



## World Journal of Pharmacy and Biotechnology

Journal Home Page: [www.pharmaresearchlibrary.com/wjpb](http://www.pharmaresearchlibrary.com/wjpb)

e-ISSN: 2349-9087 | Publisher: Pharma Research Library

W. J. Pharm. Biotech., 2023, 10(1): 35-41

DOI: <https://doi.org/10.30904/j.wjpb.2023.4538>



### A Study on Evaluation of Pulmonary Infections and Its Treatment Profile in a Tertiary Care Hospital

Dilli Siva Kavya\*, P. Pratyusha Ande, Y. Prapurna Chandra

Department of Pharmacy Practice, Ratnam Institute of Pharmacy, Pidathapolur (V&P), Muthukur (M), SPSR Nellore District – 524 346

#### Abstract

Lung infections can be caused by viruses, bacteria, fungi, or parasites. In some cases, more than one type of germ causes lung infections. The present study aimed to assess the pulmonary infections and its treatment profile in a tertiary care hospital. The prospective observational study was carried out for a period of 6 months. The study was conducted in General medicine department in a tertiary care hospital. A written and informed consent was obtained from the recruited patients. A Total of 225 patients were enrolled in the study. In our study 46-56 years age patients were more (37.33%) as compared to other ages. Sputum culture test patients were more 71(31.55%) as compared to other laboratory examinations. 5-6 years duration respiratory infection patients were more 102(45.33%) as compared to other durations. The Scabies comorbidities patients were more 89(39.55%) as compared to other comorbid conditions. The Leukotrine receptor antagonist prescribed patients was more 41 (18.22%) as compared to other prescribing pattern of drugs. Regular training and implementation of the national protocol for diagnosis and treatment of protocol for the management of pulmonary infections among adults is suggested.

**Keywords:** Lung infections, respiratory infection patients, pulmonary infections, Leukotrine receptor antagonist.

#### Article Info

##### Corresponding Author:

Dilli Siva Kavya  
Department of Pharmacy Practice,  
Pidathapolur (V&P), Muthukur (M),  
SPSR Nellore District – 524 346

##### Article History:

**Received** : 06 June 2023  
**Revised** : 28 June 2023  
**Accepted** : 29 July 2023  
**Published** : 19 Sept 2023

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**Citation:** Dilli Siva Kavya, et al. A Study on Evaluation of Pulmonary Infections and Its Treatment Profile in a Tertiary Care Hospital, 2023, 10(1): 35-41.

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#### 1. Introduction

A lung infection happens when a disease-causing microorganism like bacteria or a virus causes damage and inflammation in the lungs. This happens because immune cells race to the airways or tissues of the lungs to fight the infection. Lung infections can be caused by viruses, bacteria, fungi, or parasites (though this is rare in the United States). In some cases, more than one type of germ causes lung infections. For example, viral bronchitis can lead to bacterial pneumonia. Lung infections can be mild or severe. People of any age can get lung infections but some types are more common in people of certain ages. Lung infections can happen in different parts of the airways (e.g., bronchi, bronchioles, alveoli) or the tissues that surround the lungs

#### Types of Lung Infections

Lung infections are grouped into different types depending on how they affect the lungs and airways<sup>11-20</sup>. Some organisms are more likely to cause a certain type of lung infection, but there can also be some overlap between them. For example, some viruses can cause bronchitis and pneumonia<sup>1-10</sup>.

#### Bronchitis

Bronchitis is an infection of the large airways (bronchi) that travel between the windpipe (trachea) and the smaller airways. Bronchitis is most commonly caused by a viral infection. In 1% to 10% of cases, a bacterial infection is the cause.

## What Type of Lung Infection Is Bronchitis?

### Bronchiolitis

Bronchiolitis is an infection of the smaller airways (bronchioles) between the larger bronchi and the tiny alveoli where the exchange of oxygen and carbon dioxide takes place. Bronchiolitis is common in children under two years old and is the leading cause of hospitalizations of infants during the first year of life. That said, most children do not need to be hospitalized if they get sick with it.

