AN OBSERVATIONAL STUDY ON ANTIBIOTICS PRESCRIBING IN LOWER RESPIRATORY TRACT INFECTION IN A SECONDARY CARE HOSPITAL

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ABSTRACT

Respiratory tract infection is defined as any infectious disease of the upper or lower respiratory tract. Upper respiratory tract infections include the common cold, flu, laryngitis, pharyngitis, acute rhinitis, and acute rhino sinusitis. Lower respiratory tract infections are Bronchiolitis, Pneumonia, tuberculosis and COPD.

AIM: The aim is to observe and describe the lower respiratory tract infections (LRTI) and the medical therapy using now a days to treat such infections, to know the changes or adjustments made to the initial therapy and to determine the appropriateness of antibiotics usage, by comparing it with standardized procedures for lower respiratory tract treatment guidelines.

OBJECTIVES: To better understand the appropriateness of antibiotic therapy and to identify commonly administered antibiotics for the treatment of respiratory tract infections. To distinguish the proper application of x-rays, sputum cultures, blood cultures, and other procedures needed to diagnose respiratory tract illnesses. To detect medication resistance in individuals being treated in hospitals.

METHODOLOGY: A six-month prospective study is conducted in a 750 beds hospital, on lower respiratory tract infections medical therapy and general medicine in admitted patients. For this study, information from 100 patients was gathered in predetermined forms as medical case notes and drug diaries. From the time of enrolment until they were discharged, the patients were monitored. Descriptive statistics were applied to the collected data and analysed using Microsoft Excel Software. Institutional research and ethics committee clearance were obtained prior to the study.

KEYWORDS: Lower Respiratory tract infections, Asthma, Bronchiolitis, COPD, Pneumonia.

INTRODUCTION:

The respiratory system's main job is to oxygenate the blood, which makes it possible for oxygen to reach every area of the body. It is a complicated process that involves proper functional vital organs. The nasal passages, paranasal sinuses, and upper respiratory tract are all part of the upper airways. The trachea, bronchioles, alveolar ducts, alveolar trac's, and alveoli make up the lower respiratory tract. To represent the branching structure of airways delivering air to the lungs, the lower respiratory tract is often referred to as the respiratory tree or tracheobronchial tree, and contains the trachea, bronchi, bronchioles, terminal bronchiole, respiratory bronchiole, alveolar duct, alveolar sac and alveolus.

Infections in the lower respiratory system including the bronchioles, alveolar ducts, alveolar trac's, and alveoli, can result in acute illnesses called lower respiratory tract infections. Infections are mainly caused by varieties of gram negative and gram-positive bacteria's, fungi and viruses.

Lower respiratory tract includes.

- **Bronchitis** is caused by Influenza virus, Parainfluenza virus, Respiratory syncytial virus, Human metapneumovirus, C. pneumoniae, M. pneumonias and B. pertussis.
- **Pneumonia** is caused by S. pneumoniae**,** S. aureus**,** H. influenzae type b**,** K. pneumoniae**,** P. aeruginosa, C. pneumoniae, M. pneumoniae.
- **Bronchiolitis** is caused by Respiratory syncytial virus and Parainfluenza virus 1-3.
- **Asthma** and **COPD** are caused by environmental and genetic factors.

Epidemiology:

Combinations of intricate and still poorly understood environmental and genetic interactions lead to asthma. It is thought that shifting epigenetics heritable variables other than those connected to the DNA sequence and a changing environment are to blame for the current rise in asthma incidence. Genetic impact is more likely to play a role in onset before age 12, whereas environmental influence is more likely to play a role in onset after age 12.

Each year, pneumonia affects about 450 million people in the world, making it an extremely common illness. It is the top cause of death for all age groups, causing 4 million fatalities annually (7% of all deaths worldwide). The highest percentages are found in young children under five and elderly people over 75. In the developing world, it happens around five times more frequently than in the developed world. About 20 million pneumonia cases are caused by viral infections. Pneumonia is the eighth most common cause of mortality in the US as of 2009.

A form of obstructive lung disease known as chronic obstructive pulmonary disease (COPD) is characterised by persistent breathing issues and limited airflow. Since COPD is a progressive condition, it normally gets worse with time. Over time, simple tasks like getting dressed and walking become challenging. Emphysema and chronic bronchitis are two older terms for various forms of COPD. The phrase "chronic bronchitis" is still used to describe a productive cough that lasts at least three months for each of the preceding two years.

Complications:

Lung diseases can lead to complication like pulmonary hypertension, lung cancer, emphysema, and cause serious health issues, troubling symptoms, and potentially fatal situations if it is not treated.

