treat RTIs. Around 51% of clinicians opined that 10% of patients require a change in antibiotics while managing RTIs. As reported by 44% of the clinicians, the common causative organism for RTIs in adults seen in day-to-day practice was *S. pneumoniae*. According to 51% of clinicians, nearly 50 to 75% of patients with RTIs were prescribed with antibiotics. As reported by 86% of clinicians, cefpodoxime was the most common antimicrobial agent regularly used for treating URTIs (Fig. 1).

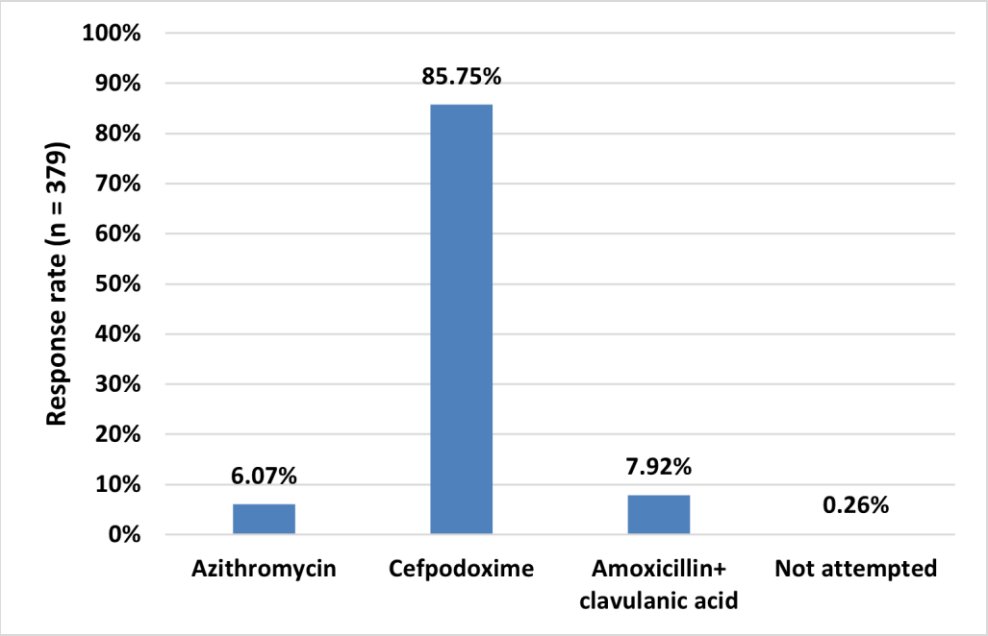

Fig. 1: Distribution of responses on the most common antimicrobial agents used in routine practice for managing URTIs

As reported by 33% of the clinicians, approximately 10 to 20 children per month are infected with acute otitis media. According to 40% of the respondents, the most common age group of children presenting with acute otitis media is 5 to 10 years. Majority (86.02%) of the clinicians reported cefpodoxime as the most preferred oral drug for treating acute otitis media (Table 2).

Table 2: Distribution of responses on the most preferred oral drug for treating acute otitis media in routine practice

Oral drug	Response rate (%)
Cefpodoxime	86.02%
Amoxicillin with clavulanic acid	12.4%
Cefuroxime	0.26%
Amoxicillin	0.26%
Not attempted	1.06%

More than half (68.34%) of the clinicians responded that they prescribe cefpodoxime for about 5 to 7 days for managing URTI (Fig. 2), and approximately 63% of clinicians reported the same prescription period for acute otitis media.

