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Assessment of Signs and Symptoms, Laboratory Parameters and Prescription Pattern of Inhaled Corticosteroids and Antimicrobial Agents for Respiratory Tract Infection Patients in Tertiary Care Hospital: A Prospective, Observational Study

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ABSTRACT:
Background: Respiratory tract infections (RTIs) pose significant challenges in clinical medicine, contributing to considerable morbidity, mortality, and workforce absenteeism worldwide. This study aims to explore the diverse clinical manifestations and laboratory abnormalities of respiratory tract infections and evaluate antimicrobial and inhaled corticosteroid prescribing patterns in hospitalized patients with common respiratory disorders.

Objectives: The primary objective of this study is to comprehensively assess the signs, symptoms, and key laboratory parameters essential for rapid and accurate diagnosis of respiratory tract infections.

Method: The prospective observational study was conducted at SDA-Diamond Hospital, Suratover six months. Patients diagnosed with respiratory tract infections were included. Ethical approval was obtained from the IEC. Then, data from 120 patients fulfilling the inclusion and exclusion criteria was collected, assessed, compiled, and analyzed statistically, and a conclusion was derived.

Results: This prospective observational study focused on 120 patients diagnosed with respiratory tract infections and found a higher prevalence among males (59.2%) compared to females (40.8%). Lower respiratory tract infections (LRTIs) were mostly encountered, accounting for 59.16% of cases, while upper respiratory tract infections (URTIs) comprised 40.83%. The predominant symptoms reported included fever (32.70%), cough and cold (29.28%), and breathlessness (10.65%). On physical examination, crepitation were noted in 60.42% of patients, and wheezing was observed in 22.92%.Laboratory results indicated elevated inflammatory markers, with raised white blood cell counts in 95 patients out of 96 patientsand increased C-reactive protein levels in 65 patients out of 120 patients, which contributed to the diagnostic evaluation. Ceftriaxone was the most frequently administered antibiotic during hospitalization (26.31%), followed by azithromycin (13.76%). Upon discharge,azithromycin and cefixime were the most commonly prescribed antibiotics, each accounting for 20.42% of prescriptions. Among inhaled corticosteroids,budesonide was predominantly used (82%), highlighting its important role in the supportive care of respiratory tract infections.

Significance: This study highlights the common clinical features, abnormal laboratory parameters, and prescribing trends observed in respiratory tract infections. Identifying frequently noted clinical manifestations and lab abnormalities can aid in early diagnosis, while data on commonly prescribed antibiotics and inhaled corticosteroids offers insight into current treatment practices.

KEYWORDS: Respiratory tract infections (RTIs),Inhaled Corticosteroids, Clinical manifestations, Laboratory parameters, Prescription pattern, Tertiary care hospital.

I. INTRODUCTION

Respiratory tract infections (RTIs) are a leading cause of morbidity from acute illnesses, prompting frequent medical visits, often affecting individuals across all age groups. These infections range from mild, self-limiting conditions to more serious illnesses requiring intensive care, particularly in tertiary healthcare settings. Due to the diverse nature of pathogens and varying host responses, the clinical picture of RTIs can differ significantly among patients. A careful assessment of symptomsalongside supportive laboratory findings is essential for accurate diagnosis and timely intervention.

URTIs include infections that spread from the nasal cavity to the trachea. LRTI includes the infections of the bronchus, bronchiole, and lung parenchyma [1].

Respiratory tract infections are classified as upper and lower respiratory tract infections. Upper respiratory tract comprises the airways from the nostrils to the vocal cords in the larynx, plus the paranasal sinuses and the middle ear. The lower respiratory tract includes the furtherance of the airways from the trachea and bronchi to the bronchioles and the alveoli.[2,3,4]

Upper respiratory tract infections (URTIs) include the common cold, laryngitis, pharyngitis/tonsillitis, acute rhinitis, acute rhinosinusitis, and acute otitis media.[2,3,4] Lower respiratory tract infections (LRTIs) include acute bronchitis, bronchiolitis, and pneumonia.

Classification:

✧ UPPER RESPIRATORY INFECTIONS:

1. Otitis Media: Ear infections are a common clinical concern, particularly among children. Otitis media involves inflammation or irritation of the middle ear, while otitis externa affects the external auditory canal. Both conditions differ in their site of origin and presentation. Bacterial organisms, including Streptococcus pneumoniae, are frequently implicated in cases of otitis media. Common symptoms include discomfort in the ear, slight hearing difficulty, and sensations of nausea. These manifestations are typically mild but require prompt attention to prevent further complications.[5]

2. Rhino-sinusitis:Sinusitis refers to inflammation and/or infection affecting the paranasal sinuses, which are the air spaces around the nose. The term rhinosinusitis is increasingly preferred, as it acknowledges that sinusitis often occurs with inflammation of the nasal mucosa.[6] Itis characterized by swelling and inflammation of the nasal mucous membrane, which makes the nose runny and stuffy.A rash, runny nose, sneezing, red eyes, and itching are signs of rhinoitis.

3. Pharyngitis:Pharyngitis is characterized as an acute infection affecting the oropharynx or nasopharynx. Although viral cause are predominant, group A β-haemolytic streptococci (GABHS), also known as S. pyogenes, represent the primary bacterial culprit responsible for this condition.[7]

Management of viral pharyngitis generally involves supportive care aimed at relieving symptoms. In specific cases such as those involving herpes simplex virus antiviral agents like acyclovir can be prescribed, especially when the individual is immunocompromised or if clinically warranted. For bacterial pharyngitis, particularly infections caused by Streptococcus pyogenes, penicillin G remains the treatment of choice. However, the selection of antibiotics may be tailored based on the identified pathogen. Agents such as erythromycin, tetracycline, and newer macrolide antibiotics have shown effectiveness against pathogens like Mycoplasma and Chlamydia.[8]

4. Laryngitis: It is the inflammation of the larynx caused by irritation, or infection. Adenovirus or influenza virus infection isthe cause of acute laryngitis. Symptoms of laryngitis usually include sore throat, dry cough, hoarseness, and swollenglands.[9]

5. Common Cold: The common cold is a viral infection of the upper respiratory tract which includes nose and throat. Amongall respiratory diseases, common colds are the most common and the main reason patients contact their doctor, miss work and school and take sick days. Viruses are the main cause of colds.

The treatment of the uncomplicated common cold is mostly symptomatic. Bed rest, water, antipyretics, and decongestants are usually enough. The best remedy to stop the disease from spreading include limiting your activity to prevent spreading the infection to others and washing your hands thoroughly. For cold prophylaxis, there isn't a commercially available vaccination.[10]

✧ LOWER RESPIRATORY INFECTION:

Lower respiratory tract infections (LRTIs) primarily result from the spread of pathogens from the upper respiratory tract. While the usual route is downward occupation, microorganisms can occasionally reach the lungs via the bloodstream especially from non-respiratory (extrapulmonary) origins or through inhalation of infectious aerosolized particles. The patient's immune response plays an important role in determining their vulnerability to infection and the severity of illness. Bronchitis, bronchiolitis, and pneumonia are the most prevalent infections affecting the lower respiratory tract. These conditions, which commonly afflict both children and adults, typically stem from either viral or bacterial infiltration of the lung parenchyma. Infections of the lung parenchyma are diagnosed mainly through clinical signs and symptoms. As treatment is usually supportive, lab confirmation is rarely needed, though serologic tests may be used when necessary. However, in cases where verification is warranted, serologic tests or the identification of the causative organism through culture or antigen detection of respiratory secretions can be used.[11]

1. Bronchitis and Bronchiolitis:

Bronchitis and bronchiolitis involve inflammation of the bronchial passages, commonly following viral upper respiratory infections. Bronchitis may be linked to bacterial infections (H. influenzae, S. pneumoniae) and factors like smoking, can often lead to chronic cough and sputum. Bronchiolitis, typically affects infants, and is mainly caused by respiratory syncytial virus (RSV), though other viruses such as M. pneumoniae, parainfluenza, influenza, and adenoviruses can also contribute to the disease.

Acute Bronchitis symptoms include coughing with or without mucus, fatigue, and sore throat. Chronic bronchitis is distinguished by a persistent cough and large amounts of phlegm, especially in the morning.

Symptoms of bronchiolitis may start with irritability, mild fever, restlessness, and cold-like symptoms like runny nose. This may be followed by vomiting and diarrhea. Breathing may be noisy and rapid, and signs of labored breathing like chest wall retractions, nasal flaring, and grunting may develop.

Supportive care is the best for viral infections. Ribavirin is used for treating respiratory syncytial virus (RSV) in neonate patients. For influenza A, antiviral agents like amantadine and rimantadine are preferred for chemoprophylaxis. In selected cases, especially in patients with chronic bronchitis, prophylactic antibiotics, bronchodilators, or corticosteroids may be beneficial[12].

2. Pneumonia:

Pneumonia is a lung infection that leads to inflammation in one or both lungs, often resulting in fluid accumulation within the air sacs. It can be acquired through multiple routes of transmission.

Pneumonia is broadly classified to aid diagnosis, epidemiology, and treatment. Community-acquired pneumonia (CAP) occurs in individuals outside healthcare settings, while hospital-acquired pneumonia (HAP), or nosocomial pneumonia, develops during hospitalization. Among bacterial causes, Streptococcus pneumoniae is the leading agent in CAP. Other streptococci are uncommon, though S. pyogenes may lead to complications like empyema. Staphylococcus aureus can cause pneumonia post-influenza or bacteremia. Hospital-acquired pneumonia (HAP) is primarily attributed to Gram-negative aerobic bacilli, Staphylococcus aureus, and multidrug-resistant (MDR) pathogens[13,14]. In older adults or those with conditions like COPD or alcoholism, Haemophilus influenzae (often nontypable) and Klebsiella pneumoniae are the more common causes.

In contrast, aerobic gram-negative bacilli—such as Enterobacter, Proteus, E. coli, Klebsiella, and Pseudomonas aeruginosa are primary culprits in HAP but rarely affect healthy individuals. Mycobacterium tuberculosis can also cause pneumonia, particularly in immunocompromised individuals. Atypical mycobacteria may mimic tuberculosis clinically.

