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A RETROSPECTIVE OBSERVATIONAL STUDY ON EVALUATION OF USE OF ANTIBIOTICS WITH THEIR RESISTANCE IN PATIENTS WITHLRTI's

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ABSTRACT

A Retrospective Observational study was carried out to evaluate the use of antibiotic therapy and co-relating it with antibiotic resistance in patients with Lower Respiratory Tract Infections (LRTIs) who were presented to Olive Hospitals during January 2022 - January 2023. Total of 200 patients, which includes both men and women, those who satisfy the inclusion criteria were selected, among which 57% were female patients and rest 43% were male. The age-group ranging between 50-60years have greater number of patients (44 patients) followed by 60-70 years with 38 patients suffering with LRTIs. It was noticed that most of the patients with LRTIs taken under the study does not have any social addictions i.e., 63.50% have no addictions followed by 15% of patients were found to be smokers (especially male patients) and it was observed that 78% (157 patients) of the patients have comorbidity conditions. Out of 200 patients, (88) patients were diagnosed with "PNEUMONIA" followed by (32) patients diagnosed with Chronic obstructive pulmonary disease(COPD). (24) patients (12%) were found to be drug resistant to antibiotics out of which (19) patients were resistance to Cephalosporin class of antibiotics. During the course of treatment, oneor more antibiotics was prescribed by the physician to the patients based on patient's clinical condition. It was observed that

"CEPHALOSPORIN" class of antibiotics was advised for majority of the patients, 147 patients were treated with Cephalosporins alone or in combination with other antibiotics and those who were resistance to Cephalosporins were treated with "Macrolide Antibiotics".

KEYWORDS: Lower respiratory tract infections (LRTIs), Pneumonia, Cephalosporins, Antibiotics, Drug-resistance, Macrolide Antibiotics.

INTRODUCTION

Lower Respiratory Tract Infection (LRTI) is a generic term that indicates the infection affecting the airway passage (Below the level of the larynx) including the parts like the trachea and alveolar sacs. -Moreover, LRTI is an extended terminology that includes various other clinical conditions such as Pneumonia, Acute bronchitis, Pulmonary tuberculosis, Acute exacerbation of chronic bronchitis, Acute exacerbation of chronic bronchiectasis, Chronic obstructive pulmonary disease. These conditions can stimulate in development of other clinical conditions like Asthma, Respiratory failure, Pulmonary Edema, Pleural effusion, cardiovascular problems, shock, etc. which can worsen the health condition that can lead of death of person if left untreated.

Signs and symptoms: "Symptoms of LRTIs vary and rely on the stage and severity of the infection caused, symptoms are similar to the common cold if the infection is in the initial stage or less severe, with symptoms such as Dry cough, fever, runny nose, mild sore throat, mild headache. In case of severe infections, the symptoms include the following- Shortness of breath (SOB), severe cough-producing phlegm, chest pain, blue tint to the skin, wheezing, and difficultyin breathing."[1]

Pneumonia: An illness called pneumonia causes the air sacs in one or both lungs to become inflamed. The air sacs may swell with fluid or pus (purulent material), which can lead to a cough that produces pus or phlegm, a fever, chills, and breathing difficulties.

Pneumonia may be brought on by a number of different species, including bacteria, viruses, and fungus. The severity of pneumonia can range from minor to life-threatening. The most vulnerable groups are newborns and young children, those over 65, and those with health conditions or weakerimmune systems. Common symptoms include a dry or productive cough, chest discomfort, fever,and breathing difficulties.[2]

Chronic obstructive pulmonary disease: A widespread, preventable, and curable chronic

lung illness that affects both men and women worldwide is chronic obstructive pulmonary disease(COPD). There are two main forms of COPD:

- Chronic bronchitis, which causes a persistent cough that produces mucus.
- Emphysema, which causes lungs to deteriorate over time.

Airflow into and out of the lungs is restricted as a result of abnormalities in the tiny airways of the lungs. The airways constrict due to a number of factors. Parts of the lung may be destroyed, the airways may be obstructed by mucus, and the lining of the airways may become inflamed and swollen. Chronic bronchitis or emphysema are other names for COPD. Emphysema often refers to the lungs small air sacs at the end of airways being destroyed. Chronic bronchitis refers to a chronic cough with the production of phlegm resulting from inflammation in the airways. COPD and asthma share common symptoms (cough, wheeze and difficulty breathing) and people may have both conditions.[3]

Treatment: Many lower respiratory tract infections (LRTIs) are self-limited and they resolve without any additional treatment given. However, certain over-the-counter (OTC) medications may be prescribed to get relief from the symptoms.

