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Prescription trends on the preference of antibiotics for the management of respiratory tract infections in India

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Abstract

Background: Respiratory tract infections are a major cause of morbidity and mortality in developing countries. Irrational prescribing of various drugs for respiratory diseases are common practice worldwide. Considering this scenario, the present study was undertaken to analyse recent prescribing trends in the management of Respiratory Tract Infections (RTIs).

Methodology: This study collected data from a multiple-response questionnaire-based survey among 442 clinicians via email or an online survey platform. The questionnaire focused on the prevalence, symptoms, causes, clinical characteristics, management of RTI, and the usage of respiratory medications in clinical practice.

Results: About 47% of respondents said that 11-30% of their patients need more than one antibiotic for RTI. 53% of respondents observed pharyngitis/ tonsillitis as the most common indication of RTI. Close to half of the respondents (45%) prescribe antibiotics to 50-75% of their patients. Nearly half of the respondents (48%) said that cefpodoxime was the most common antibiotic they prescribe regularly in their practice. 37% of respondents prefer cefpodoxime in bacterial tonsillopharyngitis while 21% prefer amoxicillin + clavulanic acid and azithromycin. 44% of respondents prefer cefpodoxime in AEBCB (acute bacterial exacerbation of chronic bronchitis) while 15% prefer amoxicillin + clavulanic acid and only 10% prefer azithromycin. 51% of respondents prefer cefpodoxime in bacterial rhino sinusitis (acute bacterial exacerbation of chronic bronchitis).

Conclusion: The prescribing patterns for the management of RTIs in the clinical practice were inconsistent with current guidelines. Strict adherence to guidelines must be ensured and antibiotic prescribing for RTIs should be discouraged.

Keywords: Respiratory tract infections, cefpodoxime, bacterial tonsillopharyngitis, acute otitis media, bacterial rhinosinusitis

Introduction

Respiratory tract infections (RTIs) are a significant health concern in India due to its large population, diverse climate, and varying socioeconomic conditions. The prevalence and occurrence levels of RTIs in India can vary depending on several factors, including geographic region, season, and population density ^[1]. Here's an overview of the situation and therapeutic solutions for RTIs in India. The National Health Portal of India reported in 2019 that there were 41,996,260 cases and 3,740 deaths from respiratory infections in India in 2018. Acute respiratory infections (ARI) accounted for 69% of the total cases of communicable diseases. RTIs, including the common cold, are widespread in India, with a high incidence, especially during the winter months. Influenza is prevalent in India, with seasonal outbreaks affecting various regions ^[2]. Tuberculosis (TB) is a major respiratory infection in India, with a high prevalence. Efforts to control TB include the Directly Observed Treatment Short-course (DOTS) strategy and improved diagnostics ^[3]. Pneumonia is a leading cause of death among children in India. Factors such as malnutrition, indoor air pollution from cooking with solid fuels, and overcrowded living conditions contribute to its prevalence ^[4]. High levels of air pollution in some Indian cities exacerbate respiratory problems and can lead to increased susceptibility to RTIs.

India faced a significant challenge during the COVID-19 pandemic, with many cases and healthcare system strain. Vaccination campaigns and public health measures were implemented to mitigate the spread.

The therapeutic solutions for RTIs in India are similar to those in other parts of the world, but there are specific considerations due to the country's healthcare infrastructure and population diversity [5]. India has national vaccination programs, including vaccines for influenza and childhood vaccinations to prevent diseases like pneumonia and tuberculosis.

Depending on the specific infection, antibiotics may be prescribed for bacterial RTIs, while antivirals may be considered for some viral infections. Promoting good nutrition and hygiene practices, particularly in children, is vital for preventing and managing RTIs. Public health campaigns promote respiratory hygiene, such as covering coughs and sneezes, and the use of masks, especially during disease outbreaks [5]. Efforts to reduce indoor air pollution and improve cooking practices in rural areas can help lower the risk of RTIs, particularly in children and women. Expanding and improving healthcare infrastructure, especially in rural areas, is critical for early diagnosis and treatment of RTIs. This includes strengthening primary healthcare centres and ensuring access to essential medications. Public awareness campaigns and education on RTI prevention and early recognition of symptoms are essential to reducing the burden of these infections [6]. Continual research and surveillance efforts are needed to monitor trends in RTIs, identify emerging pathogens, and adapt strategies accordingly.