Typical symptoms include fever, cough, dyspnea, chest pain, sputum production, and tachycardia. Some patients may also experience gastrointestinal or systemic symptoms based on age and pathogen.

Treatment is guided by clinical history exposures, comorbidities, prior infections, severity, and lab findings until the specific pathogen is identified. Once confirmed, targeted antimicrobial treatment is started.

Preventive strategies include pneumococcal and influenza vaccines for high-risk groups such as the elderly, immunocompromised, or asplenic individuals. Certain military recruits may receive adenovirus vaccines. In HIV/AIDS patients, prophylactic therapies like trimethoprim-sulfamethoxazole or aerosolized pentamidine can help prevent Pneumocystis jirovecii pneumonia. Viral pneumonia often resolves without medical treatment; however, antiviral medications such as oseltamivir or zanamivir may accelerate recovery in cases caused by influenza. For bacterial pneumonia, treatment typically begins with broad-spectrum antibiotics, selected based on the most probable pathogens and supported by laboratory results and culture findings[13, 15].

II. RATIONALE AND OBJECTIVES

Reason:

The primary goal of this study is to identify the pivotal signs, symptoms, and laboratory parameters crucial for diagnosing respiratory tract infections (RTIs). As there is susceptibility of young children to RTIs, prompt diagnosis is important to mitigate the risk of acute respiratory failure and subsequent complications. Our investigation seeks to identify the most prevalent signs, symptoms, and abnormal lab findings that are indicative of RTIs.
Moreover, we aim to scrutinize the usage of antimicrobial agents and inhaled corticosteroids. Overuse of these medications can exacerbate antimicrobial resistance and trigger adverse effects; prolonging hospital stays and complicating infection treatment. By examining prescribing patterns, we strive to enhance our understanding of optimal treatment strategies for RTIs patients.

Objectives:

- To analyze the prescription patterns of antimicrobial agents in patients diagnosed with respiratory tract infections.
- To assess the proportion and types of inhaled corticosteroids used.
- To identify and evaluate the commonly reported clinical signs and symptoms.
- To assess the warning laboratory parameters.

III. MATERIAL AND METHOD

1. Name of the Study:

Assessment of signs and symptoms, laboratory parameters and prescription pattern of inhaled corticosteroids and antimicrobial agents for respiratory tract infection patients in tertiary care hospital: A prospective, observational study.

2. Study Design:

This is a prospective observational study.

3. Study Duration:

The study was conducted at SDA – Diamond hospital, Surat (Gujarat), for six months.

4. Number of Patients and Study Site:

The total enrollment of patients in study was 120.
This study was a single-site study in which patients from the following hospital were included: SDA – Diamond Hospital, near chikuwadi Nana varracha, Surat. 395006

5. Study participation duration of each patient:

The interaction between patient depended upon their length of hospital stay, and it was different for each individual who enrolled in the study.

6. Methodology:

The study was conducted over a period of 6 months. Important documents such as protocol, data collection form like ICF, CRF was presented to the ethics committee for approval of the same. The study proceeded after permission was granted.

This study was designed as a prospective and observational. This was a single-site study which was conducted at SDA – Diamond hospital, for inpatients who has been diagnosed with respiratory tract infection over six months. The main objective was assessment of signs & symptoms, laboratory parameters and prescription pattern of inhaled corticosteroids and antimicrobial agents for respiratory tract infection patients.

The data from 120 patients who met the inclusion and exclusion criteria were collected, assessed, compiled, and subjected to thorough analysis.

7. Statistical Methodology:

MS-Excel.

8. Inclusion Criteria:

- Age - Pediatric patients and patient's age above 18 years.
- Patients diagnosed with respiratory tract infection.
- Patients with comorbid conditions like HTN, Diabetes, IHD and CKD

9. Exclusion Criteria:

- Patients whose file is incomplete.
- Patients shifted to other hospital.
- Comorbid conditions such as HIV, Cancer, COPD and asthma.
- Pregnant or Lactating women.

IV. STATISTICS AND RESULTS

1) Gender-wise distribution (n=120):

A total of 120 prescriptions were analysed and out of which 71 (59.2%) were male and 49 (40.8%) were female. The incidence of RTI was found more in males as compared to females.

GENDER	RATIO	PERCENTAGE
MALE	71	59.2%
FEMALE	49	40.8%

TABLE NO. 1 GENDER DISTRIBUTION

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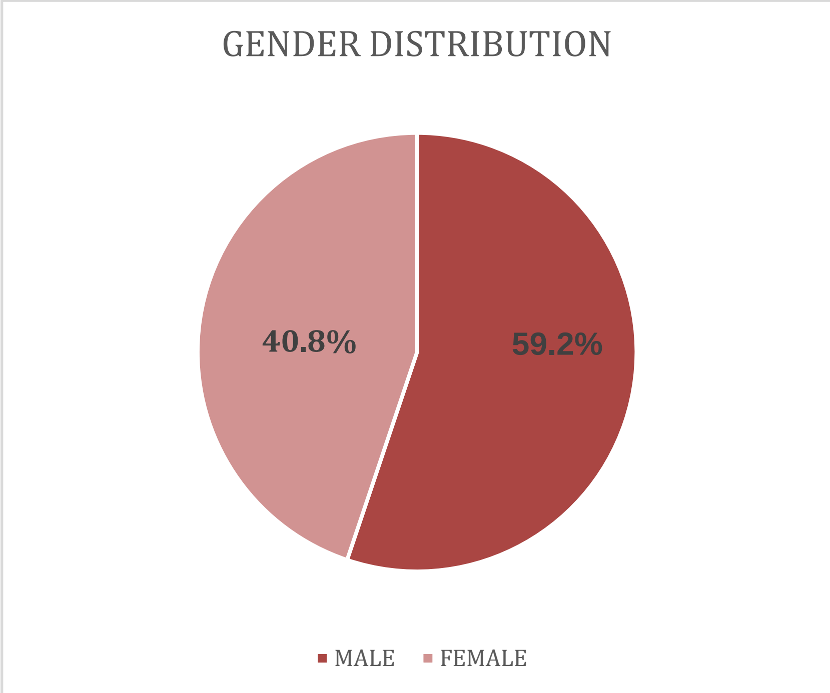

FIG. 1 GENDER DISTRIBUTION

2)Age-wise distribution:

Patients were grouped into 6 groups based on their age. 2 (1.67%) patients were found to be in the age group of newborns (0 - 28 days), 35 (29.17%) were in the group of infants (29 days – 1 year), 9 (7.50%) were in the group of toddlers (2-3 years), 12 (10%) were in the group of child (4 - 12 years), 1 (0.83%) in the group of adolescent (13 – 18 years), 61 (50.83%) were in the group of above 18 years.

AGE GROUPS	RATIO	PERCENTAGE
Newborns	2	1.67%
Infants	35	29.17%
Toddlers	9	7.50%
Child	12	10.00%
Adolescents	1	0.83%
Above 18 years	61	50.83%

TABLE NO. 2 AGE - WISE DISTRIBUTION

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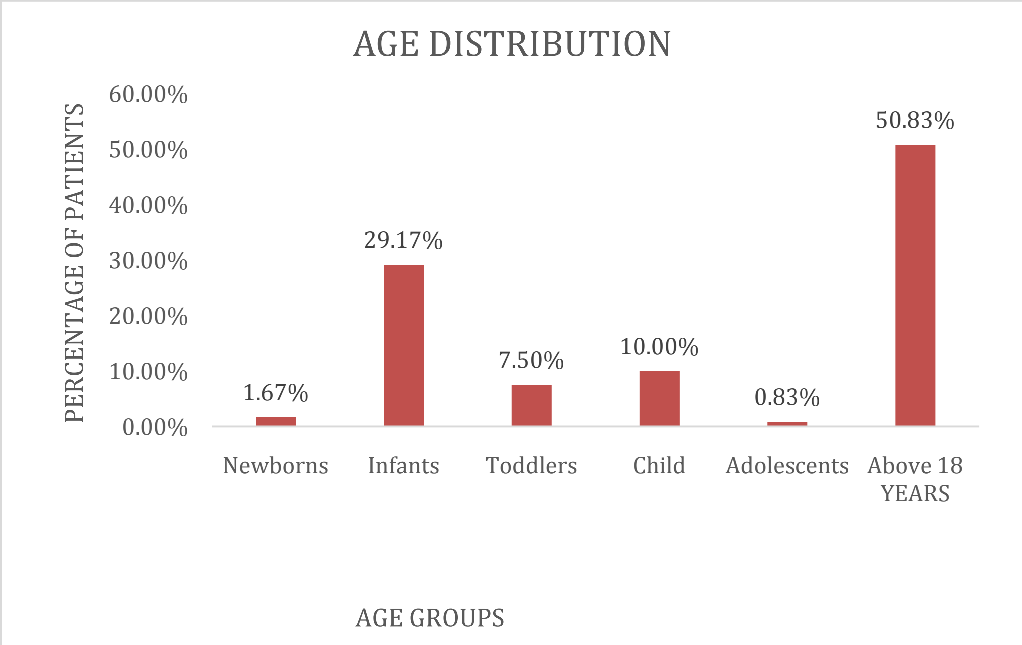

FIG. 2 AGE - WISE DISTRIBUTION

3)Disease prevalence:

Out of 120 study patient's majority of the patients were of lower respiratory tract infections which was 71 (59.16%) and remaining 49 (40.83%) were of upper respiratory tract infections.

