

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20242429>

Original Research Article

CefixView: understanding trends in respiratory infections

Sachin Choudhari^{1*}, Dattatray Pawar¹, Anjali Bhure², Apurva Ade²

¹Medical Affairs Division, Alkem Laboratories, Alkem House, Mumbai, Maharashtra, India

²Alkem Laboratories Ltd., Mumbai, Maharashtra, India

Received: 04 July 2024

Revised: 07 August 2024

Accepted: 08 August 2024

*Correspondence:

Dr. Sachin Choudhari,

Email: sachin.choudhari@alkem.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Respiratory tract infections (RTIs) are one of the most common infections in humans of all age groups and an important cause of mortality and morbidity worldwide. It can be classified as either acute or chronic. The bacterial species most commonly implicated in RTIs are *Streptococcus pneumoniae*, β -hemolytic *Streptococci*, *Hemophilus influenzae*, and *Moraxella catarrhalis*. Cefixime, a third-generation cephalosporin, is a bactericidal β -lactam antibiotic used to treat various bacterial infections. It is broad-spectrum and effective against gram-positive as well as gram-negative bacteria.

The primary objective is to understand the preferences, considerations, and clinical perspectives that influence the choice of cefixime among healthcare professionals, particularly in the management of RTIs.

Methods: It was a descriptive questionnaire-based cross-sectional study. The study was conducted among the physicians who attended the APICON-2024 and gave consent to participate in the study. A total 247 physicians registered their responses.

Results: Cefixime is preferred in indications like UTI, pharyngitis, Otitis media, typhoid fever, LRTIs, shigellosis, and dental infections. All the doctors (100%) use cefixime for the treatment of RTIs with varied frequency. The primary factor which influences the choice of cefixime for the management of RTIs is the broad-spectrum activity (46.75%) followed by a better safety profile (27.87%) and cost-effectiveness (15.08%). Overall, 92.73% of doctors view cefixime as a safe and reliable choice for the management of RTIs.

Conclusions: Cefixime has excellent tolerability and efficacy and is one of the most widely used drug in the treatment of respiratory infections.

Keywords: Cefixime, Cephalosporins, RTIs, *Streptococcus pneumoniae*

INTRODUCTION

Respiratory tract infections (RTIs) are one of the most common infections in humans of all age groups and important cause of mortality and morbidity worldwide. It is defined as a medical condition that affects the respiratory system, which includes the lungs, airways, and other organs. Upper RTIs (URTIs) include the common cold, acute rhinosinusitis, acute otitis media, laryngitis, pharyngitis/tonsillitis, acute rhinitis. Lower RTIs (LRTIs) include bronchiolitis, pneumonia, tracheitis, acute

bronchitis.¹ It can be classified as either acute or chronic. Acute respiratory infections (ARI) are sudden onset and typically resolve on their own with treatment, such as antibiotics. Examples include bronchitis, pneumonia, and the common cold. Chronic respiratory infections, on the other hand, persist over a long period and can be caused by bacterial or viral infections, or even environmental factors. ARI impairs the normal breathing function. Acute respiratory infection prevents the body from getting sufficient oxygen and can result in death.²

Southeast Asia and Sub-Saharan Africa have the highest incidences of ARI, contributing over 80% of global cases.³ India contributes to 18% of the global population, with severe acute respiratory infection (SARI) as one of the prominent causes of mortality in children >5 years of age.⁴ In developing countries, respiratory tract infection is considered as one of the major public health problems.⁵ The prevalence of acute respiratory tract infection in children under five years of age was observed to be 59.1%, with urban and rural areas registering at 63.7% and 53.7%, respectively.⁶

The bacterial species most commonly implicated in RTIs are *Streptococcus pneumoniae*, β -hemolytic *Streptococci* (usually of Lancefield group A), *Hemophilus influenzae* and *Moraxella catarrhalis*.⁷ The factors that are responsible for the development of ARI include poverty, poor nutrition, poor housing conditions, indoor air pollution (including parental smoking), poor ventilation, overcrowding, industrialization, sociocultural values, overuse and misuse of antibiotics, lack of basic health services, and lack of awareness.³