In India, addressing the prevalence of RTIs requires a multifaceted approach that includes vaccination, improved healthcare access, environmental measures, and public health education [7]. Additionally, ongoing efforts to combat TB and air pollution are essential components of respiratory infection control in the country. So, the present study was undertaken to analyse recent prescribing trends in the management of Respiratory Tract Infections (RTIs).

Methodology

A cross sectional, multiple-response questionnaire based survey conducted among physicians specialized in managing RTIs in the major Indian cities from June 2022 to December 2022.

Questionnaire

The questionnaire booklet titled ACTION (Antibiotics in Respiratory Tract Infections) study was sent to the doctors who were interested to participate. The ACTION study questionnaire focussed questions about the prevalence, symptoms, causes, clinical characteristics, management of RTI, and the usage of respiratory medications in clinical practice.

The study was performed after obtaining approval from Bangalore Ethics, an Independent Ethics Committee which was recognized by the Indian Regulatory Authority, Drug Controller General of India.

Participants

An invitation was sent to professionals across India based on their expertise and experience in treating RTIs in the month of March 2022 for participation in this Indian survey.

About 442 clinicians from major cities of all Indian states representing the geographical distribution shared their willingness to participate and provide necessary data. They were explicitly instructed to provide individual responses without consulting their colleagues. Before commencing the study, written informed consent was obtained from all survey participants.

Statistical analysis

The data were analyzed using descriptive statistics. Categorical variables were presented as percentages to provide a clear insight into their distribution. The frequency of occurrence and the corresponding percentage were used to represent the distribution of each variable. To visualize the distribution of the categorical variables, graphs were created using Microsoft Excel 2013 (version 16.0.13901.20400).

Results

Among 442 clinicians who participated in the survey, 45% were consultant physicians, 43% general practitioners, 4% each in chest physicians and paediatricians, 3% were ENTs, and 1% were surgeons. Though the prevalence of RTI is equal in both rural and urban, it is marginally more in urban (26%) as compared to rural (22%). In gender-wise prevalence, males are more prone to RTI infections at 30% as compared to females (6%) while 59% said both genders. Almost two-thirds (63%) of respondents observed that upper respiratory tract infections (URTI) are the most common type of respiratory tract infection in their clinical practice followed by Lower respiratory tract infections LRTI (25%). In this survey, 47% of respondents observed that 11-30% of their patients need more than one antibiotic, followed by 29% observing less than 10% need more than one antibiotic, and the remaining 22% of respondents observed 31-50% of their patients need more than one antibiotic (Figure 1).

This survey found that pharyngitis /tonsillitis (53%), rhino sinusitis (19%), and rhino sinusitis/pharyngitis/tonsillitis (14%) are the most common indications of RTI observed by the respondents. Close to half of the respondents (45%) who participated in the survey prescribed antibiotics to 50-75% of their patients. Another 28% of the respondents prescribed to 75% of their patients whereas 21% of respondents prescribed antibiotics to 25-50% of their patients (Figure 2). In this survey, nearly half of the respondents (48%) preferred cefpodoxime as the common antibiotic in their regular clinical practice. Amoxicillin + clavulanic acid, cefpodoxime, amoxicillin + clavulanic acid, and azithromycin are the other antibiotics prescribed by 16% to 10% of the respondents (Figure 3).

In this survey, 37% of respondents preferred cefpodoxime as an antibiotic for bacterial tonsillopharyngitis while 21% preferred amoxicillin + clavulanic acid and azithromycin each (Figure 4). Nearly 44% of respondents who participated in this survey preferred cefpodoxime in AECB (acute bacterial exacerbation of chronic bronchitis) while 15% prefer amoxicillin + clavulanic acid and only 10% prefer azithromycin for the same indication (Figure 5).