DISEASE PREVALENCE	RATIO	PERCENTAGE
URTI	49	40.83%
LRTI	71	59.16%

TABLE NO. 3 Disease Prevalence

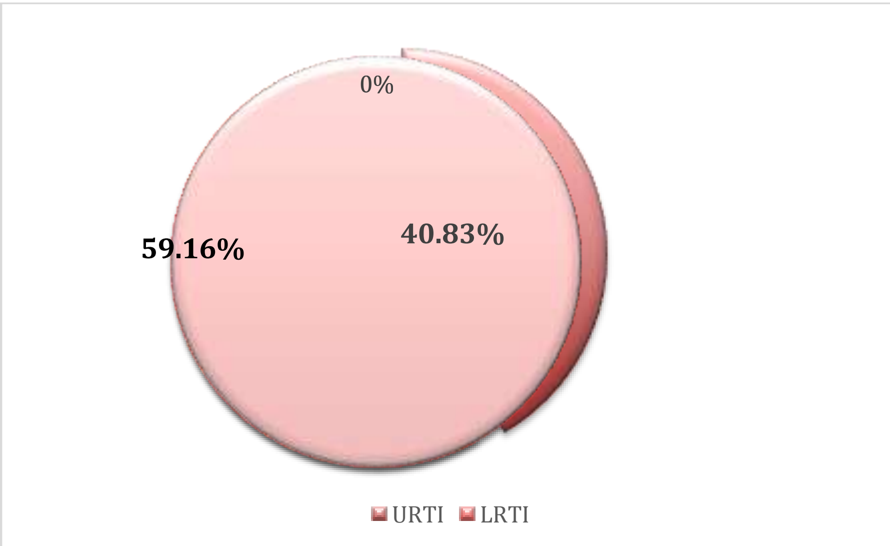

FIG. 3 Disease Prevalence

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3.a) Upper respiratory tract infections:

Among the patients diagnosed with upper respiratory tract infections (URTIs), 14 (11.67%) cases were diagnosed with viral URTI, 19 (15.83%) as viral fever, and 13 (10.83%) as otitis media. Additionally, 1 (0.83%) was diagnosed with sinusitis, while 2 (1.67%) were presented with acute infective fever.

URTI	RATIO	PERCENTAGE
VIRAL URTI	14	11.67%
VIRAL FEVER	19	15.83%
OTITIS MEDIA	13	10.83%
SINUSITIS	1	0.83%
ACUTE INFECTIVE FEVER	2	1.67%

TABLE NO. 3a Distribution of URTIs

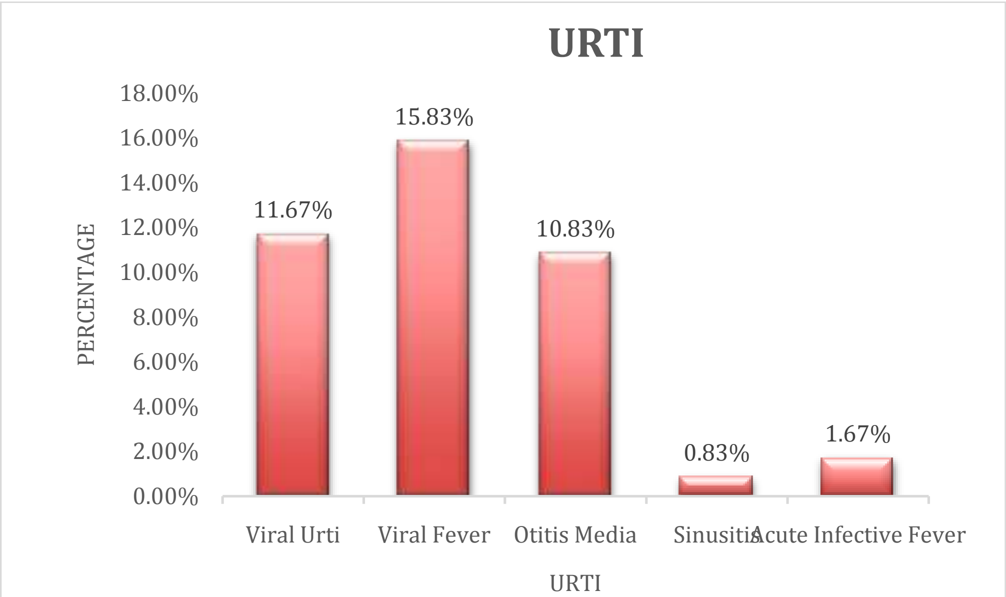

FIG. 3a Distribution of URTI

3.b) Lower respiratory tract infections:

Among the patients diagnosed with lower respiratory tract infections (LRTIs), 37 (52.11%) cases were diagnosed with unspecified LRTI, 22 (30.99%) as pneumonitis, and 5 (7.04%) as aspiration pneumonia. Additionally, 4 (5.63%) were diagnosed with viral pneumonia, while 3 (4.23%) were diagnosed with acute infective fever.

LRTI	RATIO	PERCENTAGE
UNSPECIFIED LRTI	37	52.11%
PNEUMONITIS	22	30.99%
ASPIRATION PNEUMONIA	5	7.04%
VIRAL PNEUMONIA	4	5.63%
ALLERGIC BRONCHITIS	3	4.23%

TABLE NO. 3b Distribution of LRTIs

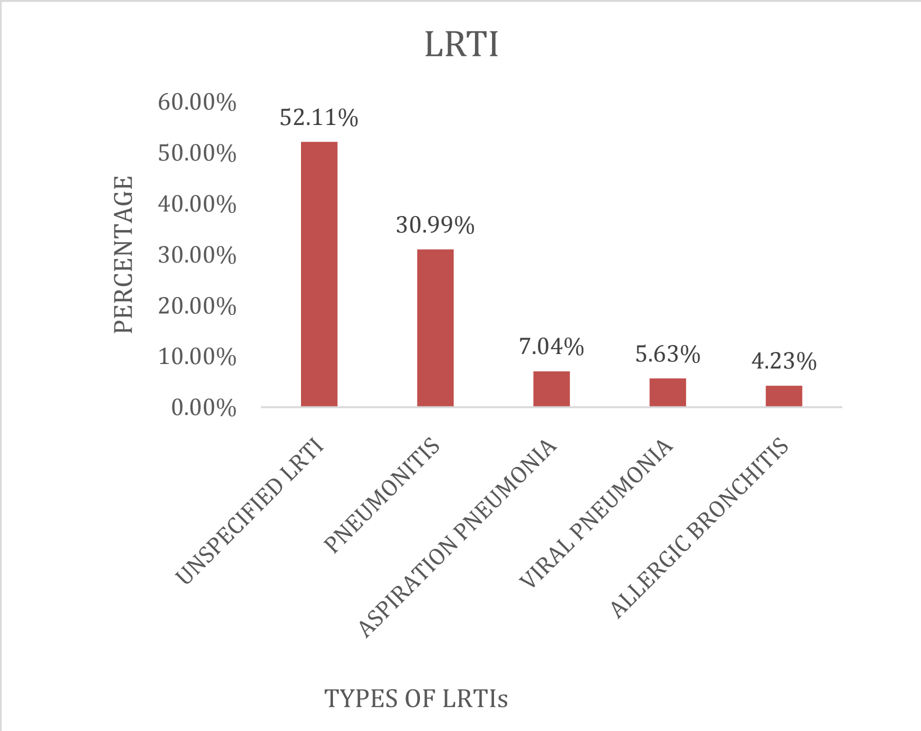

FIG. 3b Distribution of LRTIs

4) **DIAGNOSTIC PARAMETERS:**

4.a SYMPTOMS:

The most common symptoms found in the patients were Fever which was found in 86 (32.70%) patients, cough and cold in 77 (29.28%) patients and Breathlessness in 28 (10.65%) patients.

SYMPTOMS	RATIO	PERCENTAGE
Throat pain	1	0.38%
Ear pain	12	4.56%
Chest pain	4	1.52%
Chills	13	4.94%
Difficulty in hearing	1	0.38%
DOE	2	0.76%
Cough with expectoration	5	1.90%
Sneezing	1	0.38%
stuffy or runny nose	1	0.38%
Sore throat	1	0.38%
Muscle ache	1	0.38%
Headache	8	3.04%
Weakness	22	8.37%
Breathlessness	28	10.65%
Cough and cold	77	29.28%
Fever	86	32.70%

TABLE NO. 4.a.Symptoms

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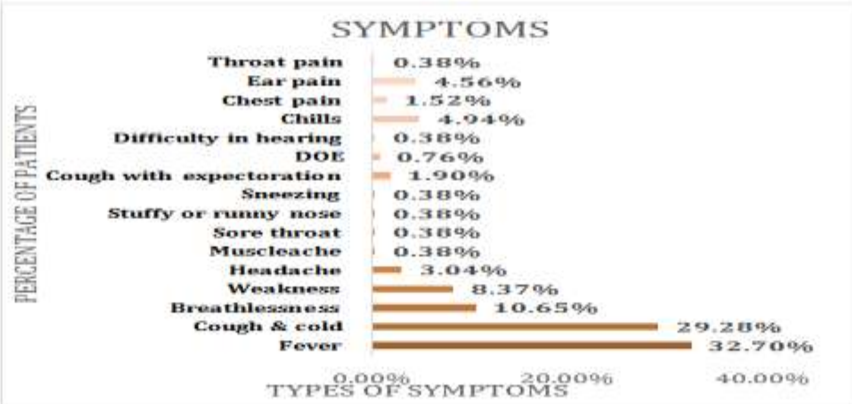

FIG. 4.a.Symptoms

4.bSIGNS:
The most common signs out of 120 patients with respiratory tract infections were crepitation which was found in 29 (60.42%) patient,wheeze in 11 (22.92%) patients and others as listed.

SIGNS	RATIO	PERCENTAGE
Wheeze	11	22.92%
Stridor	1	2.08%
Sub-costal intercostal muscle retraction	1	2.08%
Rhonchi	3	6.25%
Crepitations	29	60.42%
Tachypnea	3	6.25%

TABLE NO. 4.b.Signs

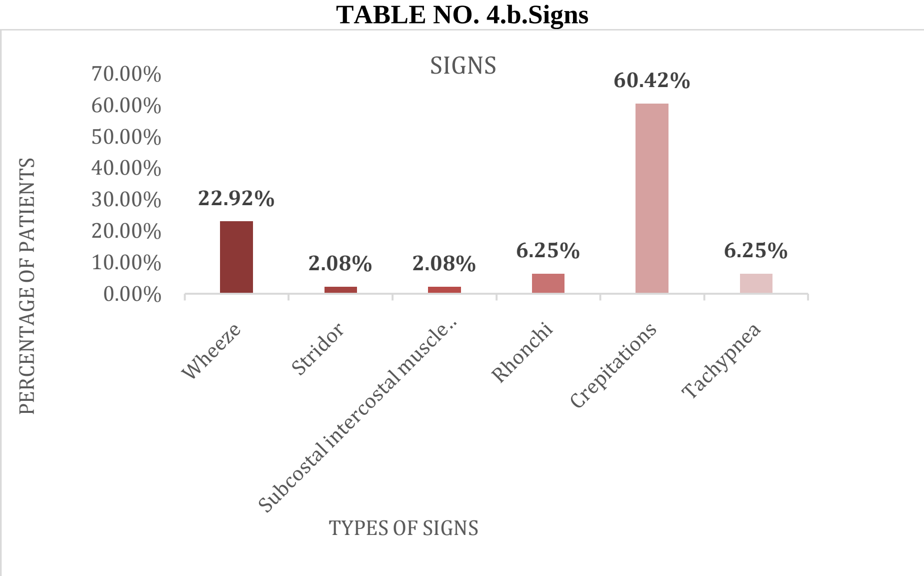

FIG. 4.b.Signs

4.c LABORATORY PARAMETERS:
The most common lab abnormalities found were WBC count, which was found abnormal in 65 patients out of 120 patient, CRP which was raised in 95 patients out of 96 patients, ESR found abnormal

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in 7 patients and procalcitonin abnormal in all the 5 patients.

