



CLINICAL PRESENTATION, LABORATORY FINDINGS, AND ANTIBIOTIC USAGE IN UPPER RESPIRATORY TRACT INFECTIONS AMONG CHILDREN AGED 1–12 YEARS - A CROSS SECTIONAL STUDY.

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Abstract

Background: Upper respiratory tract infections (URTIs) are among the most common illnesses affecting children and constitute a major cause of outpatient visits and antibiotic prescriptions worldwide. Most URTIs are viral in origin and self-limiting; however, inappropriate antibiotic use remains highly prevalent, contributing to antimicrobial resistance, increased healthcare costs, and avoidable adverse drug reactions. **Aims:** To assess the clinical presentation, laboratory findings, and antibiotic usage patterns in children aged 1–12 years presenting with upper respiratory tract infections. **Materials and Methods:** This cross-sectional study was conducted over a period of 15 months in the Department of Paediatrics at Sree Mookambika Institute of Medical Sciences. A total of 120 children aged between 1 and 12 years diagnosed with upper respiratory tract infections were included in the study. Detailed demographic data, clinical features, nutritional status, duration of illness, and previous medication history were recorded. Laboratory investigations were performed when clinically indicated. Data regarding antibiotic prescriptions, type of antibiotic used, indication, duration, and route of administration were collected and analyzed. Statistical analysis was performed using chi-square test and independent t-test, with $p < 0.05$ considered statistically significant. **Results:** Fever was the most common presenting symptom observed in 98 (81.7%) children, followed by cough in 90 (75.0%), rhinorrhea in 84 (70.0%), and sore throat in 58 (48.3%) children. Viral URTI was clinically suspected in 78 (65.0%) cases, while bacterial etiology was considered likely in 42 (35.0%) cases. Antibiotics were prescribed in 79 (65.8%) children, with amoxicillin-clavulanic acid being the most commonly prescribed antibiotic, accounting for 36 (45.6%) prescriptions. Inappropriate antibiotic usage without clear bacterial indication was identified in 29 (24.2%) cases. Antibiotic prescription was significantly associated with fever duration greater than 3 days, elevated inflammatory markers, and tonsillar exudates ($p < 0.05$). **Conclusion:** Upper respiratory tract infections were more common among younger children and were predominantly viral in etiology. Despite the predominance of viral infections, antibiotic usage remained high. Rational antibiotic prescribing practices, clinical assessment, and appropriate laboratory evaluation are essential to reduce unnecessary antibiotic use and prevent antimicrobial resistance in pediatric patients.

Keywords: Antibiotic usage; Antimicrobial resistance; Children; Cross-sectional study; Laboratory findings; Pediatric infections; Upper respiratory tract infection.



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INTRODUCTION

Upper respiratory tract infections (URTIs) are among the most common infectious illnesses affecting children worldwide and represent a major cause of pediatric outpatient visits, school absenteeism, and healthcare utilization.¹ Children are particularly susceptible because of immature immunity, frequent exposure to infectious agents in schools and daycare settings, poor hygiene practices, and close interpersonal contact.²

The majority of URTIs in children are caused by viruses such as rhinovirus, respiratory syncytial virus, influenza virus, adenovirus, parainfluenza virus, and coronavirus. Bacterial pathogens including *Streptococcus pyogenes*, *Streptococcus pneumoniae*, and *Haemophilus influenzae* contribute to a smaller proportion of infections.³ Viral URTIs are generally self-limiting and resolve with symptomatic treatment; however, differentiation between viral and bacterial infections based solely on clinical features can be challenging in routine clinical practice.⁴

Common symptoms of URTIs include fever, cough, rhinorrhea, nasal congestion, sore throat, sneezing, ear pain, irritability, and difficulty swallowing. Younger children may also present with feeding difficulty, disturbed sleep, vomiting, and reduced activity.⁵ Although most infections are mild, recurrent or untreated infections may lead to complications such as otitis media, sinusitis, lower respiratory tract infections, dehydration, and poor nutritional intake.⁶

Complete blood count, total leukocyte count, C-reactive protein, throat swab examination, and culture studies may aid diagnosis in selected cases. Elevated leukocyte count, neutrophilia, and raised inflammatory markers may suggest bacterial etiology, whereas normal or mildly elevated parameters are more commonly associated with viral infections.^{7,8}