### Bronchiolitis Lung Infection in Children

#### Common Cold

The common cold is responsible for 60% to 80% of school absences in children and 30% to 50% of time lost from work for adults. During the first six years of life, children have, on average, six to eight colds per year. For most healthy adults, it drops down to three to four colds per year.

#### Coronaviruses and COVID-19

The COVID-19 pandemic made people more aware of coronaviruses, but the one that causes COVID (SARS-CoV-2) is just one of several coronaviruses that infect humans.

Other respiratory illnesses in humans that are caused by coronaviruses are severe acute respiratory syndrome (SARS) and Middle Eastern Respiratory Syndrome (MERS).

### What Is MERS?

#### Enterovirus

Non-polio enteroviruses are a group of common viruses that can cause lung infections. They also cause hand, foot, and mouth disease (enterovirus A71), and severe infections in other parts of the body like myocarditis (inflammation of the heart), meningitis (inflammation of the protective layer around the brain), and encephalitis (brain infection or inflammation).

#### Influenza

Seasonal influenza—or "the flu"—is one of the most common lung infections. Both influenza A and influenza B viruses are spread through droplets that come out of the body when a person coughs, sneezes, or even talks. That's why the flu is very contagious.

Symptoms of the flu include:

- Fever and chills
- Sore throat
- Nasal congestion or a runny nose
- Body aches
- Headaches
- Fatigue
- A mild cough

### Whooping Cough (Pertussis)

Whooping cough (pertussis) is often thought of as a vaccine-preventable lung infection of the past, but people still get it today. About a fourth of babies and young children who get whooping cough will develop pneumonia. Less commonly (0.3%), complications of whooping cough such as encephalitis may occur.

### Risk Factors for Lung Infections

Risk factors for lung infections vary based on the type, but there are certain things that can increase your risk of lung problems in general.

### Common Risk Factors

- Some of the most common risk factors for lung infections include:
- Smoking or exposure to secondhand smoke
- Exposure to air pollution or dust at work
- A history of asthma or allergies
- Crowded living conditions
- Winter months in the northern hemisphere
- Dry mucous membranes

### Risk Factors in Children

Risk factors for lung infections in kids include:

Greater exposure to infections at daycare or school, or having multiple siblings

- Being male
- Prematurity
- Bottle feeding instead of breastfeeding
- Pacifier use
- Age (children under the age of 6 are more susceptible in general, and bronchiolitis occurs most often in children under the age of 2)
- Children born to people who smoked during pregnancy

### Lung Infection Treatment

The treatment for a lung infection depends on what is causing it and how sick a person is, as well as whether they have any other health conditions.

### Home Remedies

#### Home remedies for lung infections include:

Taking over-the-counter (OTC) medications like Tylenol (acetaminophen) or ibuprofen, or cough/cold products

#### Prescription Medications and Hospital Treatment

Bacterial lung infections can be treated with antibiotics, but viral lung infections need to "run their course." However, people with lung infections from any cause may need medical treatment if they have severe symptoms.

For example, people who develop narrowing of the airways with a lung infection (reactive airway disease) may need inhalers that open the airways and corticosteroids to help with inflammation.

People who develop low oxygen levels (hypoxia) from a lung infection might need oxygen therapy, and severe cases may need assisted breathing or mechanical ventilation to help with breathing.

### Viral Lung Infections

With viral lung infections, treatment is about helping a person feel as comfortable as possible while they are healing. Lung infections caused by a virus cannot be treated with antibiotics. Here are a few examples of how different viral lung infections might be treated for someone with influenza A, treatment with Tamiflu (oseltamivir) may reduce the severity and duration of the infection if it's started early.