- NSAIDS such as Ibuprofen, Aspirin, and Naproxen, help relieve pain and fever.
- Acetaminophen also provides relief from fever and pain.
- The use of bronchodilator inhalers (Nebulizers) can help overcome wheezing and difficulty breathing.[4]
- In case of bacterial infections, Antibiotics may be prescribed by the physicians, depending on how serious is the infection and affect your overall health. Commonly prescribed antibiotics are Doxycycline and Amoxicillin.
- In case of hypersensitivity, newer macrolides, such as azithromycin, roxithromycin or clarithromycin, are good alternatives in countries with low pneumococcal macrolide resistance.
- Clarithromycin has a broad spectrum of antibacterial activity, improved pharmacokinetic and pharmacodynamic properties, and better tolerability compared to erythromycin. Tissue concentration and concentration in the alveolar macrophages are about 2–20 times and 400 timeshigher than serum levels, respectively.[5]

Non-pharmacological treatment

- Drink lots of water to stay hydrated and loosen mucous.
- Drink warm lemon and honey for a sore throat and cough.

- Gargle warm salty water for a sore throat.
- Inhale steam (adults only).
- Avoid going out in pollution and always wear mask whenever u go out.
- Try decongestants and nasal sprays for a blocked or runny nose.
- Use a saline nose rinse for sinus congestion.
- Get plenty of rest to yourself.[6]

Antibiotics resistance: "Antibiotics are medicines used to prevent and treat bacterial infections. Antibiotic resistance occurs when bacteria change in response to the use of these medicines. Antibiotic resistance is one of the biggest threats to global health, food security, and development today. The world urgently needs to change the way it prescribes and uses antibiotics. Even if new medicines are developed, without behaviour change, antibiotic resistance will remaina major threat. Behaviour changes must also include actions to reduce the spread of infections through vaccination, hand washing, and good food hygiene".[7]

Prevention and control of antibiotic resistance: Antibiotic resistance is accelerated bythe misuse and overuse of antibiotics, as well as poor infection prevention and control. Steps can be taken at all levels of society to reduce the impact and limit the spread of resistance. Steps can be taken by 1. Healthcare professionals and healthcare industry 2. Policy makers and individuals as well.[8]

AIMS AND OBJECTIVES

Aim: To evaluate the use of antibiotics with their resistance in patients with lower respiratory tractinfections.

Objectives: To evaluate the efficacy and safety of the drug by following secondary outcomemeasures:

1. To evaluate the safety and efficacy of Antibiotic drugs used in the treatment of lower respiratorytract infections.
2. To estimate the role of social addiction in enhancing the LRTIs.
3. To estimate the prevalence of LRTIs in specific gender.
4. To estimate the prevalence of LRTIs in specific age groups.
5. To evaluate the effect of the comorbidity condition of the patient in influencing the developmentof lower respiratory tract infection.

MATERIALS AND METHODS

Study design: A Retrospective observational study was conducted to determine the use ofantibiotics with their resistance in patients with lower respiratory tract infections.

Study site: Olive hospitals, Nanalnagar, Hyderabad, Telangana.

Study period: The study was carried out for six months.

Sample size: The study included a total sample size of 200 people.

Selection criteria: The study is carried out based on the following criteria:

A) Inclusion criteria

1. Men or women
2. Patients of age group above 18 years and below 90 years.
3. All patients without or with pre-existing co-morbidities like Diabetes, Hypertension, Hyper orHypothyroid, coronary artery disease, etc.
4. Patients with social habits like smoking, alcohol, chewing(tobacco), and others
5. Patients' residence in both urban and rural areas.

B) Exclusion criteria

1. Pregnant or Lactating woman.
2. Infants and children below the age of 18 years.
3. Patients suffering from cancer are excluded from the ongoing study.
4. All disabled patients.
5. Fungal-infected respiratory disease.

Tools used: Microsoft Excel 2021.

Source of data: All the patients who met the inclusion criteria were selected and the relevant data of the patients was obtained from old and present case records of all Pulmonology departmentfrom Medical Record Department (MRD) from Jan-2022 to Jan-2023 after getting required permission from Hospital administration.