Antibiotics remain one of the most frequently prescribed medications for pediatric URTIs despite the predominantly viral nature of these illnesses. Inappropriate antibiotic prescribing is a major concern globally because it contributes to antimicrobial resistance, increased healthcare expenditure, adverse drug reactions, and alteration of normal microbial flora.⁹ Parents often expect antibiotic prescriptions for febrile illnesses, and clinicians may prescribe antibiotics because of diagnostic uncertainty, fear of complications, or pressure for rapid symptom resolution. This irrational use of antibiotics has emerged as a serious public health issue.¹⁰

Antimicrobial resistance is increasingly recognized as a major threat to global healthcare systems. Repeated and unnecessary antibiotic exposure during childhood may promote resistant bacterial strains and reduce future treatment effectiveness. Rational antibiotic prescribing based on clinical evaluation and evidence-based guidelines is therefore essential in pediatric practice.¹¹ Identifying common prescribing patterns and factors associated with antibiotic use may help improve antibiotic stewardship and reduce unnecessary medication exposure. Hospital-based studies evaluating clinical features, laboratory findings, and antibiotic usage patterns provide valuable insight into disease burden and prevailing prescribing practices in the local population.

AIMS AND OBJECTIVES

- To assess the clinical presentation, laboratory findings, and antibiotic usage patterns in children aged 1–12 years presenting with upper respiratory tract infections.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Paediatrics at Sree Mookambika Institute of Medical Sciences over a period of 15 months from January 2025 to March 2026. The study included 120 children aged between 1 and 12 years who presented with symptoms suggestive of upper respiratory tract infections in the outpatient and inpatient departments. Written informed consent was obtained from parents or guardians of all participating children.

Inclusion Criteria

- Children aged 1–12 years.
- Children clinically diagnosed with upper respiratory tract infections.
- Patients presenting with symptoms such as fever, cough, rhinorrhea, sore throat, nasal congestion, sneezing, or ear pain.
- Parents or guardians willing to provide informed consent.

Exclusion Criteria

- Children with lower respiratory tract infections such as pneumonia or bronchiolitis.
- Children with chronic respiratory diseases.
- Patients with congenital heart disease or immunodeficiency disorders.
- Children with pulmonary tuberculosis or chronic systemic illnesses.
- Patients currently on long-term antibiotic therapy.
- Parents or guardians unwilling to participate in the study.

Detailed demographic and clinical data were collected using a structured proforma. Information regarding age, gender, socioeconomic status, nutritional status, immunization history, duration of illness, previous medication history, and history of recurrent respiratory infections was documented. A detailed clinical examination was performed in all children, including assessment of temperature, respiratory rate, throat congestion, tonsillar enlargement, nasal discharge, cervical lymphadenopathy, ear findings, and hydration status. Symptoms such as fever, cough, rhinorrhea, sore throat, nasal congestion, sneezing, ear pain, difficulty swallowing, vomiting, and reduced appetite were recorded.

Laboratory investigations were performed based on clinical indication and included complete blood count, total leukocyte count, differential leukocyte count, C-reactive protein, throat swab examination, and culture studies when required. Additional investigations were carried out in selected cases to exclude lower respiratory tract involvement or other systemic

illnesses. Clinical diagnosis of viral or bacterial upper respiratory tract infection was made based on presenting symptoms, examination findings, and laboratory parameters.

Details regarding antibiotic usage including type of antibiotic prescribed, duration, route of administration, indication, and previous antibiotic exposure were recorded. Antibiotic prescriptions were assessed for appropriateness based on clinical presentation, laboratory findings, and standard pediatric treatment guidelines. Symptomatic treatment measures including antipyretics, antihistamines, steam inhalation, hydration, and supportive care were also documented.

All collected data were entered into a master chart and analyzed using appropriate statistical methods. Continuous variables were expressed as mean $\pm$ standard deviation, while categorical variables were expressed as frequencies and percentages. Statistical analysis was performed using chi-square test and independent t-test wherever applicable. A p-value less than 0.05 was considered statistically significant.

RESULTS

Most children affected with upper respiratory tract infections belonged to the younger age group of 1–5 years, indicating increased susceptibility during early childhood. Male children constituted a slightly higher proportion, although the gender difference was not statistically significant.

