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## Evaluation of Safety and Efficacy of Antibiotics in Respiratory Tract Infection Patients in a Tertiary Care Teaching Hospital: Prospective Observational Study



Mylam Suma Bhavana<sup>1</sup>, Murthysetty Likhitha<sup>1</sup>, Thirugabathina Swathi<sup>1</sup>, A.C Nikila Teja<sup>1</sup> Dr. Kudipudi Harinadha Baba<sup>2</sup>, Dr. Kanamala Arun Chand Roby<sup>3</sup>

<sup>1</sup> Pharm. D, Narayana Pharmacy College, Nellore, Andhra Pradesh, India.

<sup>2</sup> Principal, Narayana Pharmacy College, Nellore, Andhra Pradesh, India.

<sup>3</sup> Assistant Professor Narayana Pharmacy College, Nellore, Andhra Pradesh, India

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**Keywords:** RTI's: Respiratory Tract Infections, MDI: Metered Dose Inhaler, DPI: Dry Powder Inhaler, SMI: Soft Mist Inhaler, COPD: Chronic Obstructive Pulmonary Disease, P.E: Pleural effusion, ISAQ: Immune System Assessment Questionnaire, ACS: Acute cough scale, RSS: Respiratory Severity Scale.

### ABSTRACT

Respiratory tract infections are respiratory illnesses that refer to variety of infections of the sinuses, throat, airway or lungs. These are the most common group of infections. The respiratory infections are usually treated using antibiotics. Antibiotics are substances produced by one microorganism that selectively inhibit or kills the growth of other microorganisms. The objective of the study was to evaluate the safety and efficacy of antibiotics in respiratory tract infections and to evaluate the role of most useful and lifesaving drugs used in respiratory tract infections and to evaluate rationality of drug therapy. A Prospective observational study on evaluation of safety and efficacy of antibiotics was conducted in Narayana Medical College and Hospital in the Pulmonology department for a period of 6 months. In our study we considered 384 patients are observed. Out of that only 300 patients are willing to provide the information. Out of which age groups between 21-70 are considered with sex of 218 males and 82 females in that the maximum were smokers (75.33%) and the non-smokers (24.66%) with secondary education is high compared to primary and tertiary with average nutritional status and average hygienic conditions. Overall outcomes after using antibiotics were found to be better 66%, average 23.66% and no outcome 3.66%. Our study concluded that most of the patients who are suffering with respiratory tract infections are considered, maximum patients were using antibiotics for their beneficial and the mostly used antibiotic is Amoxicillin and Clavulanate. .

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### INTRODUCTION

Respiratory tract infections are the most common group of infections. It is defined as any infectious disease of the upper or lower respiratory tract [1-3]. The respiratory tract infections are classified into two types. They are

- Upper Respiratory Tract Infections
- Lower Respiratory Tract Infections

Upper Respiratory Tract Infections (URTI):

- Upper respiratory tract infections are the illnesses caused by an acute infection which involves the upper respiratory tract; i.e., nose, sinuses, pharynx, larynx, Epiglottitis etc., [4].

- It includes:
  1. Otitis media
  2. Sinusitis
  3. Pharyngitis
  4. Laryngitis(croup)
  5. Rhinitis (common cold)
  6. Diphtheria &
  7. Epiglottitis
  8. Tonsillitis

Lower Respiratory Tract Infections (LRTI):

- Lower respiratory tract infections are the inflammation of the air

\* Corresponding author:

Dr. Kanamala Arun Chand Roby, Assistant Professor, Narayana Pharmacy College, Nellore, Andhra Pradesh E-mail address: [arunchandroby@gmail.com](mailto:arunchandroby@gmail.com)

passages with in the lungs. i.e., trachea (wind pipe), bronchi and bronchioles [5].

It includes:

1. Bronchitis and acute exacerbations of COPD
2. Bronchiolitis
3. Pneumonia

Most upper respiratory tract infections are caused by viruses. The most common viruses belong to one of two groups: rhinoviruses and coronaviruses. Lower respiratory tract infections are also caused by viruses [7-9]. The exception is pneumonia, which is usually caused by streptococcus pneumoniae bacteria. Symptoms of URTIs commonly includes Cough, Sore throat, Runny nose, Nasal congestion, Headache, Low-grade fever, Facial pressure, Sneezing, Malaise, Myalgia [10,11]. The onset of symptoms usually begins one to three days after exposure and lasts 7-10 days, and can persist up to 3 weeks. Symptoms of lower respiratory tract infections vary and depend on the severity of the infection. Less severe infections can have symptoms similar to the common cold, including a stuffed up or a runny nose, dry cough, low fever, mild sore throat, dull headache [12-14]. Diagnosis of respiratory tract infections is based on Physical exam, Throat Culture, Lateral neck X- rays, Chest X-ray, CT scan, Blood tests, Pulmonary Function tests. The Non-Pharmacological management of Respiratory tract infections include Oxygen therapy, Radiotherapy, Ventilator support, Thoracic surgery. The pharmacological management of these infections includes usage of simple analgesics, anti pyretics and Antibiotics [15].