Study procedure: Basic demographic details, all the necessary data and medication chart data was collected in the data collection forms. All the patients enrolled in the study were divided according to their gender, age (18-90 Yrs.), Social habits, Co-morbidities, Diagnosis, Antibiotic drug resistance, Class of antibiotic prescribed. Data collected was then subjected to the statisticalanalysis and interpretations of results were shown.

Statistical analysis: The data collected from the patient's case records were first written in data collection form and then entered into Microsoft Excel sheet and statistical analysis was done and represented results in graphical forms.

RESULTS AND DISCUSSION

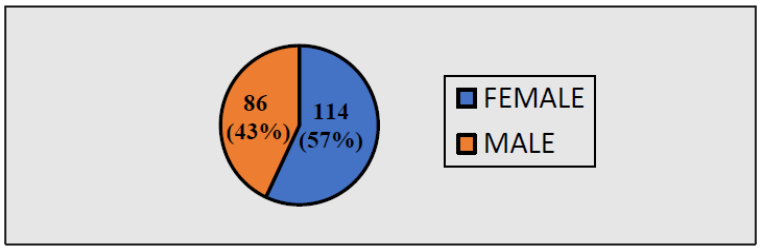

Figure 1: Pie diagram showing number of patients based on their gender.

A total of 200 patients (sample size) that includes both men and women, those who satisfy the inclusion criteria were selected for the research during the course of the study, among the 200 patients, the number of female patients were more than male patients i.e., 57% of female patients and 43% male patients. Hence, during the study period, more females are diagnosed with lower respiratory tract infections than compared to males.

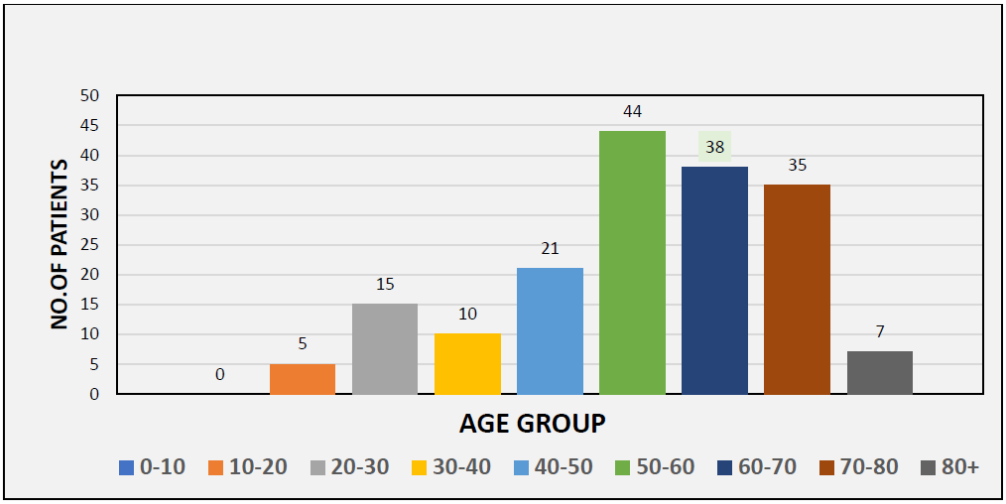

Figure 2: Graphical representation of number of patients based on their age group.

Above figure-2 shows that the patients between the age group of 50-60 years have greater numberof patients (44 patients) followed by (38) patients between age group of 60-70 years, who are affected with lower respiratory tract infections.

SR.No	SOCIAL ADDICTIONS	NO. OF PATIENTS	% OF PATIENTS
1	DRUG ABUSE	1	0.50%
2	SMOKER AND CHEWING	1	0.50%
3	BETAL LEAF	4	2.00%
4	SMOKER AND ALCOHOLIC	5	2.50%
5	CHEWING	15	7.50%
6	ALCOHOLIC	17	8.50%
7	SMOKER	30	15.00%
8	NO ADDICTIONS	127	63.50%
9	**Grand Total**	**200**	**100.00%**

Figure 3: Table showing percentage and number of patients with social addictions.

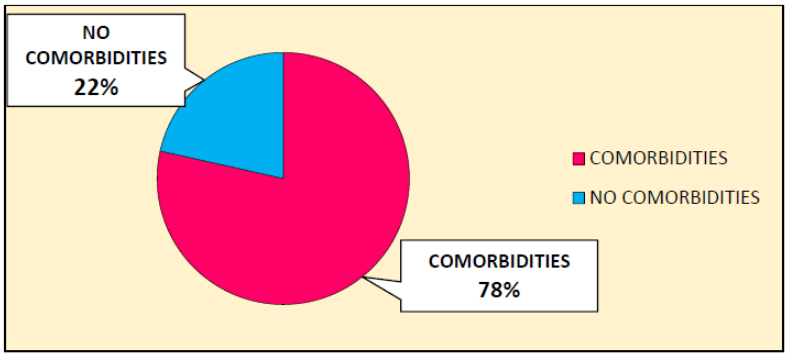

Figure 4: Pie diagram showing percentage of patients with their comorbid condition.

