

## Study of Clinical and Etiological Profile of Community Acquired Pneumonia with Special Reference to Atypical Pneumonia

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### Abstract:

**Background and Objectives:** Pneumonia is a leading cause of morbidity and mortality, especially in developing countries. The cause of community acquired pneumonia (CAP) is often difficult to establish. The most effective methods, especially for the diagnosis of atypical pathogens, are often invasive and cannot always be justified. The Asian region being very diverse, existing British and American guidelines cannot and should not be blindly transposed to this region without some idea of local prevalence. To study in detail the clinical profile and bacteriological flora of patients with community acquired pneumonia coming to our hospital. To detect proportion of atypical pathogens among Community acquired pneumonia patients.

**Methods:** 122 patients presenting to GMCH, Bettiah. Study duration of Two years. who satisfied the diagnosis of Community Acquired Pneumonia (CAP) as per the British Thoracic Society were included in this study. After sputum culture, blood culture and serological evaluation they were grouped as having typical and atypical pneumonia. Appropriate statistical analysis was done using the Chi-square test.

**Conclusion:** The proportion of typical and atypical pathogens found in our study is 40.2% and 20.5% respectively. The differentiation of typical and atypical organisms by clinical evaluation alone is difficult. Hence appropriate serological investigation and prompt treatment is important to prevent complications and mortality.

**Keywords:** Community acquired pneumonia, aetiology, typical and atypical pathogens.

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### Introduction

Community acquired pneumonia (CAP) is one of the leading causes of morbidity and mortality in the world and yet its true incidence is uncertain as most of the cases are not reported. According to WHO data, each year three to four million people, largely children and elderly die from pneumonia worldwide. [1] Pneumonia is ranked as the sixth leading cause of death in the United States. The problem is much greater in developing countries where pneumonia is the most common cause of hospital attendance in adults. [2] The cause of CAP is often difficult to establish. The most effective methods, especially for the diagnosis of atypical pathogens, are often invasive and cannot always be justified. CAP is divided into typical and atypical so as to predict the likely pathogens and thus facilitate the selection of the appropriate empirical treatment. [3] Typical pneumonia are those caused by organisms such as *Streptococcus pneumoniae*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Haemophilus influenzae*. History, physical examination and chest radiography have a modest capacity to detect these cases. [4] A definitive diagnosis needs microbiological documentation, but most cases remain undetected by the currently available tests. The importance of the atypical pneumonias is not related to their frequency

(approximately 15% of CAPs) [4], but due to their difficulty of diagnosis and their non responsiveness to recommended beta-lactam therapy. [5] Rational antibiotic guidelines can be made only if studies are done in different parts of the country to know the regional variations in etiology of CAP. [6]

### Objectives

To detect proportion of atypical pathogens among Community acquired pneumonia patients.

### Material and Methods

122 patients presenting to GMCH, Bettiah. Study duration of Two years. who satisfied the diagnosis of Community Acquired Pneumonia (CAP) as per the British Thoracic Society were included in this study. After sputum culture, blood culture and serological evaluation they were grouped as having typical and atypical pneumonia.

Patients satisfying the inclusion criteria and admitted in the Department of Medicine and Department of Pulmonology of GMC Hospital, Bettiah, West Champaran were included in the study. The study enrolled patients included 122 cases of community acquired pneumonia.

The diagnosis of CAP was considered in any patient who had newly acquired respiratory symptoms (cough, sputum production, and/or dyspnea), especially if accompanied by fever and auscultatory findings of abnormal breath sounds and crackles and at least one opacity on chest radiography[3]. Data was collected in a pre-requisite proforma. These patients were subjected to sputum and blood culture following detailed history, examination and blood investigations including complete blood count, renal function tests and liver function tests. Chest radiograph was taken for all patients. In addition to these investigations, patients with a probable diagnosis of atypical pneumonia as per Japanese Thoracic Society Guidelines [2] had Indirect Immunofluorescence assay done. Based on the etiological agent, patients were categorized as cases of typical and atypical pneumonia. The other patients were categorized as having undiagnosed pathogen.