## AIM&OBJECTIVES

### Aim

The aim of this study is to assess the safety and efficacy of antibiotics in respiratory tract infections.

### Objectives

- To evaluate the safety and efficacy of antibiotics in respiratory tract infections.
- To analyse the social habits in respiratory tract infection patients.
- To evaluate the role of most useful and lifesaving drugs used in respiratory tract infections.
- To evaluate rationality of drug therapy.

### Need of the study

- The Study is used to provide the evidence of the antibiotics used in respiratory infections.
- To provide the knowledge about different classes of antibiotics up-to-date to the physicians and to the patients.
- To provide awareness about different class of antibiotics used in respiratory infections.
- To provide the knowledge regarding the safety, efficacy and outcomes about the use of antibiotics to the public.

## METHODOLOGY

### Place of Study

The study was carried out in a tertiary care teaching hospital in south India.

### Study design

A Prospective Observational Study.

### Study site

The study was conducted at Narayana Medical College and Hospital, Nellore.

### Study population

Approximately 384 patients who are currently came to pulmonology.

### Study Duration

6 months

### Study criteria/Patient enrollment

Patients are enrolled in the study based on inclusion and exclusion criteria.

#### • Inclusion criteria

The patient's who had diagnosed with respiratory tract infection and treatment on antibiotics.

#### • Exclusion criteria

Patients who are having other co-morbidities, pregnant ladies, Lactating women, AIDS patients, insane minded people and patients who are sensitive to antibiotic therapy are excluded from the study.

### Study material

1. Patient informed consent form.
2. A specially designed patient data collection proforma.

### Study Methods

This study will be initiated after obtaining the permission from the institutional review board. The patients will be enrolled in the study after taking informed consent form from them. The enrollment of patient will be done on the basis of inclusion and exclusion criteria.

## RESULTS

The demographic details of the Patient were tabulated in Table 1; Reasons for admission into Pulmonology department were tabulated in Table 2; Number of Patients using Antibiotics were tabulated in Table 3; Table 4 shows duration of Respiratory tract infections; Table 5: Shows Inhalers used by patients; Table 6 shows Outcomes of Treatment; Table 7 shows the Efficacy of Antibiotics.

## DISCUSSION

In our study, out of 384 patients only 300 patients are willing to provide the information; all the patients are suffering with pulmonary infections, and with age groups 21-70 are considered. The maximum number of patients present in the age group between 36-50 (42.66%), and the minimum number of patients are with the age group between 25-35 (23%) with sex of 218 males (72.66%) and 82 females (27.33%) in that the maximum were smokers (75.33%) and the nonsmokers (24.66%) with secondary education high compared to primary and tertiary with average nutritional status 123 (41%) and average hygienic conditions 206(68.66%) and all belongs to India. The reasons for admission in the hospital are due to COPD/COPD with A.E (31%), Asthma (15%), Pulmonary Tuberculosis (10%), Pneumonia (13%), Bronchiectasis (5%), Pleural effusion (8%), Lower RTI (8%), Upper RTI (4%), Sinusitis (2%) Bronchitis (2%) and Hemoptysis (2%) are observed in our study. The patients are under antibiotics usage for their renounce or conditions in pulmonology department, mostly used antibiotics are Amoxicillin + Clavulanate (31.66%), Amoxicillin (26.66%), Azithromycin (16.33%) and least used is Ceftriaxone (1.66%). The most common symptoms for respiratory tract infections are Shortness of breath (27.33%), Wheeze (15%), Exacerbations (13%) and Cough (10.66%). We found that the most common drugs used by the patients in the past is Amoxicillin (27.33%), Cefotaxime (22.66%) and Cefuroxime (18.66%). Mostly the respiratory tract infections were diagnosed by using Chest X ray (55.66%), Pulmonary function test (17%), and CT scan (10.6) used as Arterial Blood gases (2.66%). The study also conducted by using Scales for evaluation. They are CRB-65 (28.66%), ISAQ (12%), RSS-HR (48.67%) and ACS (10.66%). Based on the scales, the symptoms are observed and given the treatment for that condition. After using the drugs, the duration of respiratory tract infections is analyzed based on the monitoring i.e., Asthma 3 months (28.66%), COPD 6 months (24.66%) and Pneumonia 8 weeks (19.33%). The inhalers used by the patients are Metered Dose Inhaler (49%), Dry Powder