A bacterial infection that results in an empyema, a collection of pus next to the lungs, can cause serious health issues like sepsis (bacteria in the blood). Before being approved for clinical usage, antibiotics are examined for any potential side effects; they are typically regarded as safe and well tolerated.

Pathophysiology:

In most cases, the pathogen directly invades the upper airway mucosa during upper respiratory tract infections. Infected droplets are typically inhaled to contract the organism. Infections of the lower respiratory tract include those that occur in the lungs or below the voice box. These diseases include tuberculosis, bronchitis, and pneumonia. A lower respiratory tract infection can affect the air sacs at the end of the airways, as in the case of pneumonia, or the airways themselves, as in the case of bronchitis.

Organisms can enter the upper respiratory tract through inspiration or aspiration of oral secretions or airborne droplets. Gram-negative bacteria and Staphylococcus can also enter the bloodstream and go to the lungs. Infections are typically warded off by common lung defence systems such the cough reflex, mucociliary transport, and pulmonary macrophages.

Chronic inflammation of the conducting zone of the airways, particularly the bronchi and bronchioles cause asthma, which in turn causes the surrounding smooth muscles to contract more readily. This together with other factors, causes episodes of airway narrowing and the traditional wheezing symptoms.

Clinical Manifestations:
Runny, stuffy nose and sneezing are the primary cold symptoms, which are typically not accompanied by a fever.

Diagnosis:
- An X-ray of the chest
- A full blood count test
- Pulse oximetry
- The polymerase chain reaction (PCR)
- Bronchoscopy
- CT scan of the chest
- Sputum Culture

Methodology:

Study Site: The study was conducted at Malla Reddy Health City. In Patients who have visited In-Patient Department during a period of three months was eligible for enrolment.

Study Design: This is an observational study on antibiotics prescribing in lower respiratory tract infection accompanied by medical therapy conducted over the past three months from APRIL 2023. Patients admitted in the Malla Reddy Health City for three months and then meet the following criteria eligible for enrolment.

Sample Size: The study sample of 100 subjects was collected from the IN-PATIENT DEPARTMENT within the hospital.

Study Period: The study was carried out for 6 months from December 2022 – June 2023.

Study Criteria:
1.INCLUSION CRITERIA:
- Adult patients above >18 years of age
- Role of antibiotic therapy in Respiratory Tract Infections.

2. EXCLUSION CRITERIA:
- Pregnant, lactating women
- shock patients
- Patients below 18 years

SOURCE OF DATA:
Using a suitably designed data collection from the following details will be collected
• Patient Demographics
• Clinical examination
• Prescription charts
• Doctors follow-up
• Laboratory investigations
• Progress notes and Patient medical records

DETERMINATION OF PRESCRIBING PATTERNS:
A suitable collection form was designed using data, and used data was collected with respect to:
• Demo graphic Details: Name, Age, Sex, Height, Weight
• Condition and reasons for Hospital admission was recorded.

RESULTS

In our current study, to focus on prescribing pattern of antibiotics, out of all the patients attending the general medicine inpatient department were included, among them 100 patients with respiratory tract infections receiving antibiotics were considered.

TABLE 1: SEX WISE DISTRIBUTION OF PATIENTS

SEX	NO. OF PATIENTS	PERCENT
FEMALE	45	45%
MALE	55	55%
TOTAL	100	100%

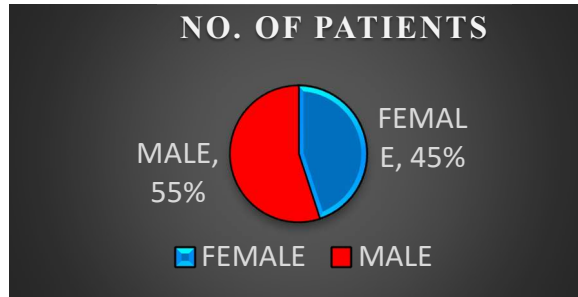**FIG 1: GRAPHICAL REPRESENTATION ON SEX WISE DISTRIBUTION**

Table 1, fig: 1, reported that male patients (55%) are more effected by respiratory tract infections than female patients (45%).