### Bacterial Lung Infections

Antibiotics are the mainstay of treatment for bacterial lung infections. The antibiotic that will be used will depend on which bacteria is causing the infection. In some cases, a provider may choose to start antibiotics while they are waiting for tests to come back. Once they know which bacteria is the cause of the infection, they might change the

antibiotic. Depending on how sick a person is, they might be able to take the medication by mouth (oral antibiotics) or they might need to have it through an IV. The timing is also important. For example, with pneumonia, antibiotics need to be started as soon as possible.

### Fungal and Parasitic Lung Infections

Anti-fungal medications such as Diflucan (fluconazole), Nizoral (ketoconazole), or Ancobon (flucytosine) are used to treat fungal lung infections. Parasitic lung infections are treated with anti-parasitic medications. The medication chosen will depend on the parasite that's causing the infection.

### Lung Infection Complications

A lung infection can be a serious illness by itself, but it can also lead to more health problems—some of which can be serious. The complications of a lung infection can happen soon after a person gets sick (acute) or later (chronic).

#### Acute

Some of the acute complications of lung infections are breathing problems. For example, viral lung infections can trigger an asthma attack in patients who have asthma.

Lung infections can also cause exacerbations in people with chronic obstructive pulmonary disease (COPD), which can in turn worsen that condition.

#### Chronic

Some effects of a lung infection don't go away when a person gets better. For example, babies and kids who get bronchiolitis are at an increased risk of having wheezing and asthma later in childhood. There is also concern that viral lung infections could play a role in a person's risk of getting COPD. Pneumonia is a lung infection involving the alveoli and can be caused by a variety of microbes including bacteria, viruses, and fungi. It is the leading infectious cause of hospitalization and death in the United States. In 2010, in the United States, pneumonia resulted in 1.1 million discharges from the hospital with an average length of stay of 5.2 days. Pneumonia accounted for 3.4 % of hospital deaths in 2006. In 2013 it accounted for 16.9 deaths per 100,000 population. Pneumonia continues to be the leading killer of young children around the world, causing 14 % of all deaths in children ages 1 month to 5 years. Most instances of pneumonia are attributable to self-infection with one or more types of microbes that originate in the nose and mouth. In healthy individuals, typical upper airway bacterial residents such as Streptococcus

pneumoniae and Haemophilus influenzae are the most common bacteria causing community-acquired pneumonia.

Hospital-acquired pneumonia is usually caused by more resistant bacteria such as Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Escherichia coli. In those with a serious impairment of their immune system, opportunistic microbes are more readily apparent such as fungi, viruses, and mycobacteria. There are many mechanisms used by the lungs to resist infection. Physical mechanisms are structure of the upper airway, branching of the bronchial tree, sticky mucous layer lining the airways, cilia that propel mucous upward, and the cough reflex. If microbes do reach the alveoli, the immune system is usually able to destroy them. A variety of strategies have been used to reduce the incidence of pneumonia<sup>11-15</sup>. Elements of a healthy lifestyle that reduce the incidence are adequate nutrition, dental hygiene, and not smoking. For those with lung disease or impaired clearance of mucous, aerobic exercise, deep breathing maneuvers, and cough assist devices can facilitate expectoration and lung hygiene. Immunity to certain microbes can be enhanced by immunization.

## 2. Methodology

**Study Design:** It was Prospective observational study.

**Study Period:** The Present study was conducted for a period of six months.

**Study site:** The Present study was conducted in department of General medicine in a tertiary care hospital.

**Sample size:** It was 225 Patients.

### Inclusion criteria

- Patients with age of more than 18 years.
- Patients with pulmonary infectious symptoms.
- Patients of either sex, diagnosed with pulmonary infections.
- Patients who are willing to give consent.
- Patients receiving pulmonary infections treatment.

### Exclusion criteria

- Patients below 18 years.
- Patients who were not willing to join in the study.
- Special population including pregnant women and lactating women.
- Psychiatric abnormalities.

## 3. Results and Discussion

### Table 1: Age

In our study 25-30 years age patients were 44(19.55%),31-39 years age patients were 36(16%),40-45 years age patients were 61(27.11%),46-56 years age patients were 84(37.33%).