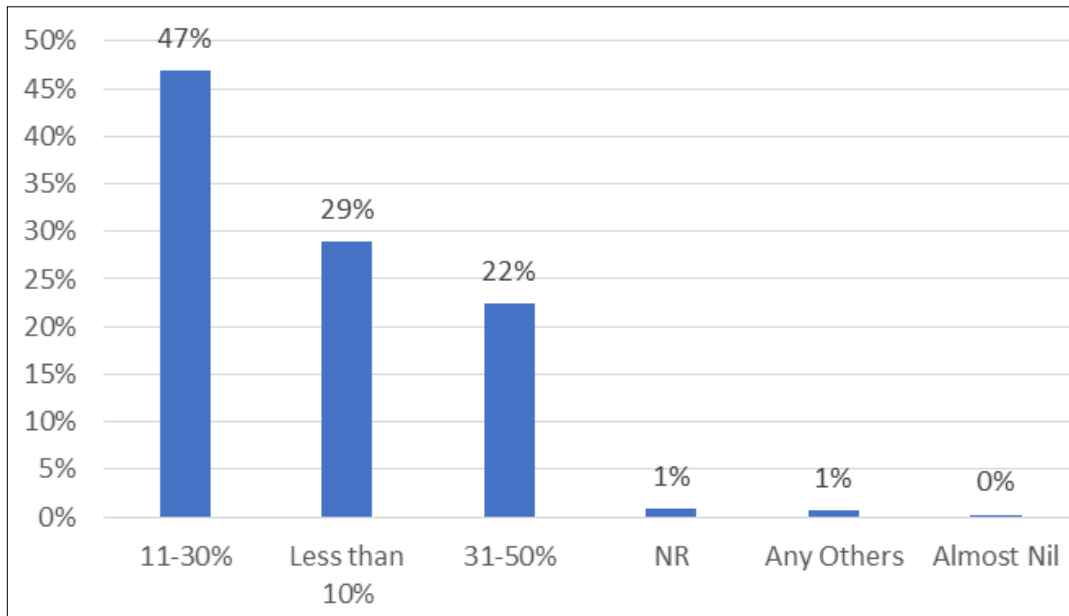


Fig 1: Distribution of physician's response regarding patients who need more than one antibiotic

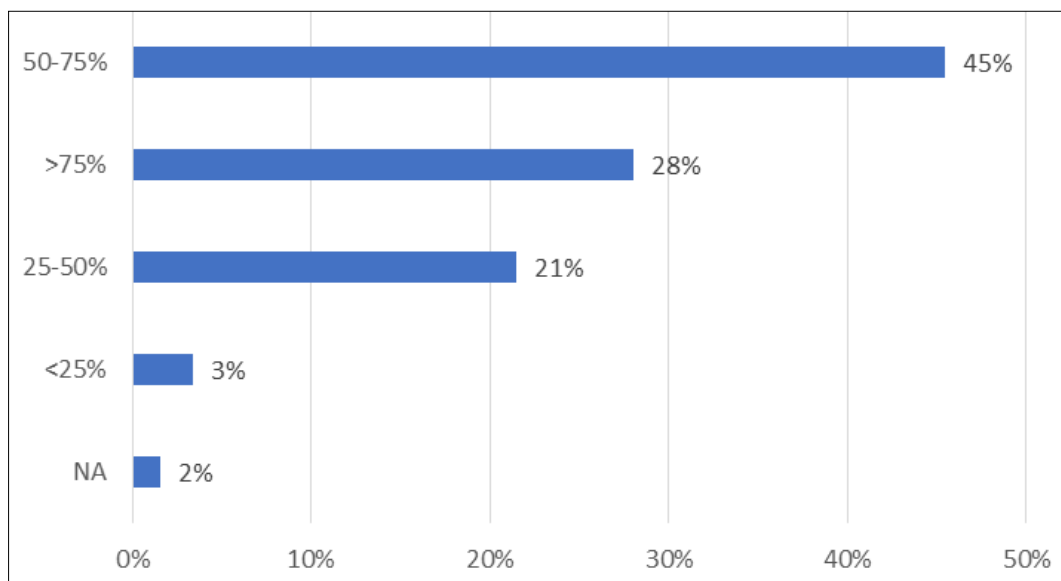


Fig 2: Distribution of antibiotics prescription for respiratory tract infection among clinicians