TABLE 2: NUMBER OF PATIENTS BASED ON THEIR AGE GROUPS

AGE GROUPS	NUMBER OF PATIENTS	PERCENT
20-40	20	20%
40-60	37	37%
60-90	43	43%
TOTAL	100	100%

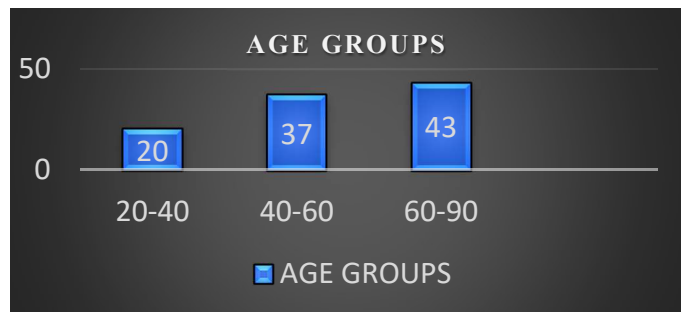**FIG 2: GRAPHICAL REPRESENTATION OF AGEWISE DISTRIBUTION**

Table 2; fig 2; reported that the patients with age group 60-90 years (43%) are most effected by respiratory tract infections and patients below are less effected 20-40 (20%).

TABLE 3: DISEASE WISE DISTRIBUTION OF PATIENTS

RESPIRATORY TRACT INFECTIONS	PERCENTAGE OF NO. OF PATIENTS
ASTHMA	21
BRONCHIOLITIS	16
TUBERCULOSIS	14
COPD	19
PNEUMONIA	30

FIG 3: GRAPHICAL REPRESENTATION OF DISEASE WISE DISTRIBUTION OF PATIENTS
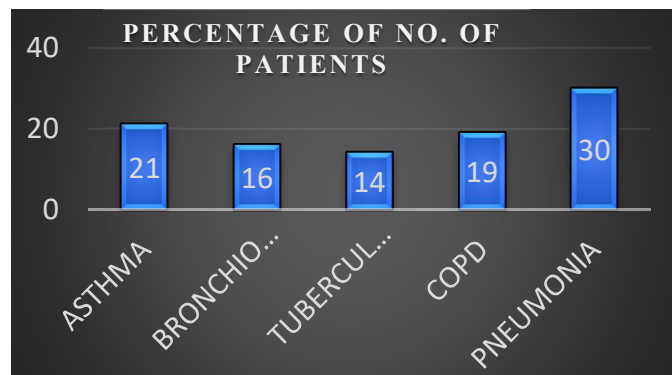

Table 3; fig 3; reported that patients with pneumonia (30%) are most effected and patients with tuberculosis are least effected (14%)

TABLE 4: DISEASE WISE DISTRIUTION OF WISE PATIENTS ACCORDING TO GENDER GENDER

FIG 4: GRAPHICAL REPRESENTATION OF DISEASE DISTRIBUTION OF PATIENTS ACCORDING TO

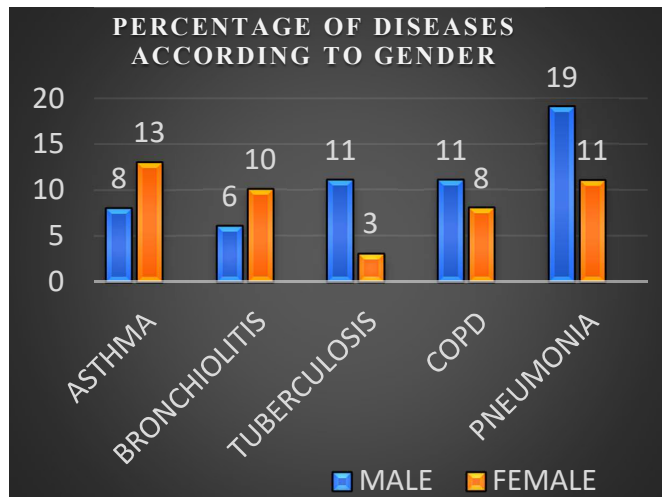| RESPIRATORY TRACT INFECTIONS	MALE PERCENTAGE	FEMALE PERCENTAGE
ASTHMA	8	13
BRONCHIOLITIS	6	10
TUBERCULOSIS	11	3
COPD	11	8
PNEUMONIA	19	11

Table 4; fig 4; reported that the male patients with pneumonia (19%) are most effected and least effected with bronchiolitis (6%). Female patients with asthma (13%) are most effected and least effected with tuberculosis (3%).