S.No	Age	Total N=225	Percentage (%)
1.	25-30	44	19.55
2.	31-39	36	16
3.	40-45	61	27.11
4.	46-56	84	37.33
	Total	225	

**Table 2: Gender**

In our study Males patients were 176(78.22%), Female patients were 49(21.77%).

S.No	Gender	Total N=225	Percentage (%)
1	Males	176	78.22
2	Female	49	21.77
	Total	225	

**Table 3: Occupation**

Business man Occupation patients were 73(32.44%), Daily worker Occupation patients were 68 (30.22%), Farmer Occupation patients were 84 (37.33%).

S.No	Occupation	Total N=225	Percentage (%)
1.	Business man	73	32.44
2.	Daily worker	68	30.22
3.	Farmer	84	37.33
	Total	225	

**Table 4: Socioeconomic class**

Upper class patients were 91(40.44%), Middle class patients were 33(14.66%), Lower class patients were 101 (44.88%).

S.No	Socioeconomic class	Total N=225	Percentage (%)
1.	Upper class	91	40.44
2.	Middle class	33	14.66
3.	Lower class	101	44.88
	Total	225	

**Table 5: Laboratory tests**

Lungs CT scan patients were 56(24.88%), Chest X ray patients were 33(14.66%), Sputum culture test patients were 71(31.55%), Blood test patients were 37 (16.44%), Throat swab patients were 28(12.44 %).

S.No	Laboratory tests	Total N=225	Percentage (%)
1.	Lungs CT scan	56	24.88
2.	Chest X ray	33	14.66
3.	Sputum culture test	71	31.55
4.	Blood test	37	16.44
5.	Throat swab	28	12.44
	Total	225	

**Table 6: Clinical symptoms**

Shortness of breath patients were 34(15.11%), Wheezing patients were 21(9.33%), Fever patients were 23(10.22%), Chronic cough patients were 22 (9.77%), Mucus production patients were 20(8.88%), Chest pain patients were 34(15.11%), Sore throat patients were 71(31.55 %).

S.No	Clinical symptoms	Total N=225	Percentage (%)
1.	Shortness of breath	34	15.11
2.	Wheezing	21	9.33
3.	Fever	23	10.22
4.	Chronic cough	22	9.77
5.	Mucus production	20	8.88
6.	Chest pain	34	15.11
7.	Sore throat	71	31.55
	Total	225	

**Table 7: Types of respiratory infections**

Clinical symptoms includes Common cold patients were 34(15.11%),Chest infection patients were 26(11.55%), Pharyngitis patients were 44(19.55%),Sinusitis patients were 37(16.44%), Pneumonia patients were 20(8.88%), Bronchitis patients were 64(28.44 %).

S.No	Respiratory infections	Total N=225	Percentage (%)
1.	Common cold	34	15.11
2.	Chest infection	26	11.55
3.	Pharyngitis	44	19.55
4.	Sinusitis	37	16.44

5.	Pneumonia	20	8.88
6.	Bronchitis	64	28.44
	Total	<b>225</b>	

**Table 8: Risk factors**

Risk factors includes Immuno deficiency patients were 67(29.77%), Lung infections patients were 43(19.11%), Chest infection patients were 21(9.33%), Smoke patients were 16(7.11%), Asthma patients were 28(12.44%), Alcohol patients were 50 (22.22%).

S.No	Risk factors	Total N=225	Percentage (%)
1	Immuno deficiency	67	29.77
2	Lung infections	43	19.11
3	Chest infection	21	9.33
4	Smoke	16	7.11
5	Asthma	28	12.44
6	Alcohol	50	22.22
	Total	<b>225</b>	

**Table 9: Duration of respiratory infections**

The Duration of respiratory infections includes 1-2 years patients were 79(35.11%), 3-4 years patients were 44(19.55%), 5-6 years patients were 102(45.33%).