LAB PARAMETERS	TEST DONE IN NO. OF PATIENTS	ABNORMAL FOUND IN NO. OF PATIENTS
WBC	120	65
CRP	96	95
ESR	12	7
PCT	5	5

TABLE NO. 4.c. Laboratory parameters

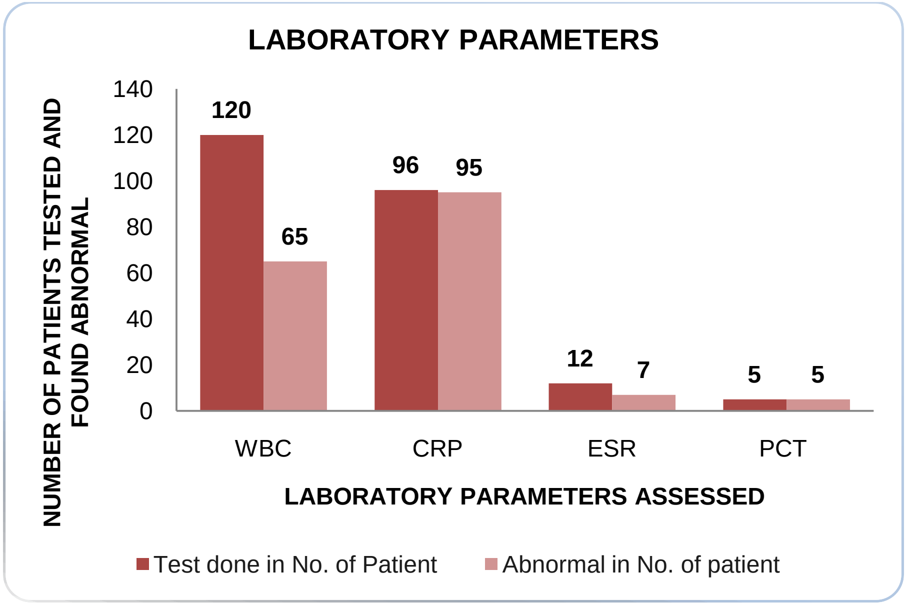

FIG. 4.c. Laboratory parameters

4.dOTHER LABORATORY PARAMETERS:

The other laboratory parameters which were done in study patients were chest x-ray in 74 (46.84%) patients, culture sensitivity test in 48 (30.38%) patients, 2D- ECHO in 12 (7.59%) patients, sputum culture test in 9 (5.7%) patients, HRCT lungs in 7 (4.43%) patients, AFB & bronchoscopy in 3 (1.9%) patients and BAL & viral flu panel in 0.63% of patients.

TESTS DONE	RATIO	PERCENTAGE
Viral flu panel	1	0.63%
BAL	1	0.63%
Bronchoscopy	3	1.9%
AFB	3	1.9%
HRCT Lungs	7	4.43%
Sputum culture test	9	5.7%
2D ECHO	12	7.59%
Culture sensitivity test	48	30.38%
Chest Xray	74	46.84%

TABLE NO. 4.d. Other Laboratory tests

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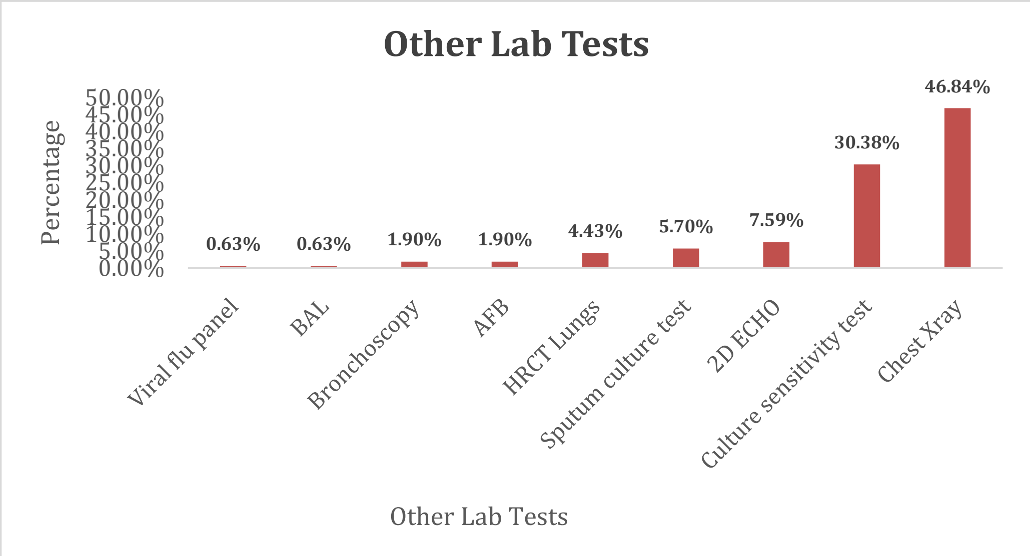

FIG NO. 4.d. Other Laboratory tests

5) ANTIMICROBIAL PRESCRIBING IN DIFFERENT AGE GROUPS:

5a. Newborns (0-28 days):

The antibiotics prescribed in newborn patients were Piperacillin-Tazobactam, Amikacin, Cefixime and Amoxicillin-Clavulonic acid during hospitalization. During discharge they were prescribed with Cefixime and Amoxicillin-Clavulonic acid.

5b. Infants (29 days to 1 year):

Mostly prescribed antimicrobial agents in infants at the time of hospitalization were Ceftriaxone 41.43%, Penicillin-Tazobactam 11.43% and Levofloxacin 10% and others as mentioned in table no. 5.b.i. During discharge the mostly prescribed antibiotics were Cefixime 27.45%, Azithromycin 9.8% and Piperacillin-Tazobactam 9.8%.

ANTIMICROBIALS PRESCRIBED IN INFANTS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Ceftriaxone	29	41.43%
Amikacin	5	7.14%
levofloxacin	7	10.00%
Oseltamivir	6	8.57%
Azithromycin	3	4.28%
Piperacillin-Tazobactam	8	11.43%
Amoxicillin-Potassium clavulanate	3	4.28%
Ofloxacin	1	1.43%
Satranidazole	1	1.43%
Meropenem	2	2.86%
Netilmycin	1	1.43%
Metronidazole	1	1.43%
Cotrimoxazole	3	4.28%

TABLE NO. 5.b.i Infants antimicrobial prescribing pattern during hospitalization

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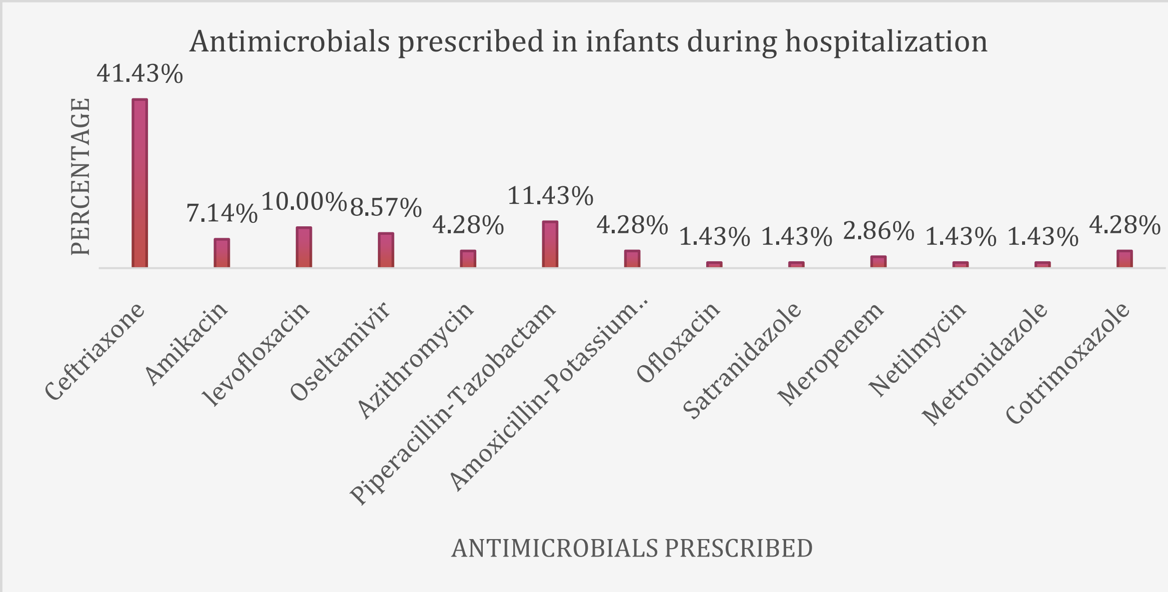

FIG NO. 5.b.i Infants antimicrobial prescribing pattern during hospitalization

ANTIMICROBIALS PRESCRIED IN INFANTS DURING DISCHARGE	RATIO	PERCENTAGE
Cefixime	14	27.45%
Azithromycin	5	9.80%
Amikacin	1	1.96%
Oseltamivir	4	7.84%
Piperacillin-Tazobactam	5	9.80%
Ceftriaxone	2	3.92%
Ofloxacin	4	7.84%
Satranidazole	3	5.90%
Metronidazole	2	3.92%
Amoxicillin-Potassium Clavulonate	3	5.90%
Levofloxacin	3	5.90%
Cotrimoxazole	4	7.84%
Faropenem	1	1.96%

