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A PROSPECTIVE OBSERVATIONAL STUDY ON PREVALENCE, RISK FACTORS AND MANAGEMENT OF LOWER RESPIRATORY TRACT INFECTIONS AT A TERTIARY CARE TEACHING HOSPITAL

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Abstract:

Aims and Objectives*: To study the prevalence, risk factors and management of Lower Respiratory Tract Infections in the General Medicine Department at a Tertiary Care Teaching Hospital.*

Materials and Methods*: It is a Prospective and Observational study carried out over a period of six months in the Department of General Medicine at Basaweshwar teaching and General Hospital, Gulburga . Patients of both the sex, diagnosed with Lower Respiratory Tract Infections, aged over 18 years were selected for the study. A total of 300 cases were collected using a predesigned data collection form and data was evaluated to study the prevalence, risk factors and management of Lower Respiratory Tract Infections (LRTIs).*

Results: *There is predominance of LRTI in males (60%) in the study population. More cases are recorded in patients below 60 years of age. In our study there is predominance of Pneumonia (40%) over other LRTIs. Diagnosis was made on the basis of clinical, radiological and laboratory findings. Imaging studies like X-Ray and Computerised Tomography (CT) scan were observed in most of the cases. Sputum smear examination (culture test) for identification of microorganisms was found to have been reported in 56 cases. Sputum examination revealed Streptococcus pneumoniae as the most common causative microorganism. Common Clinical manifestations were found to be cough, Shortness of breath, fever and fluid retention in lungs. The commonly prescribed drugs for LRTI were Antibiotics like Amoxicillin + Clavulanate, Ceftriaxone, Levofloxacin and supportive treatment was given through Nebulizer using Salbutamol, Albuterol,Budesonide, Ipratropium and supplemental oxygen. It was found that a weakened immune system (76%) was a major risk factor followed by age, gender and addictions like smoking and alcohol abuse A total of 19 recurrent cases were identified in the study.*

Conclusions: *In the present study 300 cases of Lower Respiratory Tract Infection are recorded in a period of six months, and there is predominance of LRTI in males. Majority of the cases are recorded in patients below 60 years of age and there is predominance of Pneumonia over other LRTIs. Weakened immune system, age, male gender and addictions smoking and alcohol abuse were found to be other risk factors for LRTI. Sputum examination was not carried out in most of the cases, lacking specific treatment.*

Key Words: *Lower Respiratory Tract Infections, Pneumonia, Clinical manifestations, Risk Factors, Sputum examination*

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INTRODUCTION:

Respiratory tract infections RTIs are infectious diseases involving the respiratory tract. An infection of this type usually is further classified as an upper respiratory tract infection (URI or URTI) or a lower respiratory tract infection LRI or LRTI. Lower respiratory infections, such as pneumonia, tend to be far more severe than upper respiratory infections, such as the common cold. LRTIs are a persistent and a pervasive health problem which impose an enormous burden on the society. They being common reasons for consultation and hospitalisation, the patients present with a wide spectrum of diseases which range from mi- nor self-limiting illnesses to potentially life-threatening infections. The outcome depends on the virulence of the organism and the host defence mechanism. The bacteriological profiles of the LRTIs are different in different countries, which vary with time within the same country.[1]

Lower Respiratory Tract Infections are one of the common clinical problems in community and hospital settings. Therefore there was a need to carry out the study. The study is carried out to create awareness among the physicians regarding its risk factors and management and for early identification of high-risk patients as it is important for the prevention of complications, also to increase the awareness about the clinical signs and symptoms that are most predictive of the etiologic agent which could help physicians to more accurately diagnose and treat patients in a timely manner.

TYPES OF RESPIRATORY TRACT INFECTION [2]

Upper Respiratory Tract Infection

The upper respiratory tract is considered the airway above the glottis or vocal cords. This part of the tract includes the nose, sinuses, pharynx, and larynx.Typical infections of the upper respiratory tract include tonsillitis, pharyngitis, laryngitis, sinusitis, otitis media, certain influenza types, and the common cold. Symptoms of URIs can include cough, sore throat, runny nose, nasal congestion, headache, low-grade fever, facial pressure, and sneezing.

Lower Respiratory Tract Infection

The lower respiratory tract consists of the trachea (windpipe), bronchial tubes, bronchioles, and the lungs. Lower respiratory tract infections are generally more severe than upper respiratory infections. LRIs are the leading cause of death among all infectious diseases. The two most common LRIs are bronchitis and pneumonia.

EPIDEMIOLOGY [3-4]

Lower respiratory infectious disease is the fifth-leading cause of death and the combined leading infectious cause of death, being responsible for 2.74 million deaths worldwide. This is generally similar to estimates in the 2010 Global Burden of Disease study. This total only accounts for Streptococcus pneumoniae and Haemophilus Influenzae infections and does not account for atypical or nosocomial causes of lower respiratory disease, therefore underestimating total disease burden.