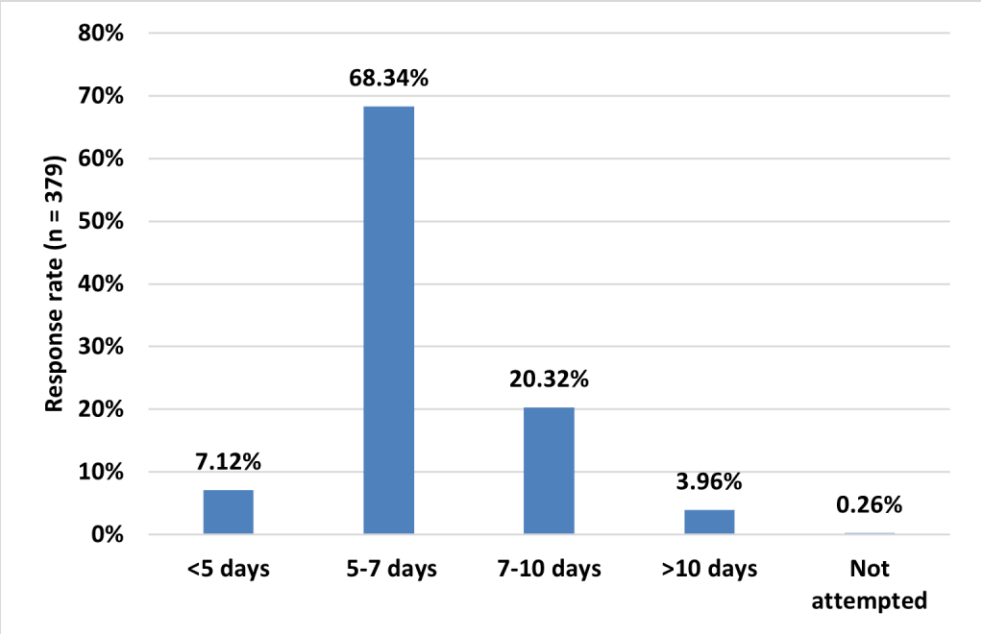

Fig. 2: Distribution of response to cefpodoxime prescription duration for managing URTI in routine practice

Nearly half (50.13%) of the clinicians opined that over 80% of patients achieve bacterial cure rates with the use of cefpodoxime. According to 65% of clinicians, the advantages of cefpodoxime include its broad spectrum, favorable pharmacokinetic profile, and good bacteriological and clinical efficacy (Fig. 3).

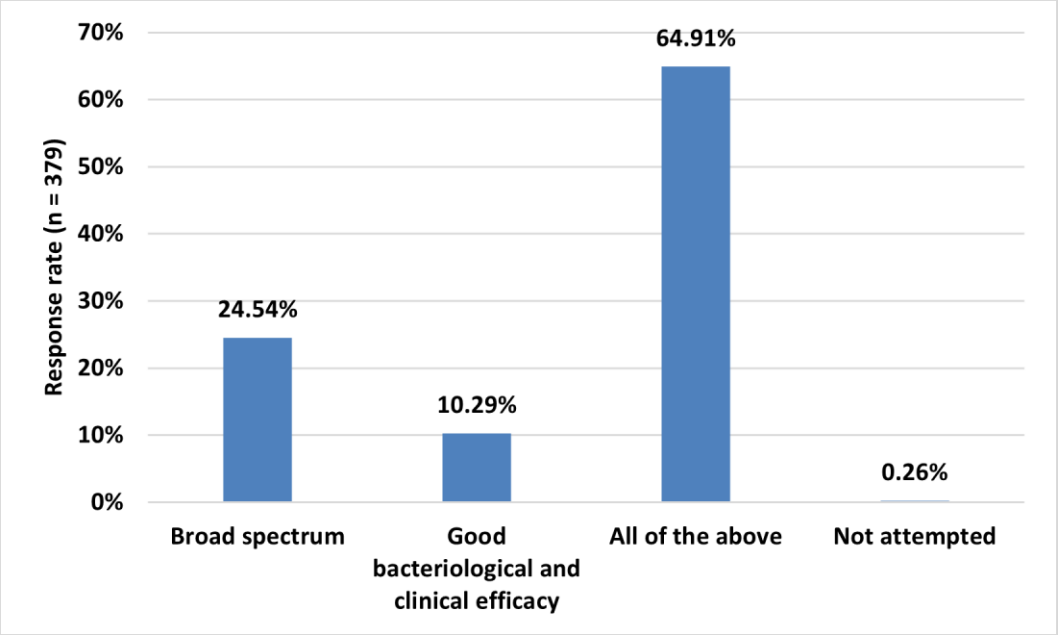

Fig. 3: Distribution of responses on the advantages of cefpodoxime

According to 36% of clinicians, nausea was the most frequently encountered adverse effect in patients receiving cefpodoxime, while 25% of clinicians reported diarrhea as a common side effect. As reported by 48% of the clinicians, around 61 to 90% of the patients complete the prescribed course of antibiotics.