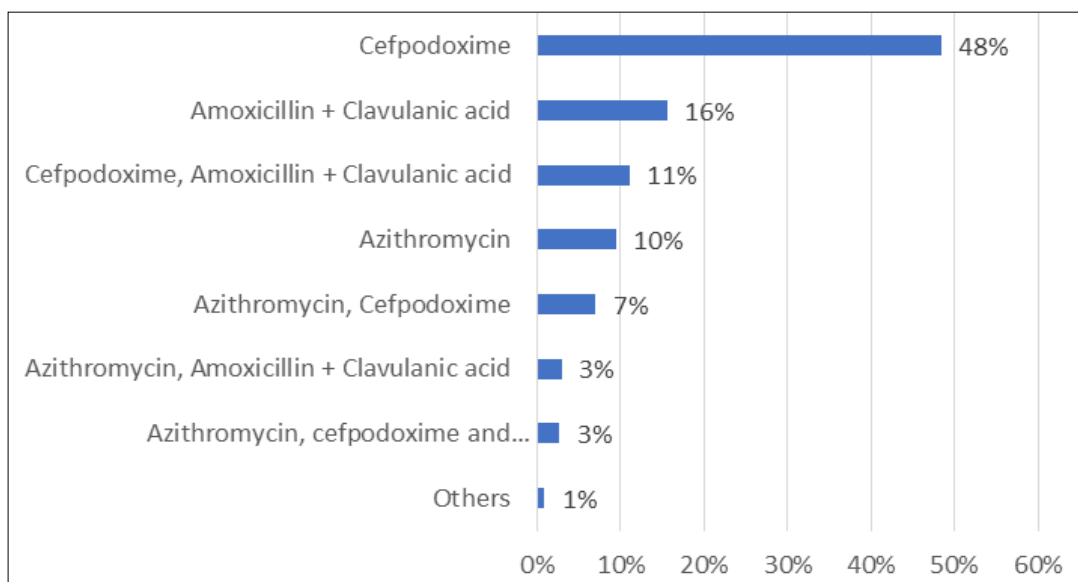


Fig 3: Distribution of commonly preferred antibiotics for respiratory tract infection among clinicians