TABLE 5: PRESCRIBING PATTERN OF ANTIBIOTICS IN LRTI
LRTI

FIG 5: GRAPHICAL REPRESENTATION ON PRESCRIBING PATTERNS OF ANTIBIOTICS IN

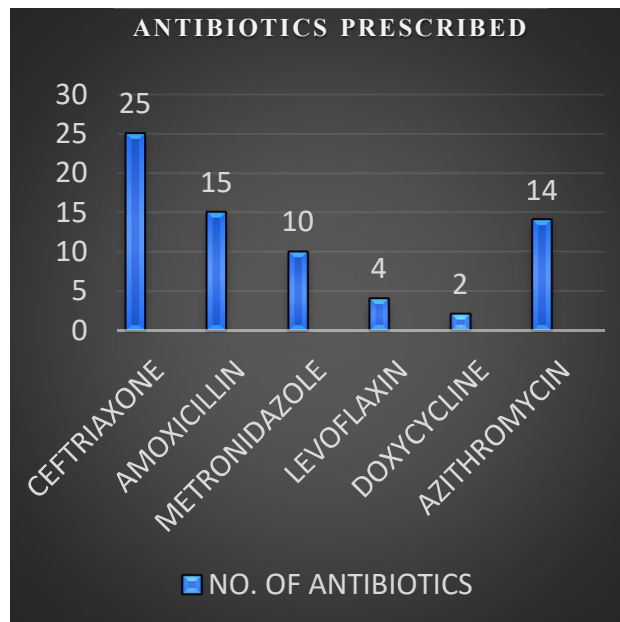| ANTIBIOTICS PRESCRIBED	NO. OF PATIENTS	PERCENTAGE
CEFTRIAXONE	25	25%
AMOXICILLIN	15	15%
METRONIDAZOLE	10	10%
LEVOFLOXACIN	4	4%
DOXYCYCLINE	2	2%
AZITHROMYCIN	14	14%

Table 5; fig 5; reported that antibiotics prescribed in LRTI, most common prescribed ceftriaxone (25%) and least Doxycycline (2%

TABLE 6: DISTRIBUTION OF PATIENTS BASED ON DIAGNOSTIC PARAMETERS PARAMETERS

FIG 6: GRAPHICAL REPRESENTATION OF PATIENTS BASED ON DIAGNOSTIC

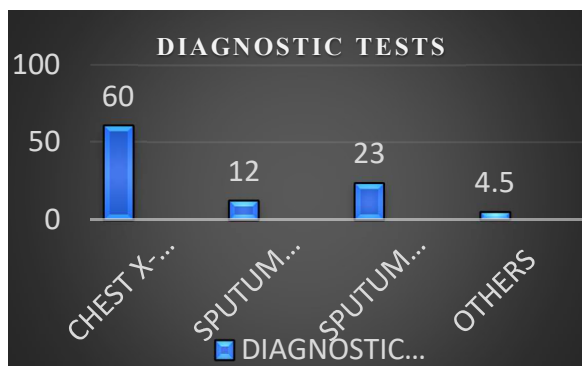| DIAGNOSTIC TESTS	NO. OF PATIENTS	PERCENT AGE
CHEST X-RAY	60	60%
SPUTUM CULTURE	12	12%
SPUTUM + X-RAY	23	23%
OTHERS	5	5%
TOTAL	100	100%

Table 6; fig 6; reported that the chest x-ray (60%) most common used to diagnose, also sputum x-ray (23%)

TABLE 7: TYPE OF ANTIBIOTIC CLASS PRESCRIBED

FIG 7: GRAPHICAL REPRESENTATION OF ANTIBIOTIC CLASS PRESCRIBED

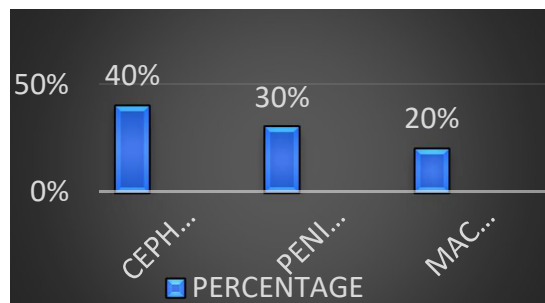| CLASS OF ANTIBIOTICS	PERCENTAGE
CEPHALOSPORINS	40%
PENICILLINS	30%
MACROLIDES	30%

Table 7; fig 7; reported that most common prescribed antibiotic class is from Cephalosporins (40%).