4. DISCUSSION

The survey results provide valuable insights regarding the preference for cefpodoxime in managing RTIs in routine practice and its potential benefits. The present survey has underscored that cefpodoxime was a beneficial addition to the antibacterial that were available for the treatment of LRTI and URTI. AM Geddes has also supported the usefulness of cefpodoxime in managing these infections [17]. Sengupta et al. reported that cefpodoxime was well-tolerated and superior in treating LRTI in children, achieving a bacterial eradication rate of 93.4% [18]. Jordan et al. concluded that cefpodoxime was highly effective and well-tolerated for treating bacterial LRTI [19]. In line with these findings, Chugh and Agrawal stated that cefpodoxime was effective in both URTIs and LRTIs [20].

The present survey has corroborated the use of cefpodoxime as the most common antimicrobial agent used in routine practice for treating URTI. In line with this finding, Bergogne-Berezin concluded that cefpodoxime appears to be an effective new antibacterial that can be recommended as a drug of the first choice in the treatment of most URTIs [15]. A multi-centric study by Osama Abdel Hamid reported that cefpodoxime was an effective empirical treatment for adult Egyptian patients with acute UTRIs [12]. Sobti et.al found that 61% of clinicians preferred the use of cefpodoxime in the treatment of URTIs [21].

Majority of the current survey respondents reported that cefpodoxime was the most preferred oral drug for the treatment of acute otitis media. According to El-Shabrawi et al., cefpodoxime was an effective, safe, and well-tolerated antimicrobial agent for the treatment of acute otitis media in children, making it an excellent choice for empirical treatment [22]. Similarly, Fulton and Perry concluded that cefpodoxime was a safe and effective treatment for pediatric patients with acute otitis media, demonstrating good bacteriological and clinical efficacy [23]. A comparative study by Mendelman et al. highlighted the clinical efficacy of cefpodoxime administered twice daily in treating acute otitis media [24]. A 5-day course of cefpodoxime has been approved for the treatment of acute otitis media and has demonstrated superior or comparable efficacy compared to amoxicillin-clavulanate, cefixime, or cefaclor [25].

The current survey has noted that cefpodoxime was generally prescribed for about 5 to 7 days to treat URTIs. A five-day course of cefpodoxime has been found effective in treating URTIs, and this drug was considered safe and effective even when used for a shorter duration of 5 days instead of 10 days. It has a low incidence of side effects and requires dosing twice a day, making it a convenient medication [20].Similar to this finding, Hamid et al. reported significant reductions in URTI-related signs and symptoms within 5-6 days of prescribing cefpodoxime [12].

The current survey has also highlighted the multiple benefits of cefpodoxime, including its broad range of effectiveness, favorable pharmacokinetic profile, and good clinical efficacy. In areas where common respiratory pathogens have reduced sensitivity to penicillin and macrolides, cefpodoxime can serve as a first-line treatment for respiratory tract infections. Studies have reported enhanced efficacy of cefpodoxime in pediatric patients with various infectious diseases such as acute otitis media, tonsillitis, and pharyngitis [26,23].

The current survey outcomes showing the trends in the prescription practice of cefpodoxime can be useful for clinicians to enhance their treatment strategies and patient care for RTI management. The survey employed a well-designed and validated questionnaire to collect data from clinicians, which was a significant strength. However, it was important to note that the survey has certain limitations. The reliance on expert opinion may introduce bias since different perspectives and preferences among clinicians could have influenced the results. Therefore, it was essential to keep these limitations in mind when interpreting the findings. Moreover, the survey may not reflect the latest trends or emerging evidence in RTI management. To address this limitation, prospective trials or real-world observational studies were needed to support the survey results and provide a more comprehensive understanding of the optimal treatment approaches.

4. CONCLUSION

The survey findings highlighted a preference for prescribing cefpodoxime for managing both URTIs and LRTIs in routine practice. The survey also underscored the multiple benefits of this antibiotic, including its broad range of antibacterial activity, favorable pharmacokinetic profile, and improved clinical efficacy in managing RTIs.

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COMPETING INTERESTS

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AUTHORS' CONTRIBUTIONS

Both the authors contributed equally in managing literature search, designing the study, performed the statistical analysis, wrote the protocol, and the first draft of the manuscript. Both of them read and approved the final manuscript.

Ethical approval:

The study was conducted after receiving approval from Bangalore ethics, an independent ethics committee which is recognized by the Indian regulatory authority, drug controller general of India.

Consent:

As per international standards or university standards, participants' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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