### Inclusion Criteria

All patients aged 18 years and above with clinical and radiological features compatible with Community acquired pneumonia

### Exclusion Criteria

- Previous Hospital admission in the last 1 week.
- Patients with ventilator associated or hospital acquired pneumonia.
- Patients with radiographic evidence of tuberculosis, pulmonary infarction, congestive cardiac failure and Lung cancer.

### Results

122 patients with Community Acquired Pneumonia were divided into two groups: those with typical pneumonia and those with atypical pneumonia to study the clinical profile.

**Table 1: age distribution of patients studied**

Age In Years	Percentage		
	Total	Males	Females
<30	4.1 %	2.8 %	1.3 %
31-40	15.6 %	10.7 %	4.9 %
41-50	23.8 %	16.4 %	7.4 %
51-60	16.4 %	11.3 %	5.1 %
61-70	18.8 %	13.0 %	5.8 %
71-80	12.3 %	8.5 %	3.8 %
81-90	9 %	6.2 %	2.8 %
<b>Total</b>	<b>100 %</b>	<b>68.9 %</b>	<b>31.1 %</b>

**Table 2: classification of pneumonia as per aetiology**

Classification	Percentage
Typical	40.2 %
Atypical	20.5 %
Undiagnosed	39.3 %
<b>Total</b>	<b>100 %</b>

Based on sputum and blood culture, and Indirect Immunofluorescence assay, patients were classified as having typical and atypical pneumonia. Out of the 122 patients, 40.2% of patients were found to have

typical organisms causing pneumonia and 20.5% had atypical organisms. In 39.3 percent of the cases, no etiological organism could be demonstrate.

**Table 3: alcoholism and smoking status**

	Classification		P value
	Typical Pneumonia	Atypical pneumonia	
	(n=49)	(n=25)	
Alcoholism	16.3 %	8 %	0.119
Smoking	49 %	40 %	0.742

typical pneumonia and 56 percent of atypical pneumonia had productive cough. Expectoration was significantly more in typical pneumonia. Dyspnea was significantly more common in patients with typical

pneumonia (79.6%) than in atypical pneumonia. Other symptoms included chest pain (27%), hemoptysis (6.6%) and upper respiratory tract symptoms (6.6%).

**Table 4: Clinical presentation: extra pulmonary symptoms**

	Classification		
	Typical pneumonia (n=49)	Atypical pneumonia (n=25)	P value
Altered Sensorium	12(24.5%)	2(8%)	0.046*
Headache	5(10.2%)	12(48%)	0.001**
Myalgia	26(53.1%)	19(76%)	0.020*
Gi Symptoms	8(16.3%)	10(40%)	0.054*

Symptoms of altered sensorium was significantly more in patients with typical pneumonia (24.5%) than in atypical pneumonia (8%). However atypical pneumonia was significantly more associated with symptoms of headache (48%), myalgia (76%) and Gastrointestinal symptoms (40%).

**Table 5: comparison of clinical findings**

Clinical Findings	Classification		
	Typical pneumonia (n=49)	Atypical pneumonia (n=25)	P value
Cyanosis	3(6.1%)	0(0%)	0.532
Crepitation	38(77.6%)	19(76%)	0.254
Bronchial Breath Sounds	9(18.4%)	3(12%)	0.034*
Hepatomegaly	1(2%)	2(8%)	0.503
Splenomegaly	1(2%)	3(12%)	0.17

In this study, one of the most common clinical examination findings was presence of crepitation. 77.6% of patients with typical pneumonia and 76% of patients with atypical pneumonia had crepitations. Bronchial breath sounds were present in 18.4% of cases of typical pneumonia as opposed to only 3 cases of atypical pneumonia

**Table 6: final outcome according to classification**

Outcome	Classification		
	Typical pneumonia	Atypical pneumonia	Undiagnosed
Recovered	91.8%	100%	95.8%
Death	8.2%	0%	4.2%
Total	100%	100%	100%

In this study 45 (91.8%) patients with typical pneumonia and 100% of patients with atypical pneumonia recovered and were discharged. 4(8.2%) patients with typical pneumonia died. There were no deaths amongst patients with atypical pneumonia.