Table 1: Age and Gender Distribution of Study Population (n = 120)

Variable	Category	Number (n)	Percentage (%)	p-value
Age Group	1–5 years	74	61.7	0.03*
	6–9 years	29	24.2	
	10–12 years	17	14.1	
Gender	Male	68	56.7	0.21
	Female	52	43.3	

Fever was the most common presenting symptom, followed by cough and rhinorrhea. The predominance of nasal and throat symptoms supports the common viral etiology of upper respiratory tract infections in children. (Table 2)

Table 2: Clinical Presentation of Upper Respiratory Tract Infections (n = 120)

Clinical Feature	Number (n)	Percentage (%)
Fever	98	81.7
Cough	90	75.0
Rhinorrhea	84	70.0
Nasal congestion	66	55.0
Sore throat	58	48.3
Sneezing	44	36.7
Reduced appetite	39	32.5
Ear pain	18	15.0

Viral upper respiratory tract infections constituted the majority of cases. Elevated inflammatory markers and tonsillar exudates were significantly associated with suspected bacterial infections and influenced antibiotic prescribing practices. (Table 3)

Table 3: Clinical Diagnosis and Laboratory Findings

Variable	Category	Number (n)	Percentage (%)	p-value
Clinical Etiology	Viral URTI	78	65.0	<0.01*
	Suspected bacterial URTI	42	35.0	
Leukocytosis	Present	38	31.7	0.02*
	Absent	82	68.3	
Elevated CRP	Present	34	28.3	0.01*
	Absent	86	71.7	
Tonsillar exudates	Present	29	24.2	0.03*
	Absent	91	75.8	

Antibiotics were prescribed in a large proportion of children despite viral infections being predominant. A considerable number of prescriptions lacked clear bacterial indication, reflecting inappropriate antibiotic usage in pediatric URTIs. (Table 4)

Table 4: Antibiotic Usage Pattern Among Study Population (n = 120)

Variable	Category	Number (n)	Percentage (%)	p-value
Antibiotic prescribed	Yes	79	65.8	<0.01*
	No	41	34.2	
Appropriate antibiotic use	Yes	50	63.3	0.02*
	No	29	36.7	
Route of administration	Oral	71	89.9	0.11
	Injectable	8	10.1	

Amoxicillin-clavulanic acid was the most commonly prescribed antibiotic, followed by azithromycin. Broad-spectrum antibiotics were frequently used, indicating a tendency toward empirical antibiotic therapy in pediatric respiratory infections. (Table 5)

Table 5: Pattern of Antibiotics Prescribed (n = 79)

Antibiotic	Number (n)	Percentage (%)
Amoxicillin-clavulanic acid	36	45.6
Azithromycin	18	22.8
Cefixime	12	15.2
Amoxicillin	8	10.1
Others	5	6.3

Antibiotic prescription showed significant association with prolonged fever, leukocytosis, elevated C-reactive protein levels, and presence of tonsillar exudates. These clinical and laboratory parameters strongly influenced the decision to initiate antibiotic therapy. (Table 6)

Table 6: Correlation of Clinical Variables with Antibiotic Prescription (n = 120)

Variable	Category	Antibiotic Prescribed n (%)	No Antibiotic n (%)	p-value
Fever duration	≤3 days	34 (47.9%)	37 (52.1%)	<0.01*
	>3 days	45 (91.8%)	4 (8.2%)	
Leukocytosis	Present	33 (86.8%)	5 (13.2%)	0.01*
	Absent	46 (56.1%)	36 (43.9%)	
Elevated CRP	Present	31 (91.2%)	3 (8.8%)	<0.01*
	Absent	48 (55.8%)	38 (44.2%)	
Tonsillar exudates	Present	27 (93.1%)	2 (6.9%)	<0.01*
	Absent	52 (57.1%)	39 (42.9%)	

DISCUSSION

A total of 120 children aged 1–12 years with upper respiratory tract infections were included in the present study. Majority of children belonged to the 1–5 years age group, accounting for 74 (61.7%) cases, indicating increased susceptibility to respiratory infections during early childhood due to immature immunity and frequent environmental exposure. Male children constituted 68 (56.7%) of the study population.

Similar age distribution and male predominance were reported by Khan EA et al.¹² who observed that most children with upper respiratory tract infections were younger than one year and predominantly male. Kwiyochea E et al.¹³ also documented higher prevalence of upper respiratory tract infections among younger children, emphasizing the vulnerability of early childhood age groups to respiratory infections.