TABLE NO. 5.b.ii Infants antimicrobial prescribing pattern during discharge

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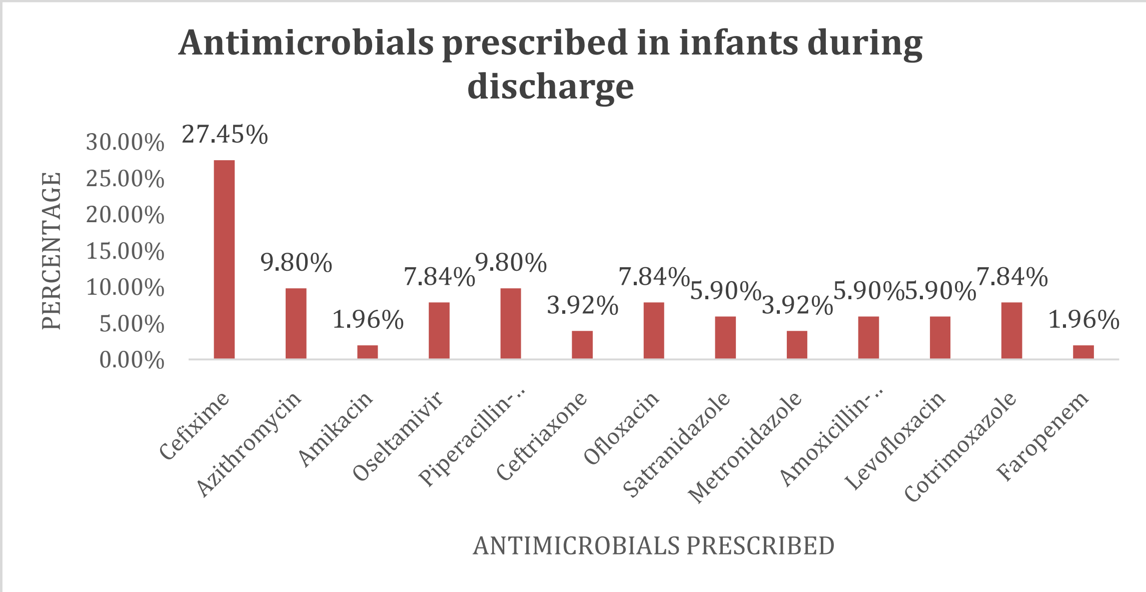

FIG NO. 5.b.ii Infants antimicrobial prescribing pattern during discharge

5c. Toddlers (2 to 3 years):

Mostly prescribed antimicrobial agents in toddlers at the time of hospitalization were Ceftriaxone 52.94%, Amikacin 11.80% and Sulfamethoxazole-Trimethoprim 11.80% and others as mentioned in table no. 5.c.i During discharge the mostly prescribed antibiotics were Cefixime 36.40%, Sulfamethoxazole-Trimethoprim 18.18%.

ANTIMICROBIALS PRESCRIBED IN TODDLERS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Ceftriaxone	9	52.94%
Amikacin	2	11.80%
Amoxicillin-Potassium clavulanate	1	5.88%
Satranidazole	1	5.88%
Ofloxacin	1	5.88%
Piperacillin-Tazobactam	1	5.88%
Sulfamethoxazole-Trimethoprim	2	11.80%

TABLE NO. 5.c.i Toddlers antimicrobial prescribing pattern during hospitalization

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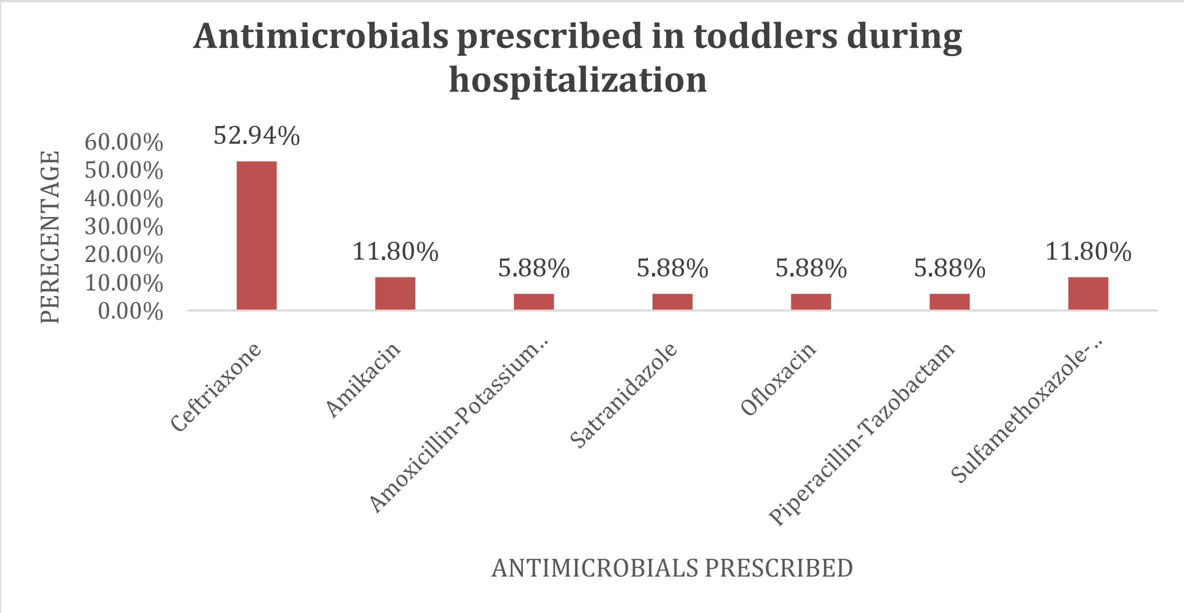

FIG NO. 5.c.i Toddlers antimicrobial prescribing pattern during hospitalization

ANTIMICROBIALS PRESCRIBED IN TODDLERS DURING DISCHARGE	RATIO	PERCENTAGE
Cefixime	4	36.40%
Amoxicillin-Potassium clavulanate	1	9.10%
Satranidazole	1	9.10%
Ceftriaxone	1	9.10%
Ofloxacin	1	9.10%
Piperacillin-Tazobactam	1	9.10%
Sulfamethoxazole-Trimethoprim	2	18.18%

TABLE NO. 5.c.ii Toddlers antimicrobial prescribing pattern during discharge

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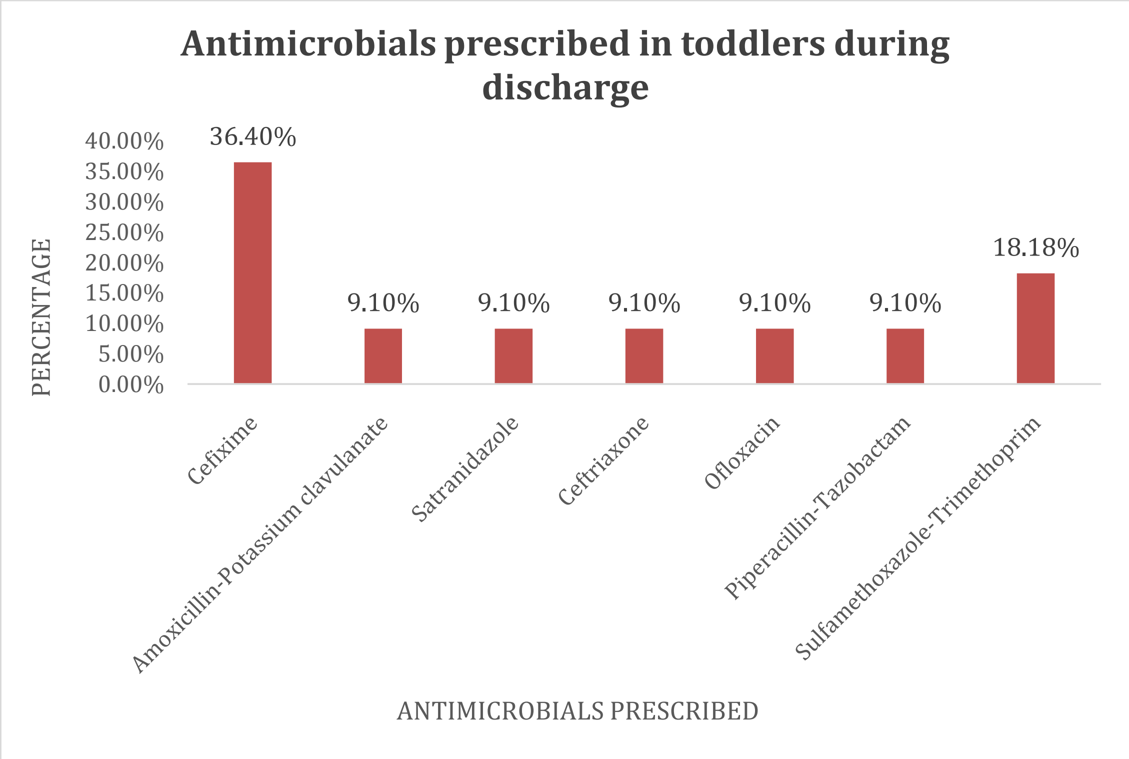

FIG NO. 5.c.ii Toddlers antimicrobial prescribing pattern during discharge

5.dChild (4 to 12 years):

Mostly prescribed antimicrobial agents in children at the time of hospitalization were Ceftriaxone 42.86%, Azithromycin 17.86% and others as mentioned in table no. 5.d.i During discharge the mostly prescribed antibiotics were Cefixime 35.00%, and Azithromycin 25.00% followed by other antibiotics as mentioned in table no. 5.d.ii

ANTIMICROBIALS PRESCRIBED IN CHILDREN PATIENTS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Ceftriaxone	12	42.86%
Azithromycin	5	17.86%
Piperacillin-Tazobactam	1	3.57%
Levofloxacin	2	7.14%
Oseltamivir	1	3.57%
Amikacin	2	7.14%
Albendazole	1	3.57%
Ciprofloxacin	1	3.57%
Sulbactam-Cefoperazone	2	7.14%
Ofloxacin	1	3.57%