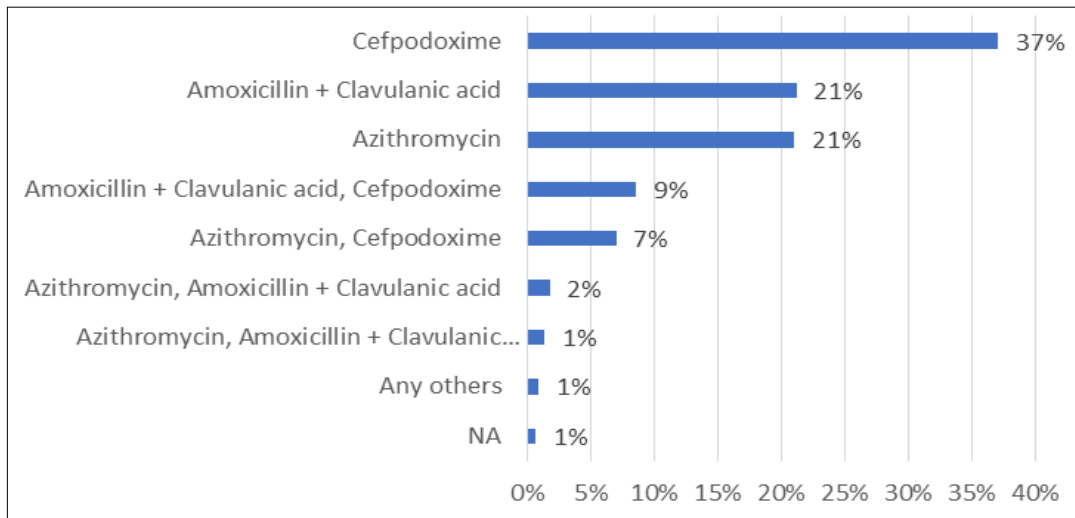


Fig 4: Distribution of antibiotics preferred in bacterial tonsillopharyngitis

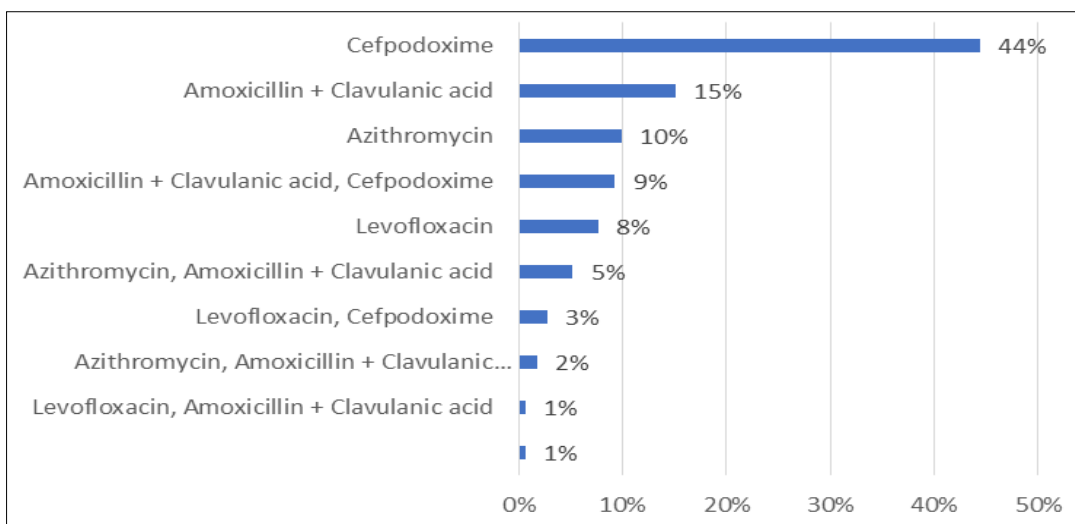


Fig 5: Distribution of antibiotics preferred in acute bacterial exacerbation of chronic bronchitis

Furthermore, 51% of respondents preferred cefpodoxime in bacterial rhino sinusitis (acute bacterial exacerbation of chronic bronchitis) while 21% preferred amoxicillin + clavulanic acid, and only 11% preferred azithromycin for the same indication (Figure 6). Moreover, 55% of

respondents preferred cefpodoxime in acute otitis media while 24% preferred amoxicillin + clavulanic acid, and only 11% preferred azithromycin for the same indication (Figure 7).

