

# Clinical, Bacteriological and Radiological Study of Community Acquired Pneumonia - A Hospital based Study

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## ABSTRACT

**Introduction:** Pneumonia is one of the leading causes of death and morbidity, both in developing and developed countries and is the commonest cause (10%) of hospitalization. CAP mortality is variable depending on the site of care; it is less than 1% in the outpatient setting, around 5% in inpatients not requiring ICU care, up to 25% in intubated patients, and near 50% in ICU patients requiring vasopressors. The aim of this study was to analyse the mode of presentation of pneumonias, its clinical features, bacteriological and radiological features for the early detection of disease, the causative agent and to find out the complications.

**Material and methods:** This was a prospective study which included total 50 cases. Patient with acute onset of fever associated chills and rigors and patients with chest pain, breathlessness and cough with expectoration were selected as pneumonia patients. Blood for WBC Count and Differential Count were done. Sputum for gram stain, AFB, and Culture were done. Chest X-ray PA view were performed to know the site of consolidation. ELISA was also done to rule out HIV infection.

**Results:** The age group in this study group varied from 18-85 years, most of them were between 30- 70 years of which 56.0% were <60 years. The incidence of CAP was most common in men (74%) compared to female (26%). The associated diseases in this study were COPD (22.0%). The commonest presenting symptoms were fever (100%), cough (100%), expectoration (92%); other symptoms include dyspnoea (78%), and chest pain (62%).

**Conclusion:** In our study prognosis was good with mortality of 8%, about 4 patients died due to respiratory failure. Most of the patients recovered without any complications, expect in patients with COPD, symptoms were not completely reduced and were advised for follow-up.

**Keywords:** Community Acquired Pneumonia, Radiological, Clinical, Bacteriological, Prospective

microorganisms.<sup>2</sup>

Pneumonia signifies pulmonary as an inflammatory process. The most significant striking feature of this is consolidation. Community acquired pneumonia (CAP) is an acute illness acquired in the community with symptoms suggestive of LRTI. Together with presence of a chest radiograph of intrapulmonary shadowing this is likely to be new and has no clear alternative cause.<sup>3</sup>

A clinical diagnosis of pneumonia can usually be readily established on the basis of signs, symptoms, and chest radiographs, although distinguishing CAP from conditions such as congestive heart failure, pulmonary embolism, and chemical pneumonia from aspiration is difficult at times. Unfortunately, defining an etiologic agent is much more challenging.

Pneumonia is one of the leading causes of death and morbidity, both in developing and developed countries and is the commonest cause (10%) of hospitalization.<sup>4,5</sup>

CAP mortality is variable depending on the site of care; it is less than 1% in the outpatient setting, around 5% in inpatients not requiring ICU care, up to 25% in intubated patients, and near 50% in ICU patients requiring vasopressors. The mortality of CAP in hospitalized patients was found to be 14% but increased up to 20% to 50% in patients who required intensive care. About 36% of patients who have CAP required admission to the ICU and despite advances in antimicrobial therapy and supportive measures the mortality in this group of patient's ranges from 21% to 58%.<sup>6</sup>

Advanced age has been associated with risk for acquiring severe CAP, particularly for those in whom comorbid conditions are also present. It is important to highlight the recent evidence associated with certain comorbid conditions, such as chronic obstructive pulmonary disease (COPD), alcohol abuse, renal failure, chronic heart failure, diabetes mellitus, coronary artery disease, malignancy, chronic neurologic disease, and chronic liver disease.<sup>7</sup>

## INTRODUCTION

Pneumonia is a disease known to mankind from antiquity. Pneumonia is an acute inflammation of the pulmonary parenchyma that can be caused by various infective and non-infective origins, presenting with physical and radiological features compatible with pulmonary consolidation of a part or parts of one or both lungs.<sup>1</sup>

The word 'pneumonia' is used in medical practice; it almost always refers to a syndrome caused by acute infection, usually bacterial, characterized by clinical and/or radiographic signs of consolidation, of a part or both lungs. However, the use of the term has been greatly extended to include nonbacterial infection of the lungs that are caused by a wide variety of