TABLE NO. 5.d.i Children antimicrobial prescribing pattern during hospitalization

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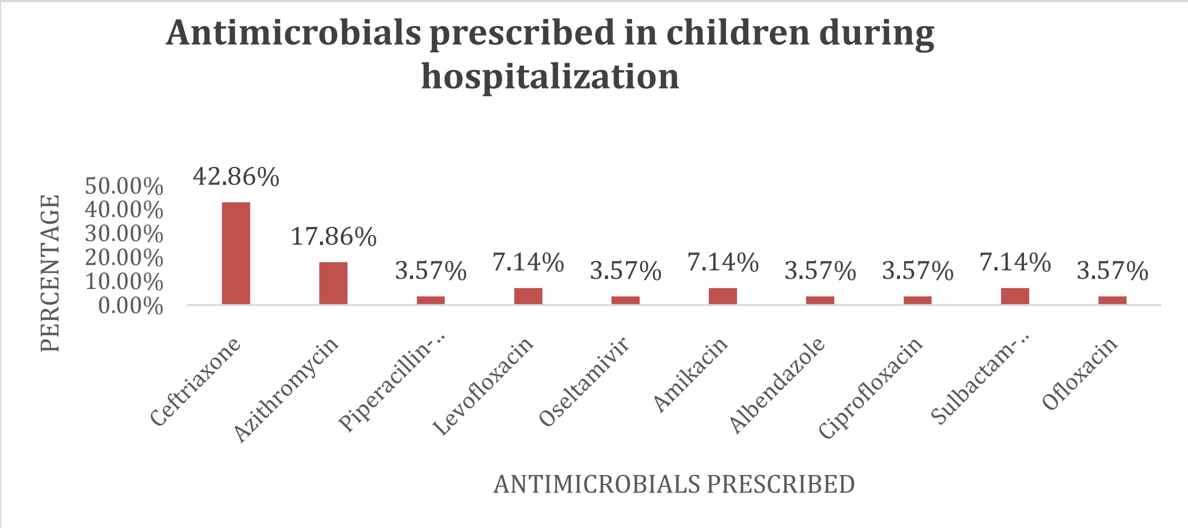

FIG NO. 5.d.i Children antimicrobial prescribing pattern during hospitalization

ANTIMICROBIALS PRESCRIBED IN CHILDREN PATIENTS DURING DISCHARGE	RATIO	PERCENTAGE
Cefixime	7	35.00%
Azithromycin	5	25.00%
Piperacillin-Tazobactam	1	5.00%
Ofloxacin	1	5.00%
Oseltamivir	1	5.00%
Levofloxacin	2	10.00%
Amoxicillin-Potassium clavulanate	1	5.00%
Sulbactam-Cefoperazone	2	10.00%

TABLE NO. 5.d.ii Children antimicrobial prescribing pattern during discharge

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ANTIMICROBIALS

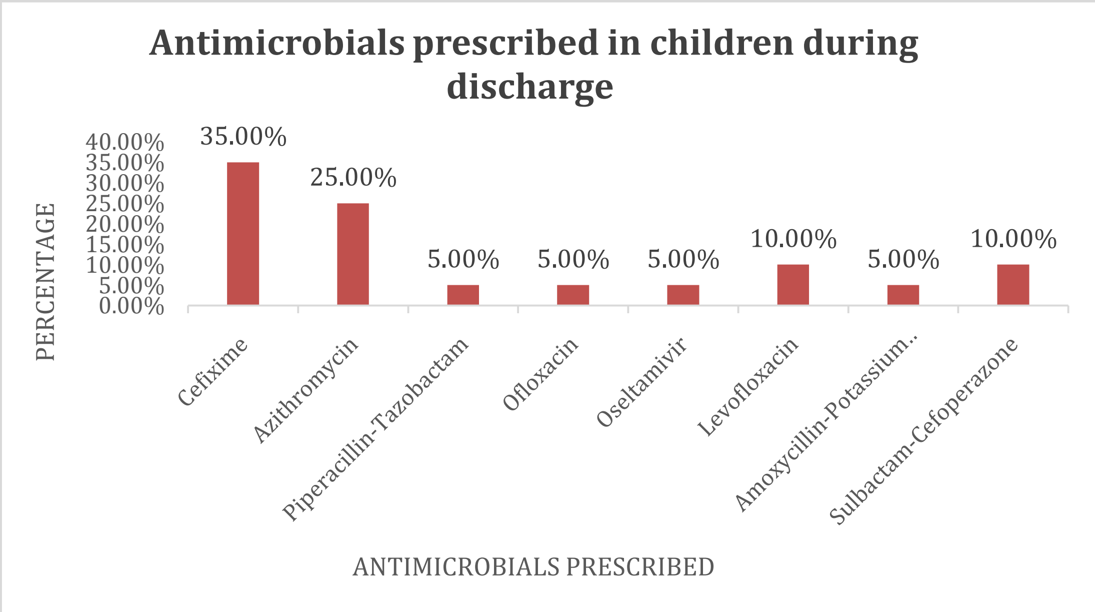

FIG NO. 5.d.ii Children antimicrobial prescribing pattern during discharge

5.e Adolescents (13 to 18 years):

Antimicrobial agents prescribed in adolescents at the time of hospitalization were Ceftriaxone 1(50%) and Azithromycin 1(50%). During discharge prescribed antibiotics were Linezolid 1(50%,) and Azithromycin 1(50%).

5.f Adults (Above 18 years):

Antimicrobial agents prescribed in patients age above 18 years at the time of hospitalization were Sulbactam-Cefoperazone 18.79%, Azithromycin 18.79%, Levofloxacin 15.04% and others as mentioned in table no. 5.f.i During discharge the mostly prescribed antibiotics were Azithromycin 26.70%, Levofloxacin 16.20% and other antibiotics as mentioned in table no. 5.f.ii

ANTIMICROBIALS PRESCRIBED IN ADULT PATIENTS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Ceftriaxone	14	10.53%
Sulbactam-Cefoperazone	25	18.79%
Azithromycin	25	18.79%
Meropenem	10	7.52%
Levofloxacin	20	15.04%
Metronidazole	6	4.51%
Amoxicillin-Potassium clavulanate	14	10.53%
Tigecycline	1	0.75%
Linezolid	6	4.51%

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Sulfamethoxazole-Trimethoprim	1	0.75%
Voriconazole	1	0.75%
Doxycycline	2	1.50%
Clindamycin	2	1.50%
Neomycin + Bacitracin + Polymyxin-B Powder	1	0.75%
Fluconazole	1	0.75%
Piperacillin-Tazobactam	1	0.75%
Ampicillin	1	0.75%
Rifaximin	2	1.50%

TABLE NO. 5.f.i Adult patient's antimicrobial prescribing pattern during hospitalization

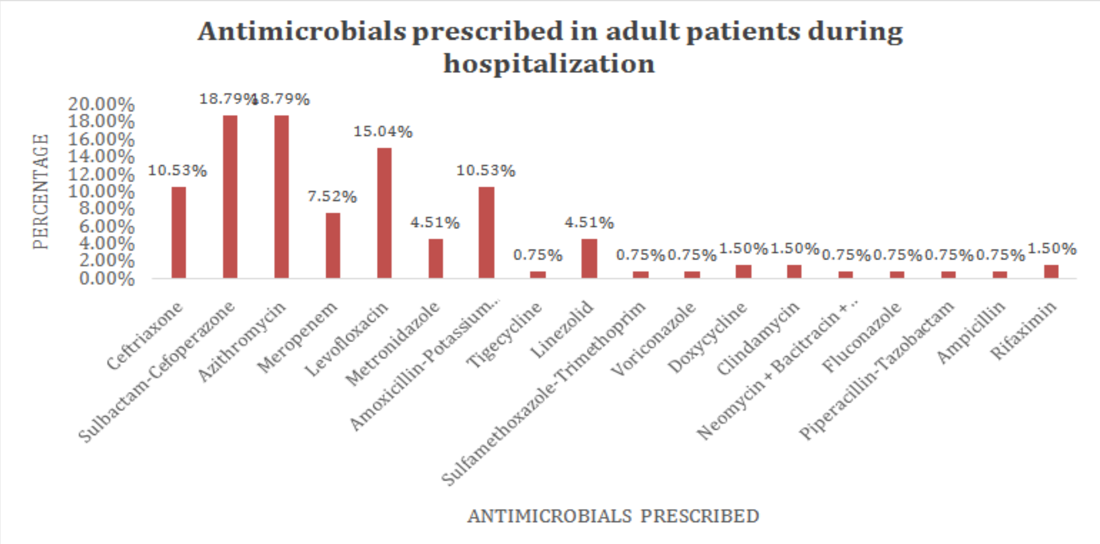

FIG NO. 5.f.i Adult patient's antimicrobial prescribing pattern during hospitalization

ANTIMICROBIALS PRESCRIBED IN ADULT PATIENTS DURING DISCHARGE	RATIO	PERCENTAGE
Azithromycin	28	26.70%
Levofloxacin	17	16.20%
Cefixime	13	12.40%
Sulbactam-Cefoperazone	7	6.70%
Ampicillin-Cloxacillin	7	6.70%

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Metronidazole	6	5.71%
Amoxicillin-Potassium clavulanate	4	3.80%
Linezolid	4	3.80%
Ampicillin	3	2.85%
Rifaximin	2	1.90%
Meropenem	2	1.90%
Doxycycline	2	1.90%
Faropenem	2	1.90%
Neomycin + Bacitracin + Polymyxin-B Powder	1	0.95%
Clindamycin	1	0.95%
Ceftriaxone	1	0.95%
Cefuroxime	1	0.95%
Moxifloxacin	1	0.95%
Voriconazole	1	0.95%
Sulfamethoxazole-Trimethoprim	1	0.95%
Tigecycline	1	0.95%

TABLE NO. 5.f.ii Adult patient's antimicrobial prescribing pattern during discharge