The prevalence rates for hospital acquired (HA) and community acquired (CA), lower respiratory tract infections (LRTIs) were 2.4% and 6.1%, respectively; this shows an increase over that reported in the First National Prevalence Study. The prevalence rate of HA infections for ventilated patients was 18.6%.

Respiratory infections often have strong seasonal patterns, with temperate climates more affected during the winter. Several factors explain winter peaks in respiratory infections, including environmental conditions and changes in human behaviours. Viruses that cause respiratory infections are affected by environmental conditions like relative humidity and temperature. Temperate climate winters have lower relative humidity, which is known to increase the transmission of influenza.

LOWER RESPIRATORY TRACT INFECTIONS[5]

Common lower RTIs include:

- Chronic Obstructive Pulmonary Disorder - It refers to a group of diseases that cause airflow blockage and breathing-related problems
- Flu - which can affect either the upper or lower respiratory tract
- Bronchitis - infection of the airways
- Pneumonia - infection of the lungs
- Bronchiolitis - It causes inflammation and congestion in the small airways (bronchioles) of the lung.

Chronic obstructive pulmonary disease [6-7]

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory lung disease that causes obstructed airflow from the lungs. Symptoms include breathing difficulty, cough, mucus (sputum) production and wheezing. It's typically caused by long-term exposure to irritating gases or particulate matter, most often from cigarette smoke.

Chronic bronchitis is inflammation of the lining of the bronchial tubes, which carry air to and from the air sacs (alveoli) of the lungs. It is characterised by daily cough and mucus (sputum) production.

Symptoms of COPD

COPD symptoms often don't appear until significant lung damage has occurred, and they usually worsen over time, particularly if smoking exposure continues.

Signs and symptoms of COPD may include:

Shortness of breath, especially during physical activities

- Wheezing
- Chest tightness
- A chronic cough that may produce mucus (sputum) that may be clear, white, yellow or greenish
- Frequent respiratory infections
- Lack of energy
- Unintended weight loss (in later stages)
- Swelling in ankles, feet or legs

Causes of COPD

The main cause of COPD in developed countries is tobacco smoking. In the developing world, COPD often occurs in people exposed to fumes from burning fuel for cooking and heating in poorly ventilated homes. Only some chronic smokers develop clinically apparent COPD, although many smokers with long smoking histories may develop reduced lung function. Some smokers develop less common lung conditions. They may be misdiagnosed as having COPD until a more thorough evaluation is performed.

Risk factors of COPD

- Exposure to tobacco smoke.
- People with asthma
- Occupational exposure to dusts and chemicals
- Exposure to fumes from burning fuel.
- Genetics

Complications of COPD

- COPD can cause many complications, including:
- Respiratory infections
- Heart problems
- Lung cancer
- Depression

Diagnosis of COPD

- Lung (pulmonary) function tests
- Chest X-ray
- CT scan
- Arterial blood gas analysis

Treatment of COPD

Many people with COPD have mild forms of the disease for which little therapy is needed other than smoking cessation. Even for more advanced stages of disease, effective therapy is available that can control symptoms, slow progression, reduce the risk of complications and exacerbations, and improve your ability to lead an active life.

Medications of COPD

Several kinds of medications are used to treat the symptoms and complications of COPD.The two main arms of treatment are airflow optimisation and antibiotic therapy. Airflowoptimization consists of physiotherapy to aid expectoration of secretions, adjunctive oxygen if appropriate, bronchodilators and sometimes short-course corticosteroids. In severe cases, aperiod of artificial ventilation may be required, an intervention which has become more common with the advent of non-invasive ventilation techniques.

The following recommendations can be made for the empiric antibiotic treatment of exacerbations of COPD. If a plausible pathogen is isolated, treatment can be modified accordingly.

First-line agents: Doxycycline, Amoxicillin

Second-line agents: Co-amoxiclav, Clarithromycin, Cefixime

A number of other drugs are promoted for the

treatment of COPD exacerbations. Of these,
Azithromycin is not recommended, as it is less active than clarithromycin against S. pneumoniae. The activity of ciprofloxacin against S. pneumoniae is insufficient to justify its use as monotherapy against pneumococcal infections (although it has useful activity against Influenzas and M. catarrhalis), and levofloxacin (which is the active isomer of ofloxacin) does not seem to offer any great microbiological advantage. Moxifloxacin is a quinolone that retains activity against Gram-negative organisms such as Haemophilus and Moraxella but has greater activity against Gram-positives such as S. pneumoniae. It has been favourably compared to standard treatment in exacerbations of COPD.

Bronchitis [8]
Bronchitis is an infection of the main airways of the lungs (bronchi), causing them to become irritated and inflamed. The bronchi branches off on either side of your windpipe (trachea). They lead to smaller and smaller airways inside your lungs, known as bronchioles.