TABLE 8: NUMBER OF DAYS OF HOSPITALIZATON

FIG 8: GRAPHICAL REPRESENTATION OF DAYS OF HOSPITALIZATION

DAYS	FREQUENCY
BELOW 3	7
FOR 3 DAYS	35
4-7 DAYS	55
ABOVE ONE WEEK	3

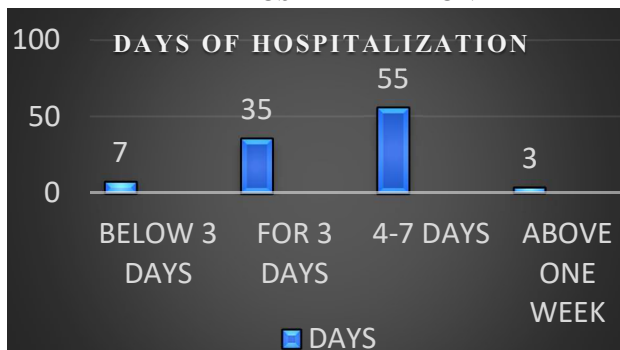Table 8; fig 8; reported that below 7 days of hospitalization has the maximum number of patients.

DISCUSSION

- We have gathered 100 patients case studies of patients with respiratory tract infection and investigated their medical treatment.
- Monitoring the usage of antibiotics given for respiratory tract infections is the primary goal of our investigation.
- Of the total number of patients in the study who had both lower and upper respiratory tract infections, 55% of patients were men and 45% of patients were women.
- When the demographic profiles of patients were completed, it was discovered that up to 43% of patients were in the range of 60 to 90 years, 37% were in the range of 40 to 60 years, and 20% were in the range of 20 to 40 years. According to our research, older age groups are more likely to get respiratory tract infections.
- In the current study, most of the population, or 56% of the patients, had LRTI, whereas 44% had URTI. When the data was analysed, 16% of patients had bronchitis, 30% of patients had pneumonia, 21% had asthma, 14% had tuberculosis, and 19% had COPD.
- Bacteriological analysis in RTIs aids in accurately prescribing antibiotic medication to the patient, improving patient outcomes and reducing the development of drug resistance.
- Only 60% of the 100 patients who were enrolled in the current study had a diagnosis based on a chest x-ray, 23% had a diagnosis based on both sputum and an x-ray, and 12% had a diagnosis based on sputum culture. Other diagnostic methods are used to diagnose 5% of cases.
- In the current trial, antibiotics were given to every patient who had been diagnosed with LRTI. Ceftriaxone accounted for 25% of the 70 antibiotics prescribed in LRTI, followed by azithromycin (14%), amoxicillin (15%), metronidazole (10%), levofloxacin (4%), and doxycycline (2%). The most often administered antibiotic in LRTI was ceftriaxone.
- Cephalosporins were the most often prescribed antibiotics for URTI. According to our study, ceftriaxone made up 9 (9%), amoxicillin was 2 (2%), ampicillin + metronidazole was 3 (3%), and azithromycin was 6 (6%). Cefotaxime made up 5 (5%), amoxicillin was 2 (2%), and metronidazole was 5 (5%), out of the 30 antibiotics recommended for URTI.
- According to our analysis, Azithromycin (25%) and Monocef (50%) were the two most often administered antibiotics prior to culture testing. Following a culture test, Azithromycin (35%) and Ampicillin + Metronidazole (20%) were the two most often recommended antibiotics.
- According to our survey, cephalosporins (40%) are the most prescribed class of antibiotics, whereas penicillin (30%) and macrolides (30%) are the least frequently prescribed.
- According to our research, Taxim (5%) and Monocef (35%) were the two most often prescribed antibiotics, respectively.
- According to our survey, most patient hospitalisations (55%) last 4–7 days.

CONCLUSION

- In the inpatient department of respiratory medicine and general medicine, LRTI was discovered to be the most often diagnosed condition among respiratory tract infections.
- For LRTI respiratory tract infections, Penicillins (Amoxicillin, Augmentin) cephalosporins (Monocef, Taxim), macrolides (Azithromycin), and were the most often recommended drugs as per lower respiratory tract infection treatment guidelines.
- Penicillins (Amoxicillin, Augmentin), Cephalosporins (Monocef, Taxim) were the most often prescribed antibiotics for LRTI as per table 8. (70%).
- As a result of our study shows the appropriateness of antibiotic therapy, less broad-spectrum antibiotic use should be done prior to diagnostic procedures.
- According to the findings of this study, using antibiotics judiciously and cautiously will lessen the burden of multi-drug resistance, allowing for better patient treatment and lowering the morbidity and death rates associated with respiratory tract infections.

Clinical chemists have a significant impact on the early identification and prevention of pharmaceutical mistakes, which helps to enhance patient care. Clinical chemist involvement in prescription analysis and prescribing pattern studies can assist in giving physicians feedback on their current prescribing practises. This can also help to reduce the likelihood of the emergence of drug resistance and encourage rational antibiotic prescription.

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