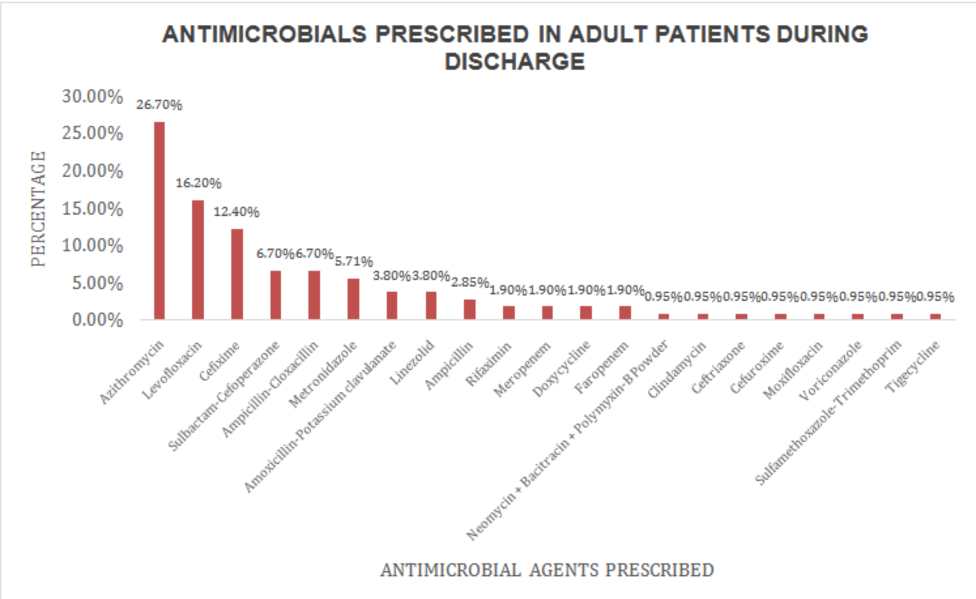

FIG NO. 5.f.ii Adult patient's antimicrobial prescribing pattern during discharge

6) PRESCRIPTION OF INHALED CORTICOSTEROIDS USED IN STUDY PATIENTS:

The highest percentage of inhaled corticosteroid which was prescribed in study patients during hospitalization wasBudesonide (82%) followed by Budesonide + Formoterol and Salmeterol + Fluticasone propionate 16% and 2% respectively. During discharge the inhaled corticosteroid which was prescribed in study patients wasbudesonide (83.79%), followed by budesonide + formoterol (13.51%) and salmeterol + fluticasone propionate (2.70%).

PRESCRIPTION OF INHALED CORTICOSTEROIDS USED IN STUDY PATIENTS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Budesonide	41	82%
Budesonide + Formoterol	8	16%
Salmeterol + Fluticasone propionate	1	2%

TABLE NO. 6.i Prescription of inhaled corticosteroids in study patients during hospitalization

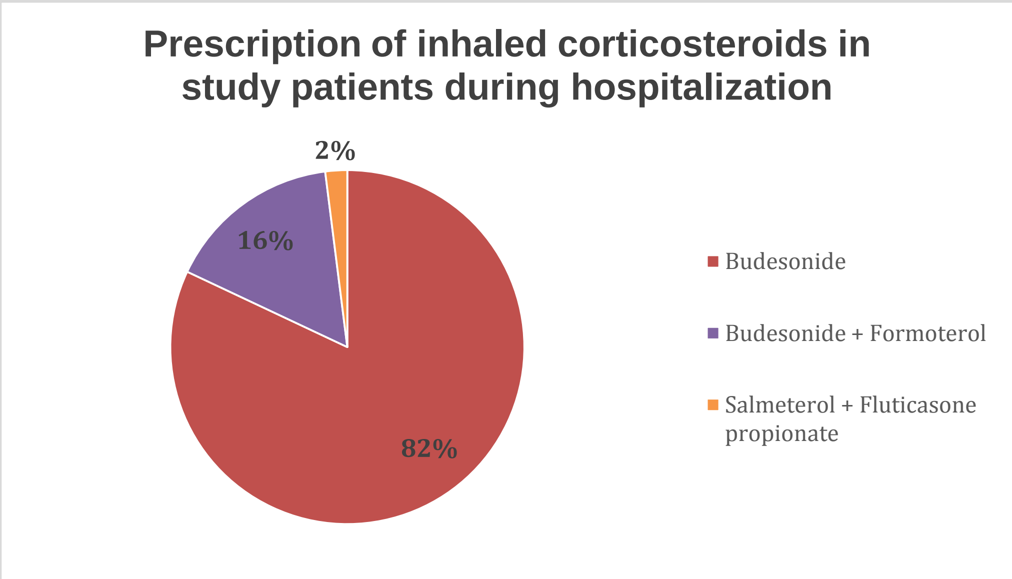

FIG NO. 6.i Prescription of inhaled corticosteroids in study patients during hospitalization

PRESCRIPTION OF INHALED CORTICOSTEROIDS USED IN STUDY PATIENTS DURING DISCHARGE	RATIO	PERCENTAGE
Budesonide	31	83.79%

Budesonide + Formoterol	5	13.51%
Salmeterol + Fluticasone propionate	1	2.70%

TABLE NO. 6.ii Prescription of inhaled corticosteroids in study patients during discharge

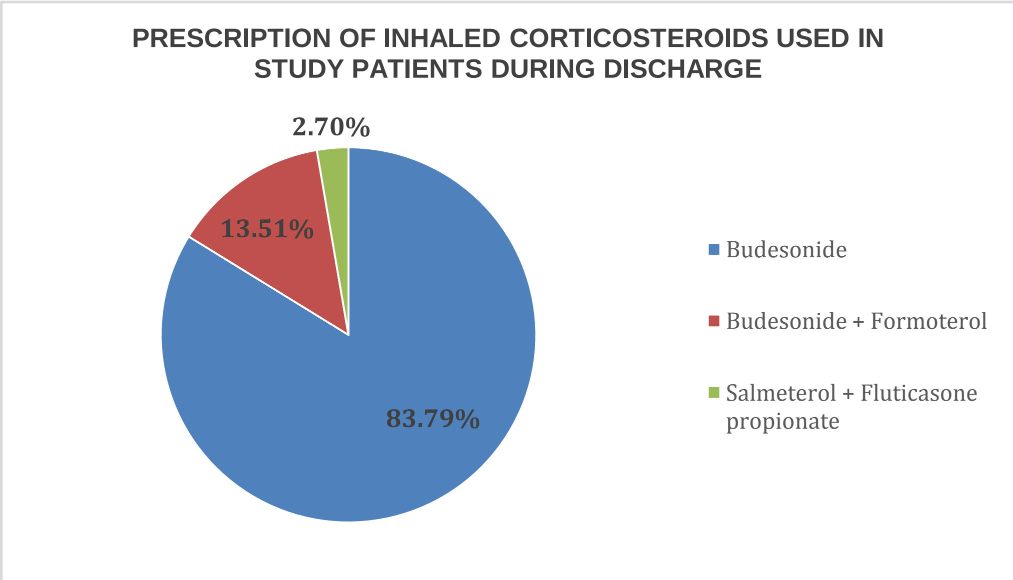

FIG NO. 6.ii Prescription of inhaled corticosteroids in study patients during discharge

7) PRESCRIPTION OF INHALED BRONCHODILATORS USED IN STUDY PATIENTS:

The mostly used inhaled bronchodilator during hospitalizationin study patients was ipratropium bromide + levosalbutamol (96.23%). During discharge only Ipratropium bromide + Levosalbutamol was given to 31 patients out of 120 study patients.

PRESCRIPTION OF INHALED BRONCHODILATORS USED IN STUDY PATIENTS DURING HOSPITALIZATION	RATIO	PERCENTAGE
Ipratropium bromide + Levosalbutamol	51	96.23%
Glycopyrrolate	2	3.77%

TABLE NO. 7.i Prescription of inhaled bronchodilators in study patients during hospitalization

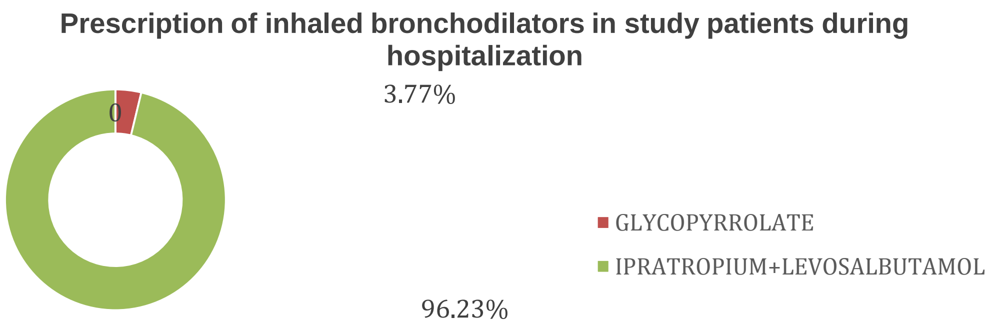

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FIG NO. 7.i Prescription of inhaled bronchodilators in study patients during hospitalization

PRESCRIPTION OF INHALED BRONCHODILATORS USED IN STUDY PATIENTS DURING DISCHARGE	RATIO
Ipratropium bromide + Levosalbutamol	31

TABLE NO. 7.ii Prescription of inhaled bronchodilators in study patients during discharge

V. DISCUSSION

Our prospective observational study analyzed data from 120 patients to investigate the clinical presentation, laboratory profiles, and treatment patterns of inhaled corticosteroids and antimicrobial agents used in Respiratory tract infections. The study's outcomes have significant implications, let's discuss.

Patient Demographics and Disease Distribution:

The male predominance (59.2%) observed in RTI issimilar to the study conducted by Mrinali et al., where (67.57%) of patients were males more than female patients.(16) This suggests that biological or behavioral factors that may contribute to increased vulnerability in males.

The study population demonstrated a slightly higher representation of adults (>18 years; 50.83%) compared to the cumulative pediatric age group (49.17%). Infants (29.17%) formed the largest subgroup within the pediatric category.

Among 120 patients, LRTI accounted for the majority of cases, comprising 71 patients (59.16%), whereas URTI was observed in 49 patients (40.83%). In the present study, the most commonly diagnosed disease was unspecified LRTI (52.11%) followed by pneumonitis (30.99%) and viral fever (15.83%). This finding underscores the importance of careful antibiotic selection and management strategies for these commonly encountered RTIs inhospital setting.