Cefixime, a third-generation cephalosporin antibiotic, is a bactericidal β -lactam used to treat various bacterial infections. Cephalosporins act by binding with the penicillin-binding proteins (PBPs) on bacterial cell wall and inhibit its synthesis, thereby causing cell lysis specifically in rapidly growing organisms.⁴ It is a broad-spectrum antibiotic and effective against gram positive as well as gram-negative bacteria.⁸ Cefixime is highly effective against all strains of group A *Streptococci*, *H. influenzae* and *M. catarrhalis* whether or not they produce β -lactamase, and also against penicillin-sensitive strains of *Pneumococci*.^{8,9} In a multinational, nonrandomized study in Central and Eastern Europe has confirmed the excellent efficacy of cefixime in both children and adults for the management of respiratory tract infection.¹⁰

This is the survey conducted among the 247 physicians. The aim was to get insights into the utilization of cefixime in the context of respiratory infections. The primary objective of this survey is to understand the preferences, considerations, and clinical perspectives that influence the choice of cefixime among healthcare professionals, particularly in the management of RTIs.

METHODS

It was a descriptive questionnaire-based cross-sectional study. The study was conducted among the physicians who attended APICON-2024 in Delhi at Bharat Mandapam (IECC) from 22nd to 25th February 2024 and those who have given consent to participate in the study. A total of 247 physicians registered their responses and the sample size was based on convenience sampling. The questionnaire was distributed via electronic media to the physicians. A total of seven questions were included in the survey. There were multiple responses to a few questions. For data analysis, Microsoft excel is used. Data were

analyzed using descriptive statistics. The data variables are expressed as numbers or percentages.

RESULTS

A total of 247 physicians participated in the study, of which 37 (14.97%) were female participants and 210 (85.02%) were male participants from different specialties. Of all the participants, the majority were general physicians, i.e., 138 (55.87%), followed by consulting physicians, i.e., 88 (35.62%). The contribution of pediatricians and gastroenterologists is less (Figure 1).

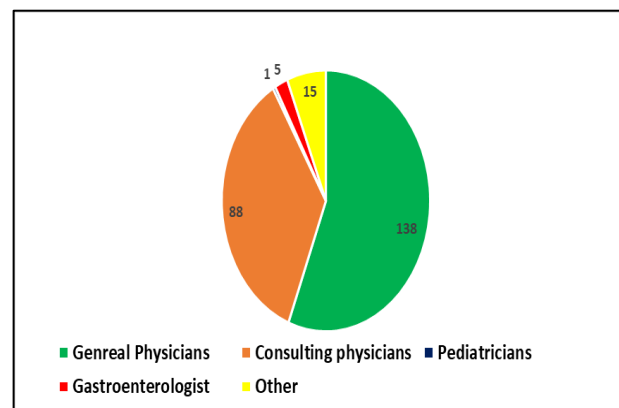


Figure 1: Number of healthcare professionals, (n=247).

When queried about their preferences for prescribing cefixime, the majority of doctors cited several primary indications. These include urinary tract infections (UTIs), pharyngitis, otitis media, typhoid fever, LRTIs, shigellosis, and dental infections. Typhoid fever emerged as the second most frequent indication for prescribing cefixime, closely followed by LRTIs. Additionally, there is notable interest in the use of cefixime for treating dental infections too (Figure 2).

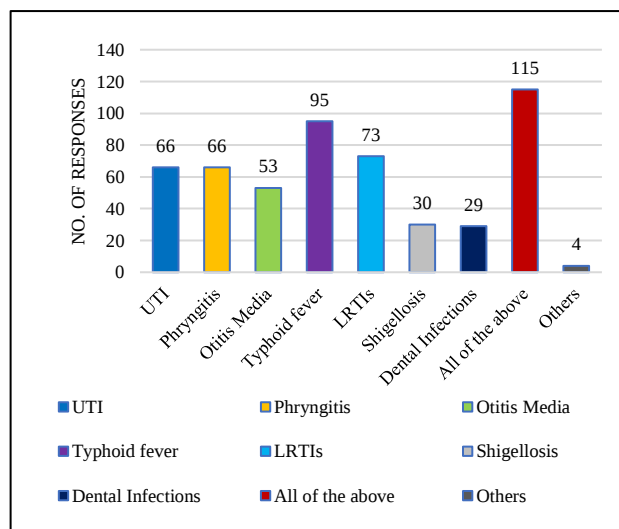


Figure 2: Cefixime and preferred indications, (n=247).