The walls of the bronchi produce mucus to trap dust and other particles that could otherwise cause irritation. Most cases of bronchitis develop when an infection irritates and inflames the bronchi, causing them to produce more mucus than usual. The body tries to shift this extra mucus through coughing.

Symptoms of bronchitis
The main symptom of acute bronchitis is a hacking cough, which may bring up clear, yellow-grey or greenish mucus (phlegm). Other symptoms are similar to those of the common cold or sinusitis, and may include:

- sore throat
- headache
- runny or blocked nose
- aches and pains
- tiredness

Causes of bronchitis
Bronchitis can be caused by either a virus or bacteria, although viral bronchitis is much more common. In most cases, bronchitis is caused by the same viruses that cause the common cold or flu. The virus is contained in the millions of tiny droplets that come out of the nose and mouth when someone coughs or sneezes.
These droplets typically spread. They hang suspended in the air for a while, then land on surfaces where the virus can survive for up to 24 hours.Bronchitis can also be triggered by breathing in irritant substances, such as smog, chemicals in household products or tobacco smoke. Smoking is the main cause of chronic bronchitis, and it can affect people who inhale second-hand smoke, as well as those who smoke themselves. People with chronic bronchitis often develop another smoking-related lung disease called emphysema where the air sacs inside the lungs become damaged, causing shortness of breath. If smoking, one should stop immediately because it aggravates bronchitis and increases your risk of developing emphysema.

Occupational exposure
One may also be at risk of developing chronic bronchitis and other types of chronic obstructive pulmonary disease (COPD) if you're often exposed to materials that can damage your lungs, such as:

- grain dust
- textiles (fabric fibres)
- ammonia
- strong acids
- chlorine

This is sometimes known as **"occupational bronchitis"**, and it usually eases once one is no longer exposed to the irritant substance.

Treatment
In most cases, acute bronchitis will clear up by itself within a few weeks without the need for treatment. In the meantime, you should drink lots of fluid and get plenty of rest. In some cases, the symptoms of bronchitis can last much longer. If symptoms last for at least three months, it's known as "chronic bronchitis".
Lifestyle changes can help ease symptoms, such as:

- eating a healthy diet can help prevent lung infections
- regular moderate exercise plus a healthy diet will help you to maintain a healthy
- weight - being overweight makes breathing harder
- avoiding smoking and smoky environments

Bronchodilators and steroids "open up" the airways and can be prescribed as an inhaler or as tablets. Mucolytic medicines thin the mucus in the lungs making it easier to cough up.

Bronchiolitis [9-10]
Bronchiolitis is a common lower respiratory tract infection that affects babies and young children under two years old. Most cases are mild and clear up without the need for treatment within two to three weeks, although some children have severe symptoms and need hospital treatment.
The early symptoms of bronchiolitis are similar to those of a common cold, such as a runny nose and cough.

Further symptoms then usually develop over the next few days, including:

- a slight high temperature (fever)
- a dry and persistent cough
- difficulty feeding rapid or noisy breathing (wheezing)

Causes

Bronchiolitis is caused by a virus known as the respiratory syncytial virus (RSV), which is spread through tiny droplets of liquid from the coughs or sneezes of someone who is infected.

The infection causes the smallest airways in the lungs (the bronchioles) to become infected and inflamed. The inflammation reduces the amount of air entering the lungs, making it difficult to breathe.

Treatment

There is no medication to kill the virus that causes bronchiolitis, but the infection usually clears up within two weeks without the need for treatment.

Pneumonia [11]

Pneumonia is swelling (inflammation) of the tissue in one or both lungs. It's usually caused by a bacterial infection. At the end of the breathing tubes in your lungs are clusters of tiny air sacs. If you have pneumonia, these tiny sacs become inflamed and fill up with fluid.

Symptoms of pneumonia

The symptoms of pneumonia can develop suddenly over 24 to 48 hours, or they may come on more slowly over several days.

- a cough - which may be dry, or produce thick yellow, green, brown or blood-stained mucus (phlegm)
- difficulty breathing - your breathing may be rapid and shallow, and you may feel breathless, even when resting
- rapid heartbeat
- fever
- feeling generally unwell
- sweating and shivering
- loss of appetite
- chest pain - which gets worse when breathing or coughing

Treatment [12]

Eradication of the offending organism and complete clinical cure are the primary objectives. Associated morbidity should be minimised (eg, renal, pulmonary, or hepatic dysfunction). The first priority on assessing the patient with pneumonia is to evaluate the adequacy of respiratory function and to determine whether there are signs of systemic illness, specifically dehydration, or sepsis with resulting circulatory collapse. The treatment of bacterial pneumonia initially involves the empiric use of a relatively broad- spectrum antibiotic (or antibiotics) effective against probable pathogens after appropriate cultures and specimens for laboratory evaluation have been obtained. Important therapeutic adjuncts include adequate hydration (by IV route if necessary), optimal nutritional support, and fever control