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In the past few years, there has been interest in identifying certain risk factors associated with mortality even in patients who do not have comorbid conditions. These risk factors include signs of disease progression, multi-lobe lung disease, need for mechanical ventilation, and need for vasopressors. In addition, these patients have the greatest severity of the disease, which leads to higher mortality.<sup>8</sup>

The true incidence of pneumonia acquired in the community is unknown and undoubtedly many pneumonic episodes are treated by primary-care physicians as 'lower respiratory tract infection' or 'bronchiolitis' without recourse to chest radiographs. The need for this study is to understand the mode of presentation of pneumonia, its clinical, bacteriological and radiological features for the early detection of disease and also to assess the causative agents and the complications related to the disease.<sup>9</sup> Hence, the aim of the present study was to assess the clinical, bacteriological and radiological features of community acquired pneumonia among the patients admitted in the hospital.

## MATERIAL AND METHODS

This was a prospective study which was conducted in Basappa Memorial Hospital, Mysore for a period of two years from August 2009 to August 2011. The study included total 50 cases. Patient who presented with acute onset of fever associated chills and rigors. Patients with chest pain, breathlessness and cough with expectoration were selected as pneumonia patients.

A detailed clinical examination for all the patients selected were subjected to make a provisional diagnosis of Community Acquired Pneumonia (CAP) followed by the below mentioned investigations. Blood for WBC Count and Differential Count were done. Sputum for gram stain, AFB, and Culture were done. Chest X-ray PA view were performed to know the site of consolidation. ELISA was also done to rule out HIV infection.

All adult patients that were admitted in Basappa Memorial Hospital, above 18 years of age and who were diagnosed to have community acquired pneumonia were included in this study. Patients below 18 years of age with aspiration pneumonia, hospital acquired pneumonia and ventilator acquired pneumonia were not included in this study. Patients who were immune deficient with community acquired pneumonia were also excluded from the study.

## STATISTICAL ANALYSIS

The Statistical software namely SPSS (version 16.0) and Minitab (version 11.0) were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc. The descriptive procedure showed univariate summary statistics for several variables in a single table and calculates standardized values (z scores).

Chi-square and Fisher's exact test were used to test the significance of percentage of various parameters between younger and elder age group CAP patients. Odds Ratio (OR) was used to find the strength of relationship of clinical, radiological and bacteriological presentation. A p value of

0.05 was considered to be statistically significant.

## RESULTS

The study group consisted of 50 patients. The age group in this study group varied from 18-85 years, most of them were between 30- 70 years of which 56.0% were less than 60 years and 44% were elderly of more than 60 years. The age group in this study group varied from 18-85 years, most of them were between 30- 70 years of which 56.0% were less than 60 years in that 18 patients were males and 10 patients were females, and 44% of the study population belong to more than 60 years of that 19 patients were males and 3 patients were females (Table no. 1).

Almost all the patients had fever, cough with expectoration (100%); majority had chest pain (62%) and dyspnoea in 78%. Dyspnoea was significantly more common in elderly CAP patients (100%) ( $p < 0.001$ ) and chest pain was more common in elderly CAP patients (72.7%) and it was more significant with CAP ( $p = 0.090$ ) (Table no. 2).

The CAP was significantly more common in patients with COPD and it was associated with 11 patients (22%) of the study population. On systemic examination, there were signs of consolidation in all among the study group (100%) and about 46 patients (92%) had adventitious sound like crackles, etc. Mild leukocytosis was seen in patients with CAP and neutrophils, leukocytosis was the significant findings in this study (Table no. 3, 4 and 5).

Sputum for AFB was negative, gram-positive were more common (54%) and gram-negative was about 38%. About 8% accounted for mixed. Sputum culture report showed streptococcal pneumonia was more common which constituted about 34%, staphylococci about 20% pseudomonas 6%, Klebsiella accounted about 34%, E. coli 2%, Actinibacter 2% and mixed constituted 8% in this study (Graph no. 1 and 2).