Talking about the prescribing practices, all participating doctors unanimously expressed confidence in cefixime for managing RTIs. A majority, 52.42% (130 doctors), reported frequent use of cefixime for RTIs, while 29.03% (72 doctors) indicated they always prescribe it for this purpose. This widespread preference underscores cefixime's status as the preferred initial treatment choice among physicians for respiratory infections (Figure 3).

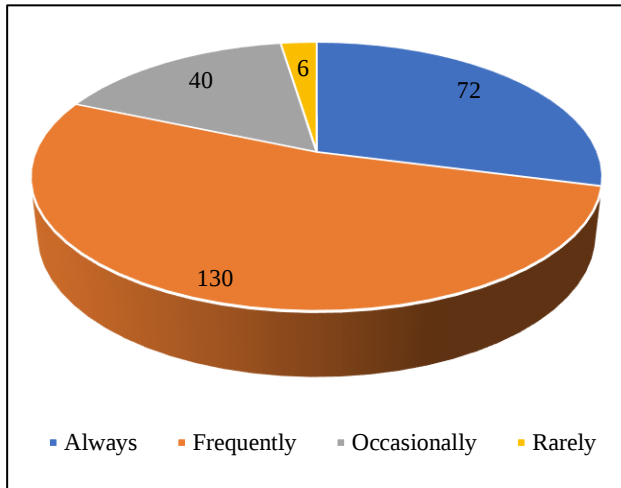


Figure 3: Frequency of prescription of cefixime, (n=247).

The most prevalent factor, that influences the choice of doctors for prescribing cefixime in the management of RTIs is cefixime's broad-spectrum activity and is cited by 46.75% of respondents. Following closely, 27.81% of doctors mentioned the low incidence of side effects as another significant reason for prescribing cefixime for RTIs. Additionally, the convenience of once-daily dosing was noted by 10.35% of respondents, while 15.08% emphasized the cost-effectiveness of cefixime. These factors collectively underscore why cefixime is favored for treating RTIs among healthcare professionals (Figure 4).

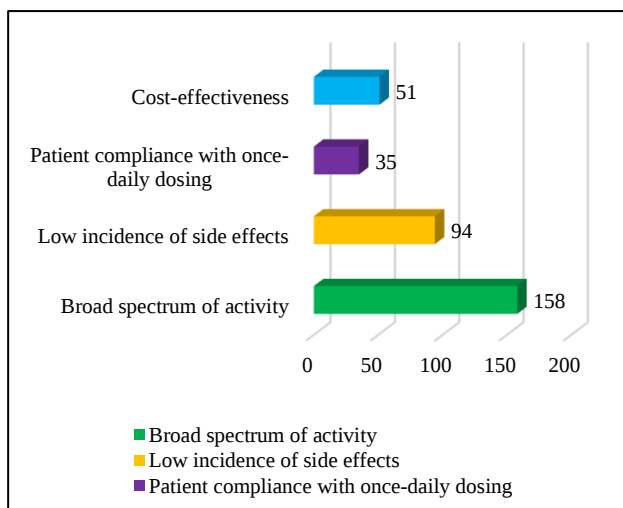


Figure 4: Primary factor for choice of cefixime in RTIs, (n=247).

When asked about their opinions regarding the safety and tolerability of cefixime for managing RTIs, a significant majority of doctors, 55.64%, expressed that they believe cefixime due to its excellent safety and tolerability. Additionally, 37.09% (92 doctors) considered cefixime to have a good safety profile in patients with RTIs. Overall, an overwhelming 92.73% of doctors view cefixime as a safe and reliable choice for prescribing in the management of RTIs (Figure 5).