- **Community Acquired Pneumonia**

Comorbidities (diabetes, heart/ lung/liver/renal disease, alcoholism)

Fluoroquinolone or β-lactam + macrolide

Elderly

Piperacillin/tazobactam or cephalosporine or carbapenem Fluoroquinolone or β-lactam + macrolide / tetracycline

- **Hospital Acquired Pneumonia**

No risk factors for MDR pathogens

Ceftriaxone or fluoroquinolone or ampicillin/ sulbactam or ertapenem or doripenem

Antibiotics for the Treatment of Bacterial Pneumonia

- **Penicillin**: Ampicillin ± sulbactam, Amoxicillin ± clavulanate, Piperacillin/tazobactam Penicillin
- **Extended spectrum cephalosporins:** Ceftriaxone, Cefotaxime, Ceftazidime, Cefepime
- **Macrolide/azalide**: Clarithromycin, Erythromycin, Azithromycin
- **Fluoroquinolones**: Moxifloxacin, Gemifloxacin, Levofloxacin, Ciprofloxacin
- **Tetracycline**: Doxycycline, Tetracycline HCl
- **Aminoglycosides: Gentamicin, Tobramycin**
- **Carbapenems**: Imipenem Meropenem
- **Others**: Vancomycin, Linezolid, Clindamycin

Mild pneumonia can usually be treated at home by:

- getting plenty of rest
- taking antibiotics
- drinking plenty of fluids

Table 1: Pneumonia Classifications and Risk Factors [13]

Types of Pneumonia	Definition	Microorganisms	Risk Factors
Community acquired pneumonia (CAP)	Pneumonia developing in patients with no contact to a medical facility	Streptococcus pneumoniae, Staphylococcus aureus, Haemophilus influenzae, and viruses.	• Age >65 years • Diabetes mellitus • Asplenia • Chronic cardiovascular, pulmonary, renal and/or liver disease • Smoking and/or alcohol abuse
Health care-associated pneumonia (HCAP)	Pneumonia developing in patients not in an acute care medical facility but two or more risk factors for MDR pathogens	Pseudomonas aeruginosa,Klebsiella pneumoniae, Acinetobacter species.	• Recent Hospitalisation≥2 days within past 90 days • Nursing Home or Long-term care facility resident • Recent (past 30days) antibiotic use, chemo- therapy, wound care or infusion therapy at either a healthcare facility or home • Haemodialysis patients • Contact with a family member with infection caused by MDR pathogen
Hospital-acquired pneumonia (HAP)	Pneumonia developing >48 hours after hospital admission	Staphylococcus aureus, methicillin-susceptible Staphylococcus aureus (MSSA) and methicillin-resistant Staphylococcus aureus (MRSA) enteric gram-negative bacilli.	• Witnessed aspiration COPD, ARDS, or coma • Administration of antacids. • H2-antagonists, or proton pump inhibitor Supine Position • Enteral Nutrition, nasogastric tube R intubation, tracheostomy or patient transport • Prior Antibiotic exposure
Ventilator associated pneumonia (VAP)	Pneumonia developing >48 hours after intubation and mechanical ventilation	Pseudomonas aeruginosa, Escherichia coli, Klebsiella pneumoniae.	Same As Hospital Acquired

AIM AND OBJECTIVE

AIM

To Study Prevalence, Risk factors and Management of Lower Respiratory Tract Infections in the General Medicine Department at a Tertiary Care Teaching Hospital.

OBJECTIVES

1. To observe the aetiology and prevalence of lower respiratory tract infection.
2. To observe the clinical manifestations and treatment of lower respiratory tract infection.
3. To identify the risk factors associated with lower respiratory tract infection.MATERIALS AND METHODS

METHODOLOGY:

PLAN OF WORK

STUDY DESIGN - A Prospective Observational Study.

STUDY LOCATION – The study was conducted in Basaweshwar teaching and General Hospital, a tertiary care teaching hospital.

STUDY POPULATION – All patients attending the General Medicine Department having lower respiratory tract infection.

STUDY DURATION – 6 months

SAMPLE SIZE – 300

SELECTION CRITERIA

Table - 2 Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Patients with age18 years and above	Active Tuberculosis, Covid-19, Lung Cancer
Patients of either sex	Pregnant and lactating mothers
Patients with confirmed Lower Respiratory Tract Infections	Patients not willing to participate
Bacterial and Viral Lower Respiratory Tract Infections	

DATA COLLECTION

1.Patient demographic data such as Age, Gender, Occupation was noted
2.The aetiology, clinical manifestations, causative organisms, patient medication history, patient illness history was recorded.
3. Laboratory Investigations like Chest X-ray, Lungs function test and culture sensitivity report was observed.
4. Treatment of identified infections was recorded.
5. Prevalence, risk factors of Lower Respiratory Tract Infections and treatment was assessed.