CAP associated with COPD constituted 22% right middle and lower lobe was more common constituting about 38%. right middle lobe about 16%, right lower lobe was seen in 8%, right paracardiac 4% and left lower lobe 14%, left middle and lower lobe 14% and bilateral in 6% and there was no involvement of right and left upper lobe (Graph no. 3).

The incidence of CAP was most common in men (74%) compared to female (26%). Out of 50 patients, 46 patients recovered well without complications and another 4 patients had respiratory failure and died (Graph no. 4 and 5).

## DISCUSSION

CAP is a common medical problem in tropical countries like India. The age group in this study group varied from 18-85 years, most of them were between 30- 70 years of which 56.0% are below 60 years and 44% are elderly above 60 years. It is well documented that pneumonia is commonly occurring disease in the community and its incidence rises sharply with extremes of age.<sup>11</sup>

In this study group patients below 18 years were not included, but majority of patients were middle aged and elderly. In a study conducted by Dey et al, reported that

Age in years	Male		Female		Total	
	No	%	No	%	No	%
<20	1	2.7	0	0	1	2.0
21-30	2	5.4	1	7.7	3	6.0
31-40	4	10.8	2	15.4	6	12.0
41-50	4	10.8	4	30.8	8	16.0
51-60	7	18.9	3	23.1	10	20.0
61-70	11	29.7	2	15.4	13	26.0
71-80	5	13.5	0	0	5	10
>80	3	8.1	1	7.7	4	8.0
Total	37	74.0	13	26.0	50	100

**Table-1:** Shows the distribution of data based on age group among the study subjects

Clinical Features	Age <60 years (n=28)		Age >60 years (n=22)		Total (n=50)		Chi-square	p value
	No	%	No	%	No	%		
Fever	28	100.0	22	100.0	50	100.0	-	.000 (s)
Cough	28	100.0	22	100.0	50	100.0	-	.000 (s)
Expectoration	26	92.9	20	90.9	46	92.0	35.28	.000 (s)
Dyspnoea	17	60.7	22	100.0	39	78.0	15.68	.000 (s)
Chest pain	15	53.6	16	72.7	31	62.0	2.88	.090 (s)

**Table-2:** Shows the distribution of data based on clinical features among the study subjects

Risk Factors	Age <60 years (n=28)		Age >60 years (n=22)		Total (n=50)		Chi-square	p value
	No	%	No	%	No	%		
Hypertension	2	7.14	3	13.6	5	10.0	32.00	.474
DM	5	17.9	4	18.2	9	18.0	20.48	.976
PTB	-	-	-	-	-	-	-	-
COPD	3	10.7	8	36.4	11	22.0	15.68	.030 (s)
Chest pain	15	53.6	16	72.7	31	62.0	2.88	.090 (s)

**Table-3:** Shows the distribution of data based on risk factors among the study subjects

Signs	No. of pts.	Percentage (%)
VF	50	100.00
BBS	50	100.00
VR	50	100.00
WP	50	100.00
Advent Sounds (ADS)	46	92.0

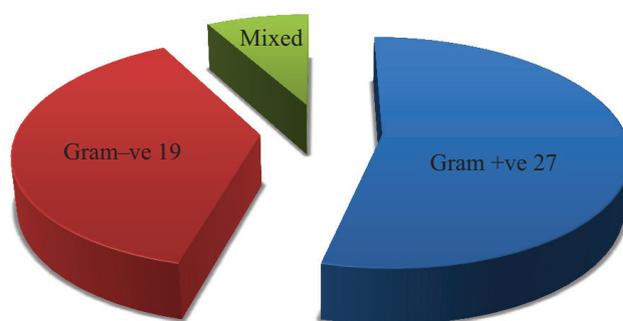
**Table-4:** Shows the distribution of data based on signs among the study subjects