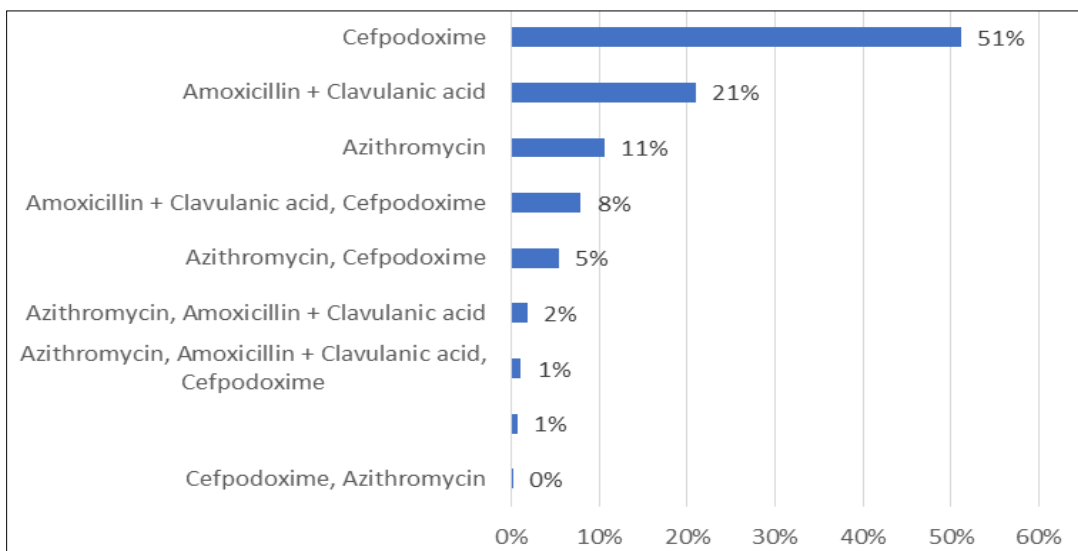


Fig 6: Distribution of antibiotics preferred in bacterial rhino sinusitis

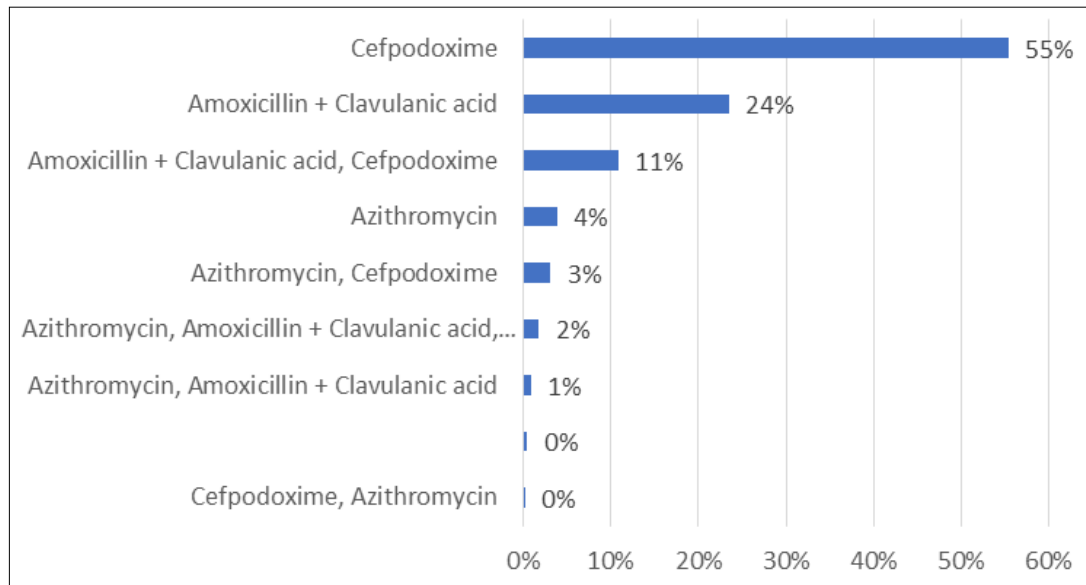


Fig 7: Distribution of antibiotics preferred in Acute Otitis Media

Cefpodoxime was preferred by 44% of the clinicians for the management of acute bacterial exacerbation of chronic bronchitis, 22% of them for pharyngitis and tonsillitis, 15% in community acquired pneumonia, 15% in pharyngitis, tonsillitis and AECB. Only 3% of the clinicians preferred it for pharyngitis, tonsillitis and community acquired pneumonia. About 28% of respondents who participated in this survey preferred cefpodoxime+ clavulanic acid in pneumonia, 15% preferred it in bronchitis, 10% preferred to prescribe in tonsillopharyngitis, 10% preferred it in tonsillopharyngitis, bronchitis, 9% preferred cefpodoxime+ clavulanic acid in pneumonia, bronchitis as indicated and 4% in sinusitis.

In addition, 81% of respondents felt that the full course has to be completed, irrespective of the resolution of infections; 14% felt that the antibiotic course shall be discontinued if there was a resolution of infection and the remaining 5% felt more evidence to handle antibiotic resistance. More than half of the respondents (52%) consider the most felt advantage of cefpodoxime to be its potent antibacterial activity against both gram-positive & gram-negative bacteria, followed by 37% who said a long elimination half-life that allows once or twice daily administration and high stability in the presence of beta lactase respondents which is mentioned.

Discussion

The present study aims to examine the prevalence, symptoms, causes, clinical characteristics, management of respiratory tract infections, and the usage of respiratory medications in clinical practice shows that the prevalence of RTI is equal in both rural and urban, it is marginally more in urban. In contrast to this finding, previous studies have found that rural children are highly affected by RTI due to poor households, home births, and unvaccinated and malnourished children^[8]. In gender-wise prevalence, males are more prone to RTI infections at 30% as compared to females (6%) while 59% said both genders. RTI may be classified into upper (URTI) and lower acute respiratory infection (LRTI), depending on the main organ affected, (nose, sinuses, middle ear, larynx, pharynx, versus trachea, bronchus, and lungs). URTI is generally mild. The

overwhelming majority of RTI deaths are due to LRTI, consisting mainly of pneumonia^[9].

In this survey, almost two-thirds (63%) of respondents observed that URTI is the most common type of respiratory tract infection in their clinical practice. This finding signifies the common prevalence of upper respiratory tract infection. Antibiotics are commonly prescribed for RTIs in adults and children in primary care. RTIs are the reason for 60% of all antibiotic prescribing in general practice, and this constitutes a significant cost to the healthcare expense. RTIs are largely self-limiting and complications are likely to be rare if antibiotics are withheld. Therefore, appropriate prescribing of antibiotics is important in RTIs^[10]. Even in this survey, 47% of respondents said 11-30% of their patients need more than one antibiotic as mentioned most. Pharyngitis is one of the most common conditions encountered by clinicians among patients with respiratory infections^[11]. This survey finding that Pharyngitis/Tonsillitis (53%) is the most common indication of RTI as recalled by the respondents correlates with other study findings.