Category	Number of Patients	Frequency (%)
<b>Age</b>		
21-35	23	7.6
36-50	128	42.66
51-65	108	36
Above 70	41	13.67
<b>Sex</b>		
Male	218	72.66
Female	82	27.33
<b>Smoking Status</b>		
Smoker	226	75.33
Non-smoker	74	24.66
<b>Educational Status</b>		
Primary	89	29.66
Secondary	125	41.66
Tertiary	86	28.66
<b>Nutritional Status</b>		
Poor	76	25.33
Average	123	41
Better	101	33.66
<b>Hygenic Conditions</b>		
Average	206	68.66
Better	94	31.33
<b>Ethnicity</b>	300	100

Table 1 Shows the demographic details of the Patient.

Reason for admission	Number of Patients	Frequency (%)
COPD/COPD with AE	93	31
Asthma	45	15
Pulmonary Tuberculosis	30	10
Pneumonia	39	13
Bronchiectasis	15	5
Pleural Effusion	24	8
Lower RTI	24	8
Upper RTI	12	4
Sinusitis	6	2
Bronchitis	6	2
Hemoptysis	6	2

Table 2 Shows reasons for admission into Pulmonology department.

Antibiotics	Number of Patients	Frequency (%)
Amoxicillin+ Clavulanate	95	31.66
Amoxicillin	80	26.66
Azithromycin	49	16.33
Doxycycline	32	10.66
Levofloxacin	26	8.66
Aminopenicillin	13	4.33
Ceftriaxone	5	1.66

Table 3 Shows Number of Patients using Antibiotics.

Condition	Duration	No. of patients	Frequency (%)
Asthma	3 months	86	28.66
COPD	6 months	74	24.66
Pleural effusion	12 weeks	40	13.33
Pneumonia	8 weeks	58	19.33
Bronchitis	8 weeks	42	14

Table 4 Shows duration of Respiratory tract infections.

Type of Inhaler	Number of Patients	Frequency (%)
Metered Dose Inhaler (MDI)	147	49
Dry powder inhaler (DPI)	88	29.33
Soft mist inhaler (SMI)	65	21.66

Table 5 Shows Inhalers used by patients.

Type of Outcome	Number of Patients	Frequency (%)
Poor	20	6.66
Average	71	23.66
Better	198	66
No outcome	11	3.66

Table 6 Shows Outcomes of Treatment.

Antibiotics	Number of Patients	Frequency (%)	Efficacy (%)
Amoxicillin+ Clavulanate	95	31.66	94.7
Amoxicillin	80	26.66	87.5
Azithromycin	49	16.33	79.59
Doxycycline	32	10.66	68.75
Levofloxacin	26	8.66	57.69
Aminopenicillin	13	4.33	38.46
Ceftriaxone	5	1.66	20

Table 7 Shows the Efficacy of Antibiotics.

Inhaler (29.335) and soft mist Inhaler (21.66%). The mostly used Methylxanthines are Theophylline (40.66%) and least used methylxanthine is Theobromine (10.33%) in conditions such as Chronic Bronchitis and acute asthma respectively. Finally after using antibiotics, the results were found to be better (66%), average (23.66%) and no outcome (3.66%). The efficacy of antibiotics was Amoxicillin + Clavulanate (94.7%), Amoxicillin (87.5%), Azithromycin (79.59%), Doxycycline (68.75%) and Ceftriaxone (20%). Amoxicillin + Clavulanate had the maximum efficacy whereas ceftriaxone has the least efficacy. Past research studies reveals usage of antibiotics for respiratory tract infections were found to be similar with these studies [16-19].

## CONCLUSION

Our study concluded that most of the patients who are suffering with respiratory tract infections are considered, maximum patients were using antibiotics for their beneficial. The mostly used antibiotic is Amoxicillin and Clavulanate which is a very beneficial for the collapse of the symptoms, the treatment regimen which is used for the patients is beneficial with the combination of drugs. So, our study analysed the data collected from the patients the treatment regimen which is using for a proper way is effective to the patients. The physicians and the clinical pharmacist should have the updated knowledge and give the medicines according to the Evidence based Medicine criteria and to overcome the complications in the further so that the health care team should provide updated knowledge about the drugs and educating the patients to make the life better so that it should not leads to life threatening events, the medicines using since two decades are same but proper awareness was not fully established, so the physicians and the clinical pharmacists should have a sound knowledge on prescribing antibiotics to the patients suffering with respiratory tract infections and also to avoid complications and adverse drug reactions of the drugs.

## Conflict of interest

Yes

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Self

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