RESULTAND DISSCUSSION:

RESULTS

A total of 300 cases of Lower Respiratory Tract Infections (LRTI) were collected from the General Medicine Department , Basaweshwar teaching and General Hospital, .in 6 months duration which include both male and female population in a age range of 18-90 years.

A total of 19 cases were reported to be recurrent out of 300 cases. These cases had previously been diagnosed with respiratory infections and symptoms such as COPD, Bronchiolitis, Tuberculosis, Pulmonary Koch's, Covid, Bronchial Asthma and emphysema along with other Illness history such as Diabetes mellitus, hypertension and chronic kidney disease.

Distribution of Patients based on Age and Gender

Out of a total number of 300 cases, 60% were male and 40% of the patients were female. More cases are recorded in patients below 60 years of age. The maximum number of cases were seen in the age group range 50 – 59 (Table 3 & 4/Figure 1 &2).

Table 3: DISTRIBUTION OF PATIENT POPULATION BASED ON GENDER

Gender	No. of Patients	Percentage
Male	180	60%
Female	120	40%

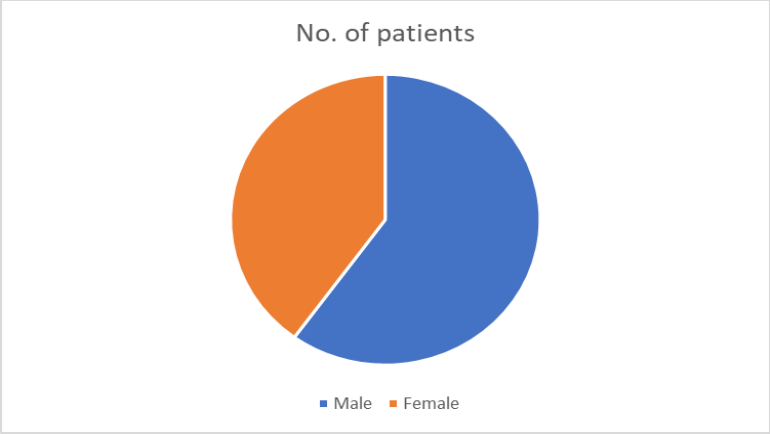

Figure 1 -Distribution of patients based on gender

Table 4: DISTRIBUTION OF PATIENTS ACCORDING TO AGE GROUP ALONG WITH GENDER DISTRIBUTION

Age group	Male(n=30)	Female(n=20)	Total Percentage
<20	0	0	0%
20-29	20	15	11%
30-39	30	24	18%
40-49	38	20	19%
50-59	**41**	**26**	**22%**
60-69	39	20	19%
70-79	6	12	6%
80-89	3	3	2%
90-99	3	0	1%
Total Percentage	**180**	**120**	**100%**
	60%	**40%**	

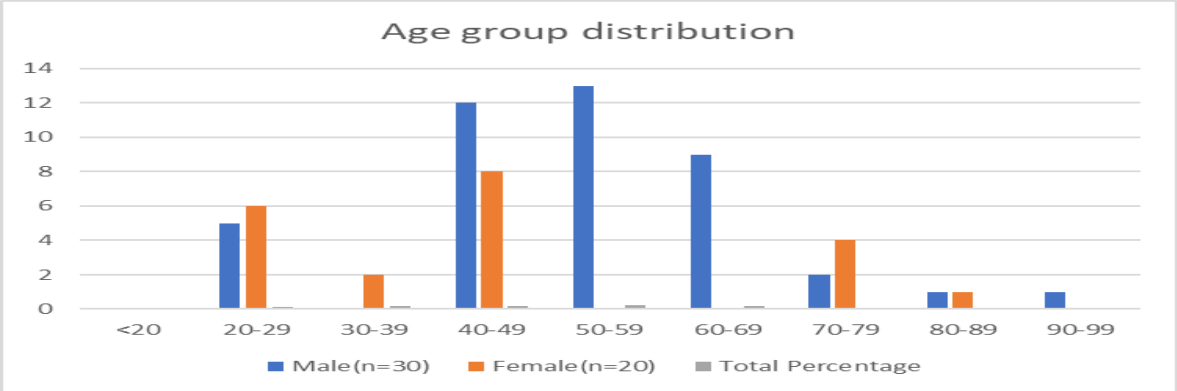

Figure - 2 Distribution according to age

5.2. Risk Factors for LRTI

Table 5: RISK FACTORS FOR LRTI

Risk Factor		Results (No .of cases found)
Age	Age < 60 years Age > 60 years	72 28
Gender	Predominance in Males	60
Immune status	Weakened Immune system / Immunocompromised	76
Addictions	Smoking / Alcohol abuse	60
Metabolic Disorder	Diabetes Mellitus Hypertension	25

Various risk factors were assessed from all the observed cases. The most common risk factor was weakened immune (76 cases), followed by age factor. 72 cases out of 100 were below 60 years. Other two major risk factors were addictions (60 cases) and gender with predominance of LRTI in male gender (60 cases) as shown in Table 5.
Table 6 & Figure 3 shows that the most prevalent addiction is Smoking followed by Alcoholism. Of these addictions , Smokers were 40% and Alcoholics were 20% , Alcoholics and Smokers both (S + A) with 10% . Non-addictions patients were 30%.