During the course of study, it was observed that 78% of the patients have comorbidity conditions. Comorbidity conditions of the patient have a great influence on the development of lower respiratory tract infection, they enhance the chances of developing the infection due to the reducedimmunity of the patient.

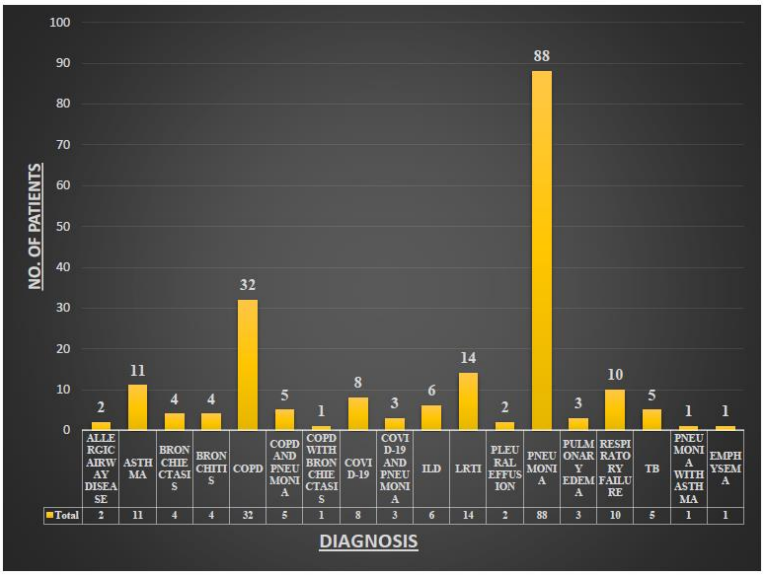

Figure 5: Graphical representation of distribution of patients based on their diagnosis.

In the course of study, among 200 patients it was found that 88 patients were diagnosed with "PNEUMONIA" followed by 32 patients diagnosed with Chronic obstructive pulmonary disease(COPD). Hence the incidence of Pneumonia was high in the patients than compared to other clinical conditions of LRTIs.

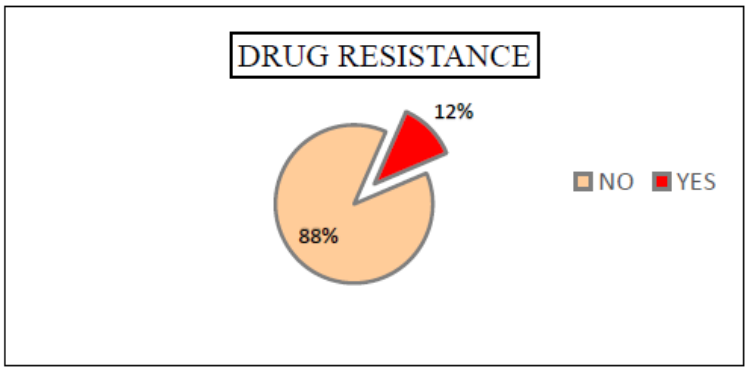

Figure 6: Pie diagram showing percentage of patients that are found to be Drug resistance.

The above diagram indicates that 12% (24 patients) of the total patients were found to be Drug-resistant to particular antibiotics. Drug resistance to particular drug or antibiotic may occur dueto prolong use of it for longer duration of time.