S.No	Duration	Total N=225	Percentage (%)
1	1-2 years	79	35.11
2	3-4 years	44	19.55
3	5-6 years	102	45.33
	Total	<b>225</b>	

**Table 10: Co morbidities**

The Comorbidities includes Renal failure patients were 34(15.11%), Diabetes mellitus patients were 22(9.77%), Liver disease patients were 29(12.88%), Peptic ulcer patients were 31(13.77%), Epilepsy patients were 20(8.88%), Scabies patients were 89(39.55%).

S.No	Comorbidities	Total N=225	Percentage (%)
1	Renal failure	34	15.11
2	Diabetes mellitus	22	9.77
3	Liver disease	29	12.88
4	Peptic ulcer	31	13.77
5	Epilepsy	20	8.88
6	Scabies	89	39.55
	Total	<b>225</b>	

**Table 11: Prescribing pattern drugs**

The Prescribing pattern drugs includes Inhaled corticosteroids prescribed patients were 25 (11.11%), Anti- Histamines prescribed patients were 22 (9.77%), Bronchodilators prescribed patients were 31 (13.77%), Proton pump inhibitors prescribed patients were 37 (16.44%), Nasal decongestants prescribed patients were 27 (12%), Mucolytic agents prescribed patients were 30 (13.33%), Leukotrine receptor antagonist prescribed patients were 41 (18.22%), Antibiotics prescribed patients were 12 (5.33%).

S.No	Prescribing pattern of NSAID'S	Total N=225	Percentage (%)
1	Inhaled corticosteroids	25	11.11
2	Anti- Histamines	22	9.77
3	Bronchodilators	31	13.77
4	Proton pump inhibitors	37	16.44
5	Nasal decongestants	27	12
6	Mucolytic agents	30	13.33
7	Leukotrine receptor antagonist	41	18.22
8	Antibiotics	12	5.33
	Total	<b>225</b>	

## Discussion

- In our study 46-56 years age patients were more (37.33%) as compared to other ages.
- In our study Males patients were more 176(78.22%) as compared to Female patients 49(21.77%).
- Lower class socioeconomical status patients were more 101 (44.88%) as compared to other socioeconomical status of the study patients.
- Sputum culture test patients were more 71(31.55%) as compared to other laboratory examinations.
- Sore throat clinical symptom patients were more 71(31.55 %) as compared to other clinical symptoms.
- Bronchitis respiratory infections patients were more 64(28.44 %) as compared to other respiratory infections<sup>16-18</sup>.
- Immuno deficiency risk factor patients were more 67(29.77%) as compared to other risk factors.
- 5-6 years duration respiratory infection patients were more 102(45.33%) as compared to other durations.
- The Scabies comorbidities patients were more 89(39.55%) as compared to other comorbid conditions.
- Leukotrine receptor antagonist prescribed patients was more 41 (18.22%) as compared to other prescribing pattern of drugs.

## 4. Conclusion

In our study 46-56 years age patients were more (37.33%) as compared to other ages. Sputum culture test patients were more 71(31.55%) as compared to other laboratory examinations. 5-6 years duration respiratory infection patients were more 102(45.33%) as compared to other durations<sup>19-21</sup>. The Scabies comorbidities patients were more 89(39.55%) as compared to other comorbid conditions. The Leukotrine receptor antagonist prescribed patients was more 41 (18.22%) as compared to other prescribing pattern of drugs. Antimicrobials are used without sufficient evidence of indication and microbiological and radiological findings.

The practice also is not supported with relevant local guidelines and no multidisciplinary approach was apparent in the management of infectious diseases. In general, to improve proper antimicrobial utilization and patient clinical outcomes, the hospital requires a coordinated intervention from all concerned bodies, including a functional antimicrobial stewardship program as soon as possible. The Prescribing of antibiotics and other medications for pulmonary infections is still high and needs rationalization. Training on and implementation of the national protocol for diagnosis and treatment of protocol for the management of pulmonary infections among adults is suggested. Further studies to explore the knowledge, skills and attitudes of physicians towards prescribing for pulmonary infections are needed.

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