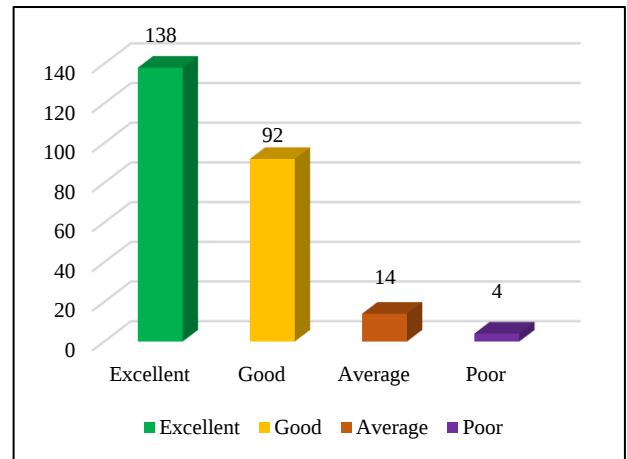


Figure 5: Safety and tolerability of cefixime (n=247).

When considering cefixime for LRTIs, doctors identified several patient populations where this antibiotic proves particularly effective. Community-acquired pneumonia (40.74%) emerged as the primary indication for prescribing cefixime in LRTIs, followed by acute exacerbation of chronic bronchitis (AECB) (21.91%). Additionally, cefixime is considered suitable for elderly patients with chronic obstructive pulmonary disease (COPD) (15.74%) and young adults with acute bronchitis (16.67%). Doctors find cefixime beneficial for treating LRTIs across a spectrum of age groups, from young adults to the elderly (Figure 6).

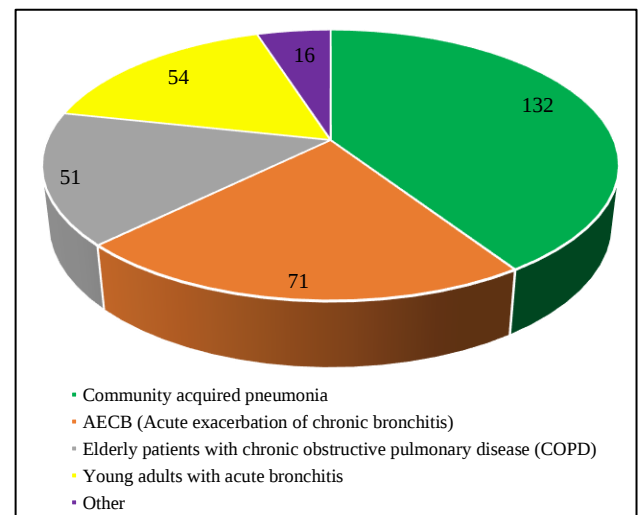


Figure 6: Cefixime in LRTIs (Indication), (n=247).

In treating mixed infections in LRTIs, 47.38% (136) of doctors prefer co-prescribing cefixime due to its synergistic effect with macrolides. Around 34.49% (99) doctors prescribed cefixime in LRTIs due to the advantage of broad coverage i.e., gram-positive and gram-negative (Figure 7).

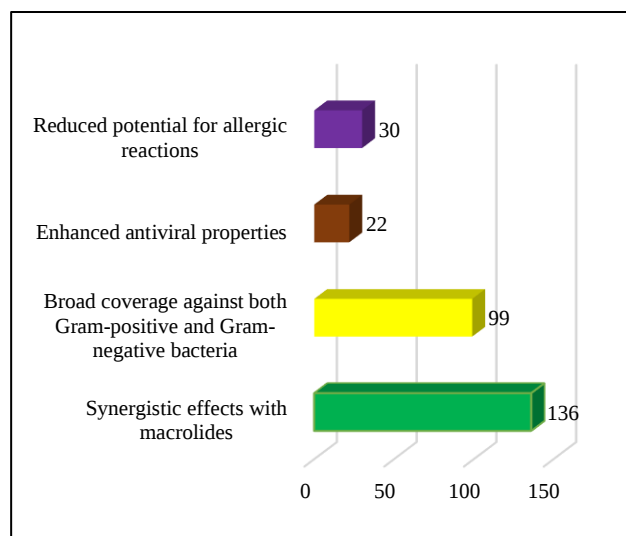


Figure 7: Advantage of cefixime in LRTIs, (n=247).

In the current context, 55.24% of doctors indicated that additional scientific evidence on safety and tolerability would enhance their confidence in prescribing cefixime for RTIs. Additionally, 27.01% of doctors emphasized that microbiological susceptibility data would increase their trust in the efficacy of cefixime specifically for RTIs. These insights highlight the specific areas where doctors seek further information to strengthen their decision-making process when considering cefixime for treating respiratory infections (Figure 8).