## Discussion

Community-acquired pneumonia (CAP) is a major cause of morbidity and mortality, especially among the elderly and in patients with chronic diseases. Owing to the various etiological agents that cause CAP, a few of which require specific methods for isolation, it is important to study the local prevalence of these organisms to devise rational antibiotic guidelines. In our study we have analyzed 122 patients satisfying the diagnosis of CAP as per British Thoracic Society Guidelines. Out of these patients 31 patients had clinical features consistent with a probable diagnosis of atypical pneumonia. On these patients we performed indirect immunofluorescence assay. For the final analysis, we categorized these patients into those with typical and atypical pneumonia based on the etiological agent identified by sputum and blood cultures, and indirect immunofluorescent assay. The mean age of the patients in our study was 56.07±16.52. 39.9% of patients were found to be more than 60 years of age. Similar age distribution was seen in a study by S Bansal et al, where 42% of 70 patients enrolled in the study belonged to sixth and seventh decade of

life. In a study done by Aroma et al, the mean age group suffering from CAP was 40 years with 20.17% of the cases having age greater than 70 years. A study done in Finland found that the rate of CAP increased for each year of age over 50 years. [7] Pneumonia is a major threat to older people, with an annual incidence for non-institutionalized patients estimated at between 25 and 44 per 1000 population, up to four times that of patients younger than 65 years. An increased incidence of pneumonia in elderly may be due to factors such as impaired mechanical clearance of airways, ineffective mucociliary clearance, decreased effective cough due to weaker respiratory muscles, loss of elastic recoil of lungs, defects in humoral and cell-mediated immunity. They are also more prone for infections as a result of underlying comorbidities. [8]

In our study, 84(68.9%) were males, and 38 (31.1%) were females. [9] This sex distribution is similar to study conducted by Bilal et al, where males 35 (70%) were more affected than females 15 (30%). [9] This may be attributed to increased rates of alcoholism and smoking in males and due to resultant comorbid conditions, such as chronic obstructive pulmonary disease. In our study, 86.9% of

patients did not yield any organism on blood culture. Of the positive blood cultures, *Streptococcus pneumoniae* was isolated in 5.7% of the cases, *Klebsiella pneumoniae* in 2.5% of the cases, *Staphylococcus aureus* in 2.5% of cases, *Hemophilus influenzae* in 1.6% of the cases, *Pseudomonas aeruginosa* in 0.8% and *E. coli* in 1.6% of the total 122 cases. Culture positivity rates were similarly low in other studies such as the study by Oberoi et al where blood culture was positive in only 22% of the cases [10]. Much lower rates were observed in another study done by Shah BA et al, where blood culture positivity was only 6%. Yet another study done by Dunalisio et al in Brazil showed positive blood culture result only in 8.2% of cases [11]. Such low rates of positive cultures in various studies emphasizes the difficulty in diagnosing the etiology of pneumonia. We performed Indirect immunofluorescence assay in patients with possibility of atypical pneumonia. The test was negative in 4.9% (2) of cases. The most common atypical organism that was isolated was *Mycoplasma pneumoniae* in 7.4% of cases and *Legionella* in 5.7% of cases. *Coxiella burnetii* was diagnosed in 3.3% of cases, *Chlamydia psittaci* in 2.5% of cases and *Influenza virus* in 1.6% of total cases. Through their study, Bansal S et al found that the mortality from pneumonia is high particularly in the elderly and in patients with associated co-morbid conditions. The mortality in their study was 11% which is higher than our study. [12] Comparing these results with a British Thoracic Society multi-centric study we found a surprisingly low mortality of 5.7%. [3,2] In our study we have found that a differentiation of typical and atypical pneumonia cannot be made based on clinical features alone. This is substantiated by similar findings in several other studies. One of the demerits of the study is that serological investigation for atypical pneumonia was performed only in patients who satisfied the Japanese Respiratory Society Guidelines. This may have caused us to miss several of the mixed infections. Also atypical pneumonia may also mimic typical pneumonia in clinical features and laboratory findings; making diagnosis further more difficult. Hence specific investigations such as serology are required for accurate diagnosis and treatment especially of atypical organisms.

### Conclusions

Community-acquired pneumonia is a common and serious problem encountered in clinical practice. The proportion of typical and atypical pathogens found in our study is 40.2% and 20.5% respectively. The differentiation of typical and atypical organisms by clinical evaluation alone is difficult. Hence appropriate serological investigation and prompt treatment is important to prevent complications and mortality.

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