Diagnostic Parameters:

Our analysis revealed that the most prevalent symptoms among patients were fever (32.70%), cough and cold (29.28%) and breathlessness (10.65%, which are common symptoms resulting from inflammation and irritation of the respiratory tract because of infection The most common signs found were crepitation (60.42%) which are abnormal crackling sounds during breathing and wheeze (22.92%).

The study's analysis of laboratory parameters in patients with respiratory tract infections revealed that out of 120 patients tested for WBC count, 65 showed abnormal results, indicating a substantial immune response to infection. The most striking finding was the elevation of CRP levels in 95 out of 96 patients tested, suggesting a widespread inflammatory response. ESR was abnormal in 7 out of 12 patients, further supporting the presence of inflammation, although the sample size was limited. Notably, all five patients tested for procalcitonin (PCT) had abnormal levels, pointing towards potential bacterial involvement. These findings collectively highlight the importance of laboratory parameters in diagnosing and understanding respiratory tract infections, with CRP levels emerging as a particularly significant marker due to their high prevalence of elevation among the patients studied.

In addition to the primary focus, the study also analyzed various other laboratory parameters, revealing that 74 patients (46.84%) underwent chest X-ray examinations, while 48 patients (30.38%) were evaluated with culture sensitivity tests. Furthermore, 12 patients (7.59%) underwent 2D-ECHO examinations, and 9 patients (5.7%) were given sputum culture tests. Furthermore, 7 patients (4.43%) underwent HRCT lung examinations, and 3 patients (1.9%) underwent AFB & bronchoscopy. One patient (0.63%) underwent BAL test and one for viral flu panel test.

Antimicrobial agentsPrescriptions:

The antimicrobial agents prescribed during hospitalization commonly among all age groups were ceftriaxone in 65 patients (26.31%), azithromycin in 34 patients (13.76%), levofloxacin in 29 patients (11.74%), and sulbactam-cefoperazone in 27 patients (10.93%). The antimicrobial agents prescribed during discharge commonly among all age groups were cefixime in 39 patients (20.42%), azithromycin in 39 patients

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(20.42%), and levofloxacin in 22 patients (11.52%).

Inhaled Corticosteroids and Bronchodilators prescription:

The corticosteroids for their potent anti-inflammatory capacity and immunosuppression properties are widely used in respiratory diseases. The highest percentage of inhaled corticosteroids which was prescribed in study patients during hospitalization wasBudesonide (82%) followed by Budesonide + Formoterol and Salmeterol + Fluticasone propionate 16% and 2% respectively. During discharge, the inhaled corticosteroid which was prescribed in study patients wasbudesonide (83.79%), followed by budesonide + formoterol (13.51%) and salmeterol + fluticasone propionate (2.70%).

The study also found thatthe most used inhaled bronchodilator during hospitalizationin study patients was ipratropium bromide + levosalbutamol (96.23%). During discharge only Ipratropium bromide + Levosalbutamol was given to 31 patients out of 120 study patients.

VI. CONCLUSIONS:

This prospective observational study provides a comprehensive analysis of respiratory tract infections (RTIs) in hospitalized patients, focusing on demographic characteristics, clinical manifestations, laboratory results, and treatment modalities.

Notably, a significant predominance of male patients was observed, which aligns with existing research and suggests that biological or behavioral factors may contribute to increased susceptibility among males.

The most common diagnoses were lower respiratory tract infections (LRTIs), including unspecified LRTI and pneumonia which co-relates with signs and symptoms like crepitation, wheezing, fever, cough & cold, and breathlessness this highlights the importance of considering presenting complaints alongside diagnosis for appropriate antibiotic selection.

The study emphasizes the importance of laboratory parameters in diagnosing and understanding RTIs. CRP levels emerged as a particularly significant marker due to its high prevalence of elevation among the patients studied. Other laboratory parameters, such as chest x-ray examinations, culture sensitivity tests, and 2D-ECHO examinations, were also analyzed.

The study's findings have significant implications for treatment strategies. The analysis of antimicrobial agents prescribed during hospitalization revealed that ceftriaxone, azithromycin, and levofloxacin were the most commonly used agents, and cefixime and azithromycin were mostly prescribed during discharge. The study highlights the need for appropriate antibiotic selection and management strategies tailored to the specific needs of patients with RTIs.

RTIs often involve inflammation of the respiratory tract, corticosteroids anti-inflammatory properties help in controlling this inflammation, thereby reducing symptoms and improving lung function. Budesonide was the most prescribed inhaled corticosteroid, while ipratropium bromide + levosalbutamol was the preferred inhaled bronchodilator. Many RTIs, especially those leading to conditions like bronchitis or pneumonia, can cause constriction of the airways, so the combination of ipratropium bromide and levosalbutamol provides effective bronchodilation, makes it easier for patients to breathe and improves oxygenation.

Overall, the study underscores the importance of continued research in this area to improve the care and outcomes for Respiratory Tract Infection Patients.

LIMITATIONS:

i. The study consists of limited sample size, based on patient flow and study duration.
ii. Single site study limited the broad research conclusions.

ABBREVIATIONS:

RTI= RESPIRATORY TRACT INFECTION
IEC = INSTITUTIONAL ETHICS COMMITTEE
CAP = COMMUNITY ACQUIRED PNEUMONIA
HAP= HOSPITAL-ACQUIRED PNEUMONIA
LRTI= LOWER RESPIRATORY TRACTINFECTION
URTI = UPPER RESPIRATORY TRACTINFECTION
CRP = C-REACTIVE PROTIEN
WBC = WHITE BLOOD CELLS
ESR = ERYTHROCYTE SEDIMENTATION RATE
PCT = PROCALCITONIN
GABHS = GROUP A BETA-HEMOLYTIC STREPTOCOCCI
RSV = RESPIRATORY SYNCYTIAL VIRUS
MDR = MULTI-DRUG RESISTANCE

COPD = CHRONIC OBSTRUCTIVE PULMONARY DISEASE
HIV = HUMAN IMMUNODEFICIENCY VIRUS
AIDS = ACQUIRED IMMUNODEFICIENCY SYNDROME
ICF = INFORMED CONSENT FORM
CRF = CASE REPORT FORM
IHD =ISCHEMIC HEART DISEASE
CKD = CHRONIC KIDNEY DISEASE
HTN = HYPERTENSION
DOE = DYSPNEA ON EXERTION
2D-ECHO = TWO - DIMENTIONAL ECHOCARDIOGRAPHY
HRCT LUNG = HIGH RESOLUTION COMPUTED TOMOGRAPHY
AFB = ACID-FAST BACILLUS
BAL = BRONCHO-ALVEOLAR LAVAGE

AUTHOR'S CONTRIBUTION

Palak Patil, Devanshi Rathod, Mandeep Mangrola and Janki Donga collaborated on theconceptualization, study design, methodology, data analysis, and drafting of the article, contributing to data collection and manuscript review. Dr. Fatima Tadwala and Dr. Gaurav Raiyani provided supervision, and critical feedback on the manuscript.

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REFERENCES:

[1]. J.T.Dipiro, R.L.Talbert, Gary. C. Yee, et.al; Pharmacotherapy: A pathophysiologic Approach; nineth edition; The MC Graw Hills Company; 2014
[2]. Errabelly P, Ramavath V, Afreen A and Sanaboina A et al. Analysis of the Prescribing Patterns of antibiotics in Respiratory Tract Infections at Department of Medicine at a Tertiary Care Hospital. Int Pharm Sci Res 2015; 6(7).
[3]. National Institute for Health and Clinical Excellence. Respiratory Tract Infections – prescribing of antibiotics for Self-limiting Respiratory Tract Infections in adults and children in primary care. NICE Clinical Guidelines, No. 69. London: National Institute for Health and Clinical Excellence; 2008 July.
[4]. Dasaraju PV, Liu C et al.Infectionsof the Respiratory System. In: Baron S, editor. MedicalMicrobiology. 4th edition. Galveston (TX): University of Texas Medical Branch at Galveston; 1996 Chapter 93.
[5]. McCullers JA, Karlström Å, Iverson AR, Loeffler JM, Fischetti VAJPp. Novel strategy to prevent otitis media caused by colonizing Streptococcus pneumoniae. 2007;3(3):e28.
[6]. Chow AW, Benninger MS, Brook I, et al. IDSA clinical practice guideline for acute bacterial rhinosinusitis in children and adults. Clin Infect Dis 2012;54(8):e72–e112
[7]. Shulman ST, Bisno AL, Clegg HW, et al. Clinical practice guideline for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the Infectious Diseases society of America. Clin Infect Dis 2012;55: 1279–1282
[8]. Watkinson J, Clarke R. Scott-Brown's otorhinolaryngology and head and neck surgery: 3 volume set: CRC Press; 2018.
[9]. Muto T, Imaizumi S, Kamoi K. Viral Conjunctivitis. Viruses. 2023;15(3).
[10]. Abioye AI, Bromage S, Fawzi W. Effect of micronutrient supplements on influenza and other respiratory tract infections among adults: a systematic review and metaanalysis. BMJ global health. 2021;6(1).
[11]. Dawn E Jaroszewski et al. Diagnosis and management of lung infections. Thorac Surg Clin 2012 Aug ;22(3):301–324.
[12]. Snell NJJoAC. New treatments for viral respiratory tract infections—opportunities and problems. 2001;47(3):251-9.
[13]. Lionel A Mandell et al.Infectious Diseases Society of America/American Thoracic Society consensus guidelines on the management of community-acquired pneumonia in adults. Clin Infect Dis 2007;44 (Suppl 2):S27–S72.

[14]. Thomas J Marrie et al. The role of atypical pathogens in community-acquired pneumonia. Semin Respir Crit Care Med 2012;33(3)

[15]. Ruiz, Mauricio et al. "Diagnosis of Pneumonia and Monitoring of Infection Eradication." Drugs 60.6 (2000)

[16]. Thakur M, Shah R, Dave D, Buch JG. Analysis of prescribing patterns in paediatric respiratory tract infections with the focus on antimicrobial use, adverse effects and cost of drug therapy. J Pharm Pharmacol Res. 2020;4:1-14.