Despite the majority of RTI infections being viral, a high percentage are treated with antibiotics. In this survey, close to half of the respondents (45%) prescribed antibiotics to 50-75% of their patients. This highlights the overuse of antibiotics for respiratory tract infections (RTIs). Cefpodoxime is an oral, third-generation cephalosporin antibiotic for the treatment of various mild to moderate susceptible infections. It is an extended spectrum that inhibits bacterial cell wall synthesis^[11, 12]. Previous study findings have supported the use of cefpodoxime in the treatment of RTI due to its high efficacy and good tolerability. This correlates with the survey finding that nearly half of the respondents (48%) opted for cefpodoxime as the common antibiotic they prescribe regularly in their practice. Other findings such that 37% of respondents preferred cefpodoxime as an antibiotic for bacterial tonsillopharyngitis; 37% of respondents preferred cefpodoxime in bacterial tonsillopharyngitis; 51% of respondents preferred cefpodoxime in bacterial rhino sinusitis (acute bacterial exacerbation of chronic bronchitis);

55% of respondents preferred cefpodoxime in acute otitis media.

Cefpodoxime has potent antibacterial activity against the major bacterial pathogens involved in lower respiratory tract infections: *Haemophilus influenzae*, *Moraxella* (*Branhamella*) *catarrhalis* (including β -lactamase-producing strains), and *Streptococcus pneumoniae* (including amoxicillin resistant strains) [13]. Six randomized comparative studies in patients with lower respiratory tract infections, 5 of which were large (enrolment of more than 200 patients) and double-blind, examined the efficacy and safety of cefpodoxime. Cefpodoxime 200mg administered twice daily for 5 to 10 days was similar in clinical and bacteriological efficacy [14]. Additionally, a dosage equivalent to 100mg or 200mg of cefpodoxime twice daily was similar in clinical and bacteriological efficacy in the treatment of bronchitis (acute or AECB). Thus, cefpodoxime is a useful addition to the antibacterials available for the treatment of infections of the lower respiratory tract. In this survey, 37% of respondents preferred cefpodoxime in AECB, 22% preferred pharyngitis, tonsillitis, and 15% for community-acquired pneumonia (CAP). Guidelines on antibiotic choice for RTI are generally not consistent. The main class of antibiotics prescribed are penicillins, cephalosporins, macrolides, and fluoroquinolones [15].

Apart from amoxicillin-clavulanate, the other commonly prescribed broad-spectrum antibiotics in RTI are cephalosporins and macrolides. The results from various comparative studies indicated the superiority or enhanced/better susceptibility of these bacterial strains to cefpodoxime plus clavulanic acid in comparison to amoxicillin plus clavulanic acid [16]. In this survey also, 28% of respondents preferred cefpodoxime + clavulanic acid in pneumonia, 15% preferred bronchitis, 10% preferred tonsillopharyngitis, and 9% preferred pneumonia. These findings highlight the widespread use of cefpodoxime in respiratory tract infections [17, 18]. Since antibiotics are used extensively in RTIs, this may lead to antibiotic resistance, and increased incidence of adverse effects [19, 20]. Hence, it is very important to avoid antibiotic resistance. In this survey, more than a fifth (81%) of respondents recommended taking the full course irrespective of early resolution of infections to tackle antibiotic resistance. More than half of the respondents (52%) consider the most felt advantage of cefpodoxime to be its potent antibacterial activity against both gram-positive & gram-negative bacteria, followed by 37% who said a long elimination half-life that allows once or twice daily administration and high stability in the presence of beta lactase respondents.

Conclusion

The majority of clinicians felt that most of their patients need more than one antibiotic. On the top of the mind, cefpodoxime is prescribed by most of the respondents especially for bacterial rhino sinusitis, bacterial tonsillopharyngitis, and AECB. Almost most of the physicians recommended to complete the full course of antibiotics to prevent resistance development. Dosage compliance was the most often seen challenge among the patients who take antibiotics. Consequently, a better understanding of appropriate antibiotic prescribing must be fostered. Strict adherence to guidelines must be ensured and antibiotic prescribing for URTIs should be discouraged. We

also urge the policymakers to introduce antimicrobial stewardship programs and guidelines in healthcare institutes that will help with planning future initiatives among the primary healthcare centres of India.

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