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## Research Article

### STUDY OF CLINICAL AND AEROBIC BACTERIOLOGICAL (NON-MYCOBACTERIAL) PROFILE OF LOWER RESPIRATORY TRACT INFECTION IN ADULTS

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#### ABSTRACT

Lower respiratory tract infection due to bacteria is a treatable but dreadful condition. In this study, main stress was to identify the common aerobic (non-mycobacterial) bacteria causing this infection and submit a clinical presentation of the disease. Total 56 non-immunocompromised adult patients were enrolled by systematic sampling & investigated. The important conclusions of the study include that COPD & past history of TB is important association, Streptococcus pneumoniae is the most commonly found organism & sputum culture should be done in all cases of LRTI.

##### Key Words:

Lower respiratory tract infection,  
sputum, bacteria

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#### INTRODUCTION

The lower respiratory tract infections (LRTI) include laryngotracheitis, bronchitis, bronchiolitis and pneumonia. However, bronchiolitis does not occur in adult<sup>1</sup>. LRTIs are very common, with an incidence in world population of 40-50 per 1000<sup>2</sup>. Every year approximately 7 million people die worldwide as a direct consequence of acute and chronic respiratory infections<sup>3</sup>. It is estimated that Bangladesh, India, Nepal and Indonesia together account for 40% of the global burden of mortality due to respiratory infections. The incidence of LRTI is similar in developed and developing countries. However, while the incidence of pneumonia in developed countries may be as low as 3-4%, its incidence in developing countries range between 20-30 %<sup>4</sup>. Bacterial lower respiratory tract infection is a treatable but dreadful condition. Physicians of tropical countries have to deal with a large number of LRTI patients. In our opinion there is paucity of related study published from India, so the present study was undertaken to assess the clinical pattern of infection and to detect the aerobic (non-mycobacterial) bacteria by sputum culture so as to get a guideline for therapy.

#### MATERIALS & METHODS

56 non-immunocompromised adult patients attending the Tropical Medicine OPD and admitted in Carmichael Hospital,

STM, Kolkata- 73 were enrolled by systematic random sampling and investigated fulfilling the following inclusion criteria:

History of cough with any one of the following: development or worsening of dyspnoea (difficulty in breathing) or production of purulent sputum.

Signs in the chest examination to suggest pneumonia. (Dullness on percussion, bronchial breath sound, whispering pectoriloquy, coarse crepitation)

Severity features like: Increased respiratory rate (30/min.), low blood pressure (systolic < 60mm Hg, diastolic < 90mm Hg), new onset confusion.

Known HIV positive individuals, children (0-12 yrs), tuberculosis patients were not included in our study.

Every patient was studied by thorough history and clinical examination, complete blood count, direct examination of sputum smear by gram stain, aerobic non-mycobacterial bacteriological culture, blood culture, chest X-ray.

#### RESULTS AND ANALYSIS

All of our findings are presented in the following tables:

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Associated Illness **Table 1**

Comorbidity	Number of Patients
C O P D	15
Asthma	8
Past history of Tb	11
Diabetes	16
High blood pressure	18
Valvular heart disease or congestive heart failure	3

Clinical Data **Table 2**

	Number of Patients	Percentage
<i>Presentation</i>		
Cough	54	96.43
Fever	45	80.36
Purulent sputum	40	71.43
Chest pain	35	62.5
Shortness of breath	32	57.14
Altered mental status	6	10.71
<i>General Survey Findings</i>		
Pallor	23	41
Cyanosis	13	23.21
Palpable lymph node	15	26.8
Tachycardia	31	55.36
Bradycardia	11	19.64
High B.P.	18	32.14
Low B.P.	8	14.3
High respiratory rate	23	41
Clubbing	13	23.21
Oedema	9	16
Subnormal body temperature	6	10.71
<i>CNS findings</i>		
Confusion	4	7.14
Unconscious	2	3.57

Respiratory System Findings **Table 2** contd.

	Number of Patients	Percentage
<i>Trachea</i>		
Central	51	91
Opposite	5	8.93
<i>Movement of chest</i>		
Diminished	12	21.43
Normal	29	51.8
Indrawing	15	26.8
<i>Percussion note</i>		
Dull	11	19.64
<i>Breath sounds</i>		
B/l vbs	39	69.64
Diminished vbs	10	17.86
Bronchial	10	17.86
Whispering pectoriloquy	9	16
Rhonchi	36	64.23
Crepitations	51	91
<i>Signs of complications</i>		
Pleural effusion	7	12.5
Empyema	2	3.57