Fever was the most common presenting symptom in the present study, observed in 98 (81.7%) children, followed by cough in 90 (75.0%) and rhinorrhea in 84 (70.0%) cases. Nasal congestion, sore throat, sneezing, and reduced appetite were also frequently reported. Similar symptom patterns were documented by Jadhav S et al.¹⁴ who reported cough, fever, and rhinitis as the most common presenting complaints among children with upper respiratory tract infections.

Khan EA et al.¹² similarly observed high frequency of fever, cough, rhinorrhea, and pharyngitis among pediatric patients. Ear pain was observed in 18 (15.0%) children in the present study, suggesting associated upper airway inflammation or early otitis media in some patients. Comparable findings were noted by Kwiyochea E et al.¹³ who identified bacterial isolates from ear infections among children with upper respiratory tract infections.

Clinical assessment in the present study suggested viral etiology in 78 (65.0%) children, whereas bacterial infection was suspected in 42 (35.0%) cases. Laboratory findings showed leukocytosis in 38 (31.7%) children and elevated C-reactive protein levels in 34 (28.3%) patients. Tonsillar exudates were present in 29 (24.2%) children and showed significant association with suspected bacterial infections.

Similar observations were made by Kwiyochea E et al.¹³ who demonstrated that viruses were the most common cause of upper respiratory tract infections, with rhinovirus being the predominant pathogen. Turyasiima M et al.¹⁵ also reported that upper respiratory tract infections, especially common cold and tonsillopharyngitis, constituted the majority of pediatric respiratory infections, highlighting the predominance of viral etiologies.

Despite viral infections accounting for most clinically diagnosed cases, antibiotics were prescribed in 79 (65.8%) children in the present study. Amoxicillin-clavulanic acid was the most frequently prescribed antibiotic, followed by azithromycin. Broad-spectrum antibiotics were commonly utilized, reflecting empirical prescribing practices in pediatric respiratory infections. Similar overuse of antibiotics was reported by Jadhav S et al.¹⁴ who observed antimicrobial prescription in more than 90% of children with upper respiratory tract infections. Mustafa ZU et al.¹⁶ also documented alarmingly high antibiotic utilization rates among children with upper respiratory tract infections, with most patients receiving multiple antibiotics despite limited appropriate indications.

Inappropriate antibiotic use without clear bacterial indication was identified in 29 (24.2%) children in the present study, highlighting irrational prescribing practices. Comparable findings were observed by Al Sous MM et al.¹⁷ who reported extremely high antibiotic prescribing rates among patients with upper respiratory tract infections, particularly in acute tonsillitis. Mustafa ZU et al.¹⁶ further demonstrated that only a small proportion of prescriptions fulfilled appropriate treatment criteria, emphasizing the need for antimicrobial stewardship programs.

Antibiotic prescription in the present study showed significant association with prolonged fever duration, leukocytosis, elevated C-reactive protein levels, and tonsillar exudates. Children with these clinical and laboratory findings were more likely to receive antibiotics. Oral antibiotics constituted the majority of prescriptions, while injectable antibiotics were reserved for selected patients with severe symptoms or poor oral tolerance. Similar observations were made by Khan EA et al.¹² who reported that most children recovered with supportive care alone and only a small proportion required antibiotic therapy or hospitalization.

The present study also highlights the influence of parental expectations and empirical prescribing practices on antibiotic use. Albayrak A et al.¹⁸ reported that a considerable proportion of parents believed antibiotics were effective against viral infections, and some parents pressured physicians to prescribe antibiotics. Such misconceptions contribute significantly to unnecessary antimicrobial exposure in children.

CONCLUSION

URTI were more common among younger children and predominantly presented with fever, cough, and rhinorrhea. Most infections were clinically suggestive of viral etiology, although antibiotics were prescribed in a large proportion of cases. Elevated inflammatory markers, prolonged fever, and tonsillar exudates significantly influenced antibiotic usage. A considerable proportion of antibiotic prescriptions lacked clear bacterial indication, highlighting inappropriate prescribing practices. Rational clinical assessment and selective laboratory evaluation are essential for appropriate management of pediatric upper respiratory tract infections. Strengthening antibiotic stewardship programs and promoting evidence-based prescribing practices are necessary to reduce unnecessary antibiotic exposure and prevent the emergence of antimicrobial resistance in children.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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