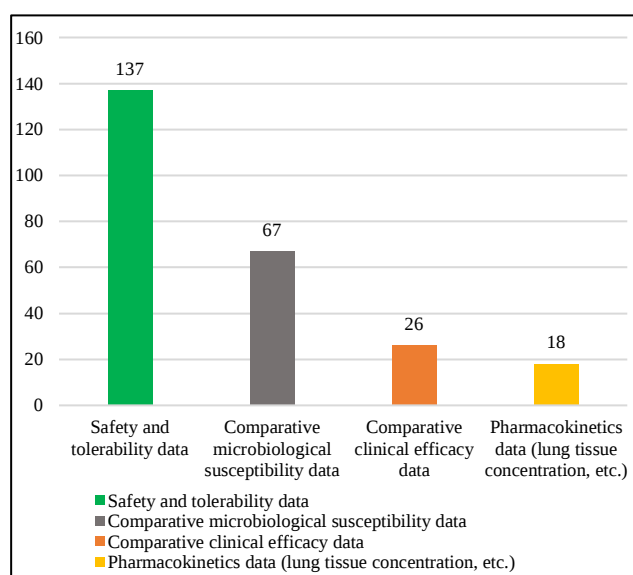


Figure 8: Evidence generation for the use of cefixime in RTIs, (n=247).

DISCUSSION

This survey was conducted with an aim to gain a profound understanding into the application of cefixime in the context of RTIs. The main goal of this survey was to explore the preferences, factors considered, and clinical viewpoints guiding healthcare professional's selection of cefixime, particularly in treating RTIs.

Cefixime is a third-generation cephalosporine and widely used for the treatment of a variety of infections in adult and children. It is available in oral as well as in intravenous formulations. It has broad-spectrum antibacterial activity against Gram-negative and positive pathogens with additional coverage of atypical organisms, e.g. *Mycoplasma* and *Chlamydia*.¹¹ It is one of the most widely used drug in the empirical treatment of respiratory infections like bronchitis, and pneumonia. Also, it is used in the management of sexually transmitted diseases like gonorrhea; and infections of the ears, throat, tonsils, and urinary tract. Cefixime is distinguished by its 3-hour elimination half-life which permits twice daily, or in many instances once daily, administration.¹²

Clinical trials have shown that cefixime is as effective as amoxicillin and cefaclor in treating acute otitis media in children aged two months to 13 years.¹² In a comparative study of the effectiveness of cefixime and penicillin V for the treatment of pharyngitis in children and adolescents it was found that cefixime, once daily, was as safe as and significantly more effective than penicillin V given 3 times daily for the treatment of group A beta-hemolytic streptococcal pharyngitis.¹⁴

In this survey, it was found that most of the doctors preferred to use cefixime in indications like UTI, pharyngitis, Otitis media, typhoid fever, LRTIs, shigellosis, and dental infections. The most common indication to prescribe cefixime is typhoid fever followed by LRTIs. In a study conducted by Dreshaj et al community-acquired infections in 89 patients of different ages with different diagnosis were treated during a period of six months in the university clinical centre in Prishtina, Kosovo found that all isolates were susceptible to cefixime and concluded that community-acquired infections like LRTIs, acute otitis media and UTI, caused by susceptible pathogens can be treated with cefixime.¹⁵

Cefixime is effective for the treatment of young children (where quinolone antibiotics are contra-indicated) with gastroenteritis caused by *Salmonella* and *Shigella* species that are resistant to traditional antibiotics such as amoxicillin and trimethoprim-sulfamethoxazole.¹² In large clinical trials on both children and adult patients with regard to cefixime for the treatment of upper RTIs with *Streptococcal* tonsillitis, cure or improvement was noted in 98.8 and 98.0% of cases, respectively.¹⁶

Oral cefixime is a safe and effective treatment for typhoid fever, even with multidrug-resistant *S. typhi*.¹⁷ In a

randomized controlled trial to compare the clinical efficacy of azithromycin in the treatment of childhood typhoid fever with that of cefixime it was found that clinical cure rate was 87% in azithromycin group and 93% in cefixime group.¹⁸ In an open-labeled, non-comparative study conducted in 112 subjects to evaluate the efficacy and safety of cefixime for the treatment of typhoid fever, cefixime showed clinical efficacy of around 92.5% which signifies that cefixime is a highly efficacious and safe drug for the management of typhoid fever.¹⁹