Result of Aerobic Bacteriological Conventional Sputum Culture **Table 3**

Single Organism	Number of Patient	Percentage
Streptococcus pneumoniae	9	16.07
Staphylococcus aureus	3	5.36
Klebsiella spp.	2	3.57
Haemophilus influenza	2	3.57
Pseudomonas aeruginosa	1	1.8
Escherichia coli	1	1.8
Mixed Organism		
Klebsiella + Streptococcus	3	5.36
Streptococcus + Pseudomonas	2	3.57

Radiologic Findings **Table 4**

Chest Radiograph	Number of Patient	Percentage
Normal Finding	24	42.9
Hyper Inflated	6	10.71
Calcification	4	7.14
Consolidation	14	25
Patchy Consolidation	7	12.5
Blunt Cp Angle	10	17.9
Mediastinal Lymphadenopathy	3	5.36

## DISCUSSION

Lower respiratory tract infection is known to occur in all part of society. In this study 60.71% patients were male. High incidence of male patients is no different from other studies of third world countries.

Studying the age distribution it is clear that LRTI incidence increases with ageing. The average age of presentation in our study was 42.56 years. In a study on LRTI by the Microbiology department of Christian Medical College & Hospital, Ludhiana the mean age of presentation was 40 years<sup>5</sup>. Comorbidities like COPD, hypertension were common in elderly people. So as per the BTS guideline (CURB-65) old age is an important factor guiding the LRTI management<sup>6,7</sup>. Similar data was observed in a South African study<sup>8</sup>.

Cigarette smoking was clearly associated with high incidence (about 65% in our study) of LRTI which was also observed by Baik I *et al*<sup>9</sup>. COPD was present in 15 (27%) patients. It is a common risk factor for LRTI. Infection is an important culprit for acute exacerbation of COPD. Most of the COPD patients in our study were smoker, alcoholic and elderly people. As per the culture report the etiology of LRTI was not different in COPD patients. A Spanish multicentre study by Torres A *et al* also observed similar fact<sup>10</sup>.

Half of our study population took some antibiotic before coming to us. A study from Turkey calculated the incidence of prior antibiotic therapy in their country which was 36%<sup>11</sup>. So it is much higher in our study (overall 50%).

Almost all patients had cough as their presenting symptom. Fever was evident in 80% of population. Pallor was seen in 41% patients and clubbing in 23% of patients. A respiratory rate > 30/min. and tachycardia were found in 41% and 55% patients respectively. A large number of patients (20%) had bradycardia. Sputum culture showed growth of bacteria in only one of them. Relative bradycardia with no growth in sputum culture could be due to viral infection or atypical pneumonia<sup>12</sup>. There were 18 patients (32%) with a hemoglobin level > 12gm/dl in our study. This was unusual in a poor country like India. COPD is chronic hypoxic condition leading to stimulation of erythropoietin production. This leads to excessive production of hemoglobin. Among these 18 patients 8 patients had an associated COPD. This high hemoglobin could be due to associated COPD.

LRTI produces neutrophilic leukocytosis. Nearly 55% of the patients had leukocytosis. Growth was detected in 41% of patient's sputum on conventional sputum culture, of which 9% had mixed flora and 32.1% had single organism. The percentage of multiple organisms was similar in a study from Turkey published in 2004 where it was 10%. Detection of multiple organisms is important. Patients with mixed flora had

a severe course of illness. The most commonly detected single organism is *Streptococcus pneumoniae* (16%). It was detected in all groups like diabetics, smokers, alcoholics, patients with COPD.

Radiologically, we proceeded with chest X-ray P/A view in all patients. 43% patients had a normal X-ray. Classical consolidation was found in 14 patients of which 9 patients had a positive microbiological finding. All kind of organism can give rise to consolidation. Sputum culture detected a growth in 64.29% of patients having consolidation in chest X-ray. So chance of getting organism in sputum is high in patients showing consolidation in chest X-ray.

We did not get any growth in any culture in 59% patients. The cause could be prior antibiotic therapy, viral pneumonia, infections by anaerobes or atypical organisms that were difficult to grow by conventional aerobic bacteriological culture like *Mycoplasma*, *Chlamydia*, *Legionella* etc. The study by CMC, Ludhiana in 2006 used serology for *Mycoplasma* and *Chlamydia* for all patients. They detected the occurrence of atypical pneumonia in 34% cases. A study by Dey AB et al from AIIMS, New Delhi in 2000 suggested that the prevalence of *Mycoplasma* was around 35%<sup>13</sup>

So, our impression from the study is that COPD and past history of tuberculosis is important association of LRTI.

The severity criteria given by BTS guideline i.e. CURB-65 is useful in a set up like us. It helps to recognize the severely ill patients early. Bradycardia is found in a group of patients (19.64%). These patients may be harbouring atypical pneumonia. Empyema is rare, but more commonly associated with *Staphylococcus*.

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