Haematological Parameters	Mean	SD
Haemoglobin	12.17	1.80558
Neutrophils	66.12	7.52313
Lymphocytes	27.56	6.22752
Monocytes	3.40	2.10926
Eosinophil's	2.86	1.52543
ESR	20.14	12.8158
RBS	136.5	46.3109
Total Count	9592	3690.24

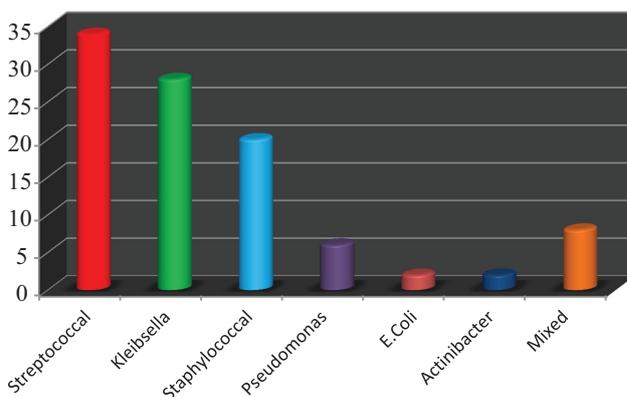
**Table-5:** Shows the distribution of data based on haematological parameters among the study subjects

elderly aged patients are more susceptible to community acquired pneumonia. Our study is also shows that increasing age has more susceptible to community acquired pneumonia and our study is on par with their study.<sup>12</sup>

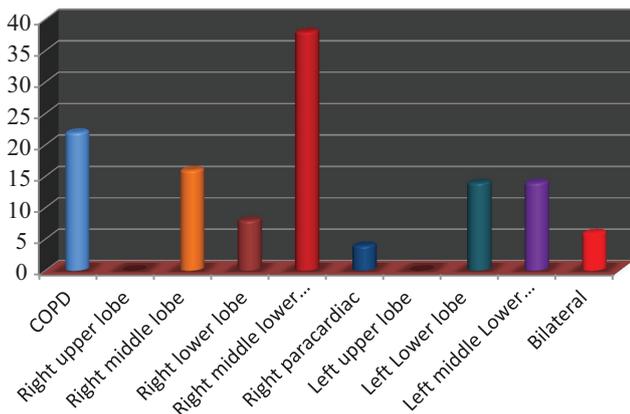
In this study of 50 patients it was observed that majority of patients are males (74%) in comparison to the female



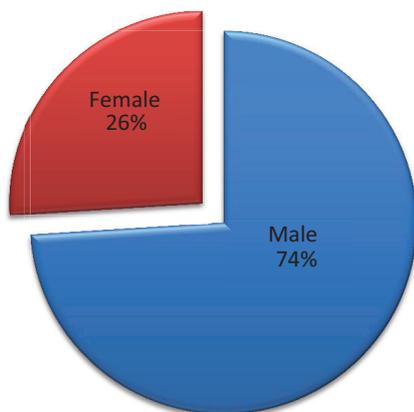
**Graph-1:** Shows the distribution of data based on gram stain report among the study subjects



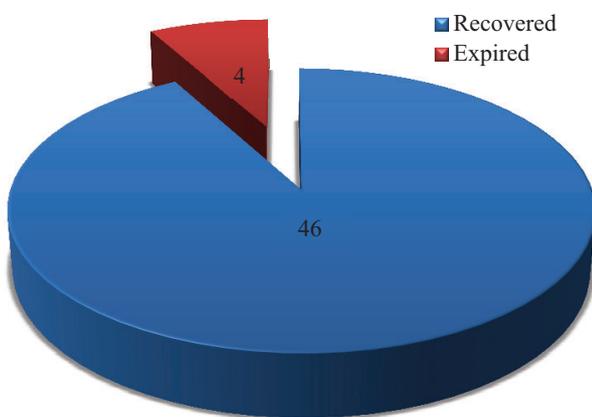
**Graph-2:** Shows the distribution of data based on sputum culture report among the study subjects



**Graph-3:** Shows the distribution of data based on among the study