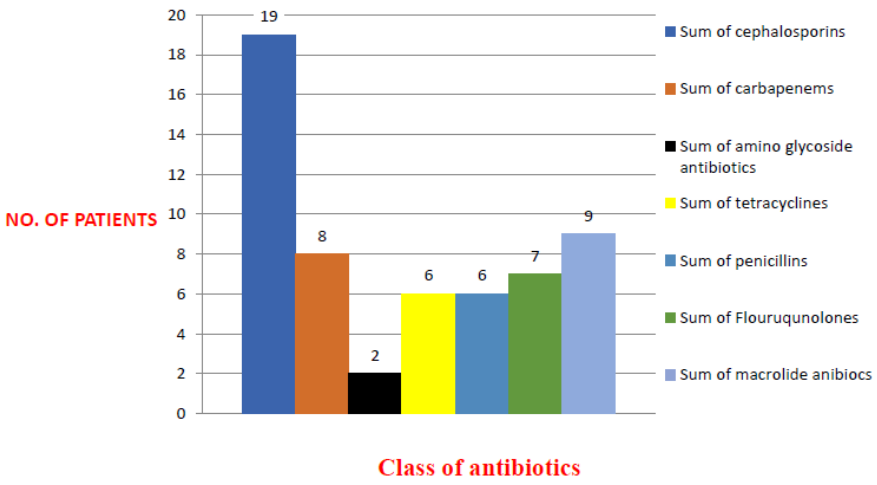

Figure 7: Graphical representation of distribution of patients based on class of antibiotic resistant.

Among 200 patients, 24 patients were found to be drug resistant to antibiotics, out of which 19 patients were found to resistance to Cephalosporin class of antibiotics, this could be due to previouscontinuous exposure of drug by the patient.

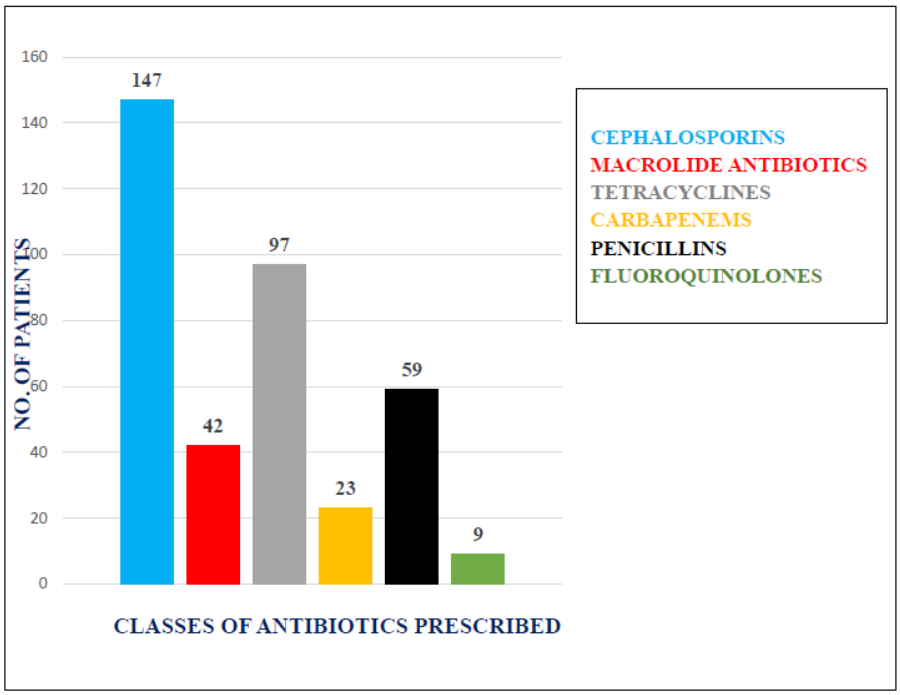

Figure 8: Graphical representation of number of patients receiving each class of antibiotics prescribed by the physician.

During the course of treatment, one or more antibiotics were prescribed by the physician to the patients based on patient's clinical condition. It was observed that CEPHALOSPORIN class of antibiotics was advised for majority of the patients by the physician, out of 200 patients, 147 patients were treated with Cephalosporins alone or with combination with other antibiotics followed by 97 patients were treated with Tetracyclines alone or in combination withCephalosporin or with other class of antibiotics.

CONCLUSION

- Among all the patients taken into the study, 12% of the total patients were found to be Drug-resistant to particular antibiotics. Among 200 patients, 24 patients were found to be drug resistant to antibiotics, out of which 19 patients were found to resistance to Cephalosporin class of antibiotics followed by 9 patients found to be drug-resistant to macrolide antibiotics. Drug resistance to particular drug or antibiotic may occur due to prolong or continuous use of that drug for longer duration of time.
- To all the patients suffering with different lower respiratory tract infections, Cephalosporins class of antibiotics was prescribed to majority of the patients, i.e., out of 200 patients, 147 (73.5%) patients were treated with Cephalosporins alone or in combination with others antibiotics such as Tetracyclines, Penicillin, Macrolide antibiotics.

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