Table 6: DISTRIBUTION BASED ON PATIENTS WITH ADDICTIONS

Addiction	Total	Percentage
Smoker	120	40%
Alcoholic	60	20%
Both (S + A)	30	10%
No - Addiction	90	30%

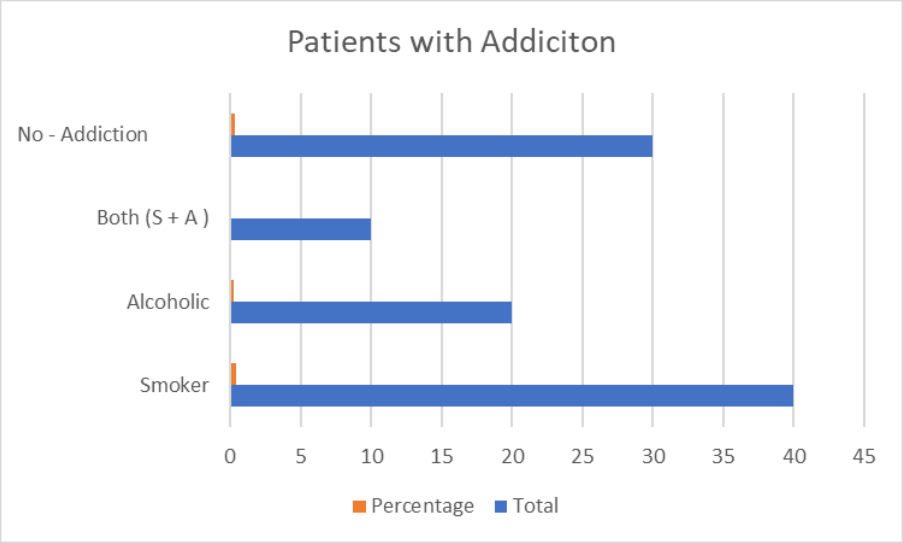

Figure 3: Patient with addiction

5.3.Treatment

The most commonly prescribed drugs (Table 7/Figure 9) are Antibiotics like Ceftriaxone, Levofloxacin, Amoxicillin + Clavulanate, Azithromycin, Doxycycline, Piperacillin + Tazobactam, Clindamycin and Bronchodilators which include Deriphyllin, and inhalational drugs such as Salbutamol, Budesonide, Ipratropium and Albuterol were given through Nebulizer. Supplemental oxygen was given as a support.

Table 7: DRUGS PRESCRIBED FOR DIFFERENT TYPES OF LRTI

Infections	Drugs Prescribed	No. of cases	Percentage
Typical Pneumonia	**Doxycycline** **Ceftriaxone** **Amoxicillin + Clavulanate** **Levofloxacin** **Clindamycin**	126	42%
Pneumonia with COPD	**Amoxicillin + Clavulanate** **Ceftriaxone**	66	22%
Community Acquired Pneumonia	**Amoxicillin + Clavulanate** **Ceftriaxone** **Piperacillin + Tazobactam** **Levofloxacin** **Azithromycin**	66	22%
Bronchitis	**Levofloxacin** **Deriphyllin**	15	5%
Bronchiolitis	**Deriphyllin** **Prednisolone**	24	8%
Hospital Acquired Pneumonia	**Ceftriaxone** **Piperacillin + Tazobactam** **Levofloxacin**	3	1%