In a multinational, non-randomized study, once-daily cefixime in oral suspension resulted in clinical cure or improvement in 45 (100%) of children with acute sinusitis and 48 (96%) of children with acute otitis media. In patients of acute exacerbations of chronic bronchitis (60 adults) and pneumonia (12 adults), 400 mg of cefixime resulted in a cure or improvement in 59 (98%) and 12 (100%) of the patients, respectively.¹⁰ Many trials have established the clinical efficacy of cefixime in patients with LRTI. In comparative studies, cefixime had similar efficacy to amoxicillin±clavulanic acid, cefaclor, cefalexin, cefuroxime axetil, and clarithromycin in the management of LRTIs.²⁰ In one of the studies, once-daily cefixime in oral suspension led to clinical cure or improvement in 100% of 45 children with acute sinusitis and 96% of 50 children with acute otitis media, while cefixime 400 mg resulted in cure or improvement in 98% of 60 adults with acute exacerbations of chronic bronchitis and 100% of 12 adults with pneumonia.¹⁰

In a comparative study on the efficacy and safety of cefixime and ciprofloxacin in managing adults with community-acquired pneumonia in Ibadan, Nigeria, cefixime was found to be superior to ciprofloxacin in terms of efficacy.²¹ Comparative trials shows that the clinical and bacteriological efficacy of cefixime 200 to 400 mg daily administered as a single dose or in 2 divided doses, is comparable with that of multiple daily doses of co-trimoxazole (trimethoprim+sulphamethoxazole) or amoxycillin in acute uncomplicated urinary tract infection, with that of amoxycillin, amoxycillin/clavulanic acid and cefaclor in acute lower RTIs, and with that of amoxycillin and cefroxadine in adult patients with acute tonsillitis or pharyngitis. The most frequently reported adverse effects, diarrhea, and stool changes, are usually mild to moderate in severity, and transient.¹²

In a multicenter, double-blind, randomized, controlled clinical trial of 222 patients with acute exacerbations of chronic bronchitis. It was found that oral cefixime 400mg once daily is an effective and well-tolerated treatment for acute exacerbations of chronic bronchitis.²²

Limitations

A limited number of participants were included in the survey. Further, studies are required to validate the safety and efficacy of cefixime in RTIs.

CONCLUSION

Cefixime, a third-generation cephalosporin, is widely used to treat various infections in adults and children due to its broad spectrum of antibacterial activity against gram-positive, gram-negative, and atypical pathogens. Known for its excellent tolerability and efficacy, it is commonly prescribed for respiratory infections such as bronchitis, pneumonia, and URTIs, as well as for gonorrhoea and UTIs. Additional research focusing on the safety, tolerability, and microbial susceptibility of cefixime is essential to bolster physicians' confidence in its efficacy for treating RTIs.

ACKNOWLEDGMENTS

Authors would like to thank to extend our sincere thanks to the organizers of APICON 2024 for providing a dynamic platform that enabled us to engage with doctors and conduct our survey.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Respiratory tract infections-antibiotic prescribing (no date) National Center for Biotechnology Information. Available at: [https://www.ncbi.nlm.nih.gov/books/NBK53632/#:~:text=Upper%20respiratory%20tract%20infections%20\(URTIs,%2C%20bronchiolitis%2C%20pneumonia%20and%20tracheitis](https://www.ncbi.nlm.nih.gov/books/NBK53632/#:~:text=Upper%20respiratory%20tract%20infections%20(URTIs,%2C%20bronchiolitis%2C%20pneumonia%20and%20tracheitis). Accessed on 25 June 2024.
2. Vikaspedia domains (no date) Vikaspedia. Available at: <https://vikaspedia.in/health/diseases/lungs-related/acute-respiratory-infection-ari#:~:text=Acute%20respiratory%20infection%20prevents%20the,The%20disease%20is%20quite%20widespread>. Accessed on 25 June 2024.
3. Murarkar S, Gothankar J, Doke P, Dhumale G, Pore PD, Lalwani S, et al. Prevalence of the Acute Respiratory Infections and Associated Factors in the Rural Areas and Urban Slum Areas of Western Maharashtra, India: A Community-Based Cross-Sectional Study. *Front Public Health*. 2021;9:723807.
4. Waghmode R, Jadhav S, Nema V. The Burden of Respiratory Viruses and Their Prevalence in Different Geographical Regions of India: 1970-2020. *Front Microbiol*. 2021;12:723850.
5. Thapa S, Gokhale S, Sharma AL, Sapkota LB, Ansari S, Gautam R, Shrestha S, Neopane P. Burden of bacterial upper respiratory tract pathogens in school children of Nepal. *BMJ Open Respir Res*. 2017;4(1):e000203.
6. Kumar SG, Majumdar A, Kumar V, Naik BN, Selvaraj K, Balajee K. Prevalence of acute respiratory infection among under-five children in urban and rural

- areas of puducherry, India. J Nat Sci Biol Med. 2015;6(1):3-6.
7. Cefixime - an overview ScienceDirect Topics. Available at: <https://www.sciencedirect.com/topics/medicine-and-dentistry/cefixime>. Accessed on 31 May 2024.
 8. LiverTox: Clinical and Research Information on Drug-Induced Liver Injury. Bethesda (MD): National Institute of Diabetes and Digestive and Kidney Diseases; 2012. Cephalosporins. 2021.
 9. Hamilton-Miller JM. Overview of cefixime use in community-acquired infections. Clin Microbiol Infect. 2000;6(3):79-81.
 10. Ludwig E. Cefixime in the treatment of respiratory and urinary tract infections. Chemotherapy. 1998;44(1):31-4.
 11. Ige OM, Okesola ao. comparative efficacy and safety of cefixime and ciprofloxacin in the management of adults with community-acquired pneumonia in Ibadan, Nigeria. Ann IB Postgrad Med. 2015;13(2):72-8.
 12. Brogden RN, Campoli-Richards DM. Cefixime. A review of its antibacterial activity. Pharmacokinetic properties and therapeutic potential. Drugs. 1989;38(4):524-50.
 13. Tan BJ. Cefixime use in children: When and why. Can J Infect Dis. 1995;6(4):204-5.
 14. Block SL, Hedrick JA, Tyler RD. Comparative study of the effectiveness of cefixime and penicillin V for the treatment of *Streptococcal* pharyngitis in children and adolescents. Pediatr Infect Dis J. 1992;11:919-25.
 15. Dreshaj SH, Doda-Ejupi T, Tolaj IQ, Mustafa A, Kabashi S, Shala N, et al. Clinical role of Cefixime in community-acquired infections. Prilozi. 2011;32(2):143-55.
 16. De Lalla F. Cefixime in the treatment of upper respiratory tract infections and otitis media. Chemotherapy. 1998;44(1):19-23.
 17. Matsumoto Y, Ikemoto A, Tawara S. 'Antibacterial activity of cefixime against *Salmonella typhi* and applicability of Etest'. J Infect Chemother. 1999;5(3):176-9.
 18. Begum B, Haque MA, Ahmed MS, Islam MN, Ahsan MM, Khan AH, et al. Comparison between azithromycin and cefixime in the treatment of typhoid fever in children. Mymensingh Med J. 2014;23(3):441-8.
 19. Chaudhary MK. Efficacy of Cefixime in the Treatment of Typhoid Fever'. Int J Pharmaceut Biolog Arch. 2013;4(2):307-9.
 20. Markham A, Brogden RN. Cefixime. A review of its therapeutic efficacy in lower respiratory tract infections. Drugs. 1995;49(6):1007-22.
 21. Hausen Th, Weidlich G, Schmitt J: Safety and efficacy of cefixime in the treatment of respiratory tract infections in Germany. Infection. 1995;23(2):65-9.
 22. Lorenz J, Steinfeld P, Drath L, Keienburg T, Troester K. Cefixime Short-Course versus Standard-Course Study Group. Efficacy and Tolerability of 5- vs 10-Day Cefixime Therapy in Acute Exacerbations of Chronic Bronchitis. Clin Drug Investig. 1998;15(1):13-20.

Cite this article as: Choudhari S, Pawar D, Bhure A, Ade A. CefixView: understanding trends in respiratory infections. Int J Basic Clin Pharmacol 2024;13:685-90.