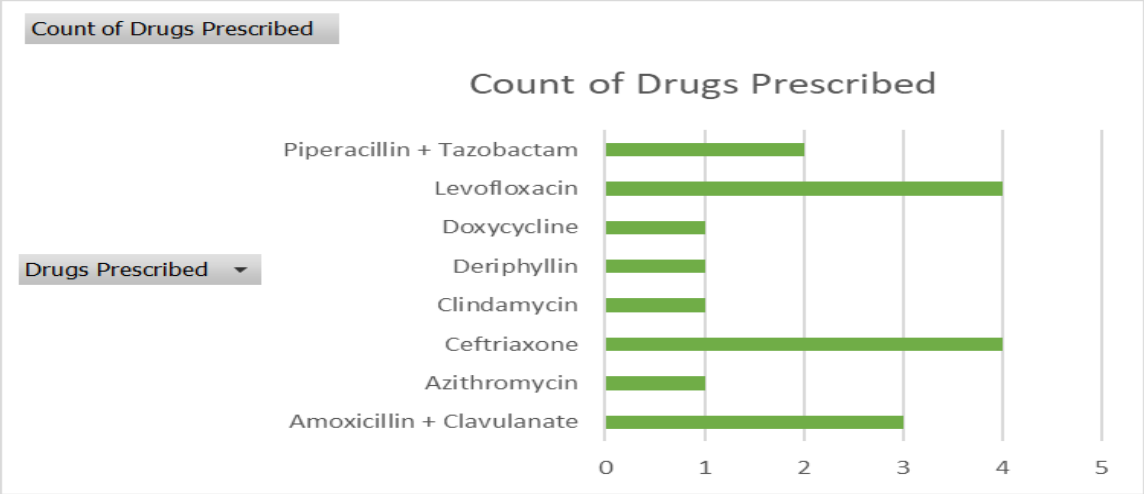

Figure 4: DRUGS PRESCRIBED FOR DIFFERENT TYPES OF LRTI

Diagnosis

Diagnosis includes clinical, radiological i.e. imaging studies like X-Ray and Computerised Tomography (CT) scan and laboratory findings like sputum smear examination (culture test) for identification of microorganisms.

300 cases have been found to report culture tests (Table 8/Figure 5), cases of LRTI are due to *Streptococcus pneumoniae* which is the most predominant microbe (31%), followed by gram stain positive diplococci (17%), pneumococcus (2%), gram negative bacilli *Pseudomonas aeruginosa* (2%) and *Klebsiella pneumoniae* (1%), one case each of *Staphylococcus aureus* (1%) and atypical microbe *Mycoplasma pneumoniae* (1%), with one mixed infection (1%) in bilateral pneumonia. In the remaining cases there were no reports of sputum culture tests.Chest X ray and CT scan was observed in the remaining cases for the investigation.

Table 8: Diagnostic criteria of LRTI based on Microorganism

Type of Infection	Sputum Examination Causative microorganism	No. of cases
Typical Pneumonia	*Streptococcus pneumoniae*	119
Community Acquired Pneumonia	*Gram stain positive diplococci*	93
Aspiration Pneumonia	*Pneumococcus*	26
Pneumothorax	*Pseudomonas aeruginosa*	26
Atypical pneumonia	*Mycoplasma pneumoniae*	9
Bilateral pneumonia	Cocci in pairs & few gram-negative bacilli	9
Hospital Acquired Pneumonia	*Staphylococcus aureus*	9
	Klebsiella pneumoniae	9

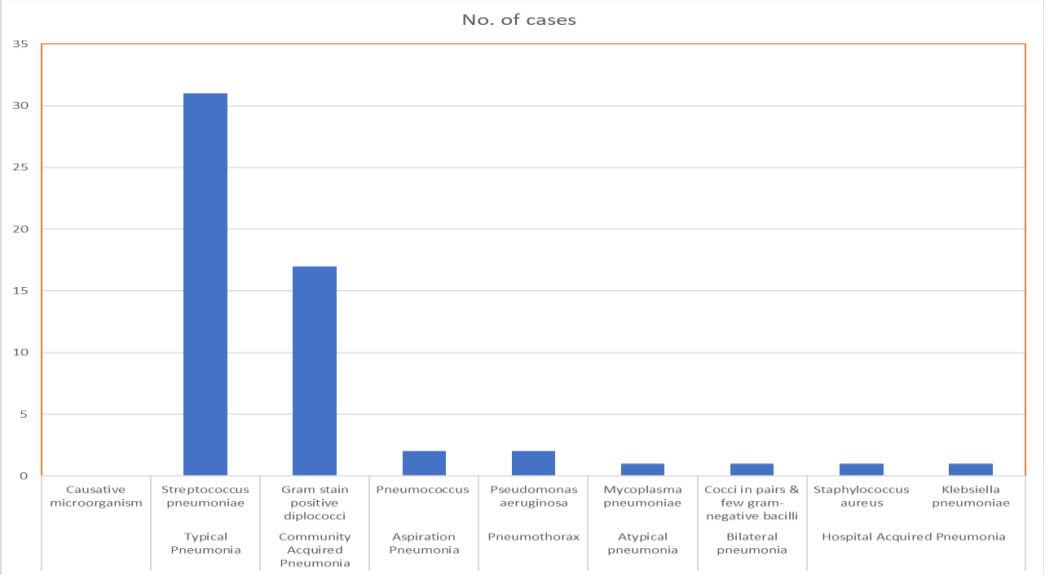

Figure 5: Diagnosis for Causative Microorganism

DISCUSSION:

In the present study we have performed a prospective observational study on prevalence, risk factors and management of Lower Respiratory Tract Infection at a tertiary care teaching hospital. In the present study evidence of LRTI was observed in 300 patients.Out of 300 patients 180 no. of cases were males which is 60% and 120 no. of cases were females which is 40%. Hence, there is predominance of male population in the study. This is in accordance with a study conducted by Gurjeet Singh et.al (2013)[29] in Navi Mumbai. In a few other studies conducted by Sunil Vijay and Gaurav Dalela (2016)[30] in Rajasthan and Syed Mustaq Ahmed (2013)[31] in North Kerala have also reported similar results.

The analysis of age wise data portrait and increased prevalence in the 50-59 age group (22%) as shown in the table -2 which was on par with the findings of studies conducted by Sunil Vijay and Gaurav Daalela (2016)[32] in Rajasthan and M.Ieven et.al (2018)[33] in European countries.In contrast with similar studies conducted by Gurjeet Singh et.al (2013)[34] and Syed Mustaq Ahmed (2013)[35] have reported predominance in patients aged 60 and above.

Most predominant infection (LRTI) in our study was found to be Typical Pneumonia (42%) followed by Pneumonia with Chronic Obstructive Pulmonary Disease (22%), Community Acquired Pneumonia (22 %), Bronchitis (5%), Bronchiolitis (8 %) and Hospital Acquired Pneumonia (1%).

Diagnosis was made on the basis of clinical, radiological and laboratory findings. Imaging studies like X-Ray and Computerised Tomography (CT) scan were observed in most of the cases. Sputum smear examination (culture test) for identification of microorganism was found to have reported in 300 cases, out of which 119 cases of LRTI were found to cause by *Streptococcus pneumoniae* which were the most predominant (31%),followed by gram stain

positive diplococci(17%), pneumococcus (2%), gram negative bacilli *Pseudomonas aeruginosa*(2%) and *Klebsiella pneumoniae*(1%),one case each of *Staphylococcus aureus* (1%) and atypical microbe *Mycoplasma pneumoniae*(1%), with one mixed infection(1%) in bilateral pneumonia. In the remaining cases there were no reports of sputum culture tests.

Some of the other studies conducted by M.Ieven et.al (2018)[36] in European countries, Syed Mustaq Ahmed et.al (2013)[37] in North Kerala,Shaker Salehi,Salman Khan et.al (2015) [38]in Nepal,Thairu et.al (2019) [39] and Ritty Sara (2020)[40] in Bengaluru have also reported Pneumonia as the commonest LRTI with *Streptococcus Pneumoniae* as the predominant microbe.In contrast to our findings,studies conducted by K.V Ramana et.al (2013)[41] and Sunil Vijay (2016)[42] have reported *Klebsiella Pneumoniae* as the major causative microorganism for LRTI.
The most predominant symptoms reported were fever, cough, runny nose, dyspnea, increased purulent sputum and fluid retention in lungs

Specific treatments prescribed for various LRTI observed in the study were **Antibiotics** like Ceftriaxone, Clindamycin, Piperacillin + Tazobactam, Levofloxacin and Amoxicillin + Clavulanate. **Bronchodilators** which include Deriphyllin, and inhalational drugs such as Salbutamol, Budesonide, Ipratropium and Albuterol were given through Nebulizer. Supplemental oxygen was given as a support

Major risk factors were found to be weakened immune system (76 cases), followed by smoking and alcohol abuse (60 cases), male gender (60 cases), age below 60 years (72 cases) and metabolic disorders like diabetes mellitus (25 cases).Hence, immune status , addictions , gender and age were found to be the frequent risk factors in the study.

A total of 154 cases were reported to be recurrent out of 300 cases. These cases had previously been diagnosed with respiratory infections and symptoms such as COPD, Bronchiolitis, Tuberculosis, Pulmonary koch's, Covid-19, Bronchial Asthma and emphysema along with other Illness history such as Diabetes mellitus, hypertension and chronic kidney disease.
Sputum examination was carried out in most of the cases and received specific treatment, while in other final diagnosis was based on clinical and radiological (X-Ray and Computerised Tomography (CT) scan) findings and were given empirical treatment. Hence, there is a need to confirm aetiological diagnosis so as to improve management of LRTI through culture tests so that the specific treatment can be opted and recurrence is avoided.

CONCLUSION:

In the present study 300 cases of Lower Respiratory Tract Infection are recorded in a period of six months, and there is predominance of LRTI in males. There is Preponderance of LRTI in patients below 60 years of age.
In our study there is predominance of Typical Pneumonia (Nos.126) over other LRTIs. Empirical treatment was given by physicians based on clinical assessment and radiological studies in most of the cases.

Commonly prescribed drugs for LRTI are Antibiotics like Amoxicillin + Clavulanate, Ceftriaxone, Levofloxacin and Bronchodilators such as Deriphyllin with supportive treatment given through Nebulizer using , Salbutamol, Albuterol, Budesonide, Ipratropium and supplemental oxygen.

Weak immune systems and addiction like smoking and alcohol abuse are the major risk factors for LRTI.A total of 76 recurrent cases were identified in these studies.
Most common Clinical manifestations were found to be cough, Shortness of breath, fever and fluid retention in lungs. Sputum examination was carried out in about 119 cases, with reports of identification of causative microorganisms/ culture sensitivity report. Streptococcus Pneumoniae is seen in majority of the cases and strains of other gram positive cocci, certain gram positive and gram negative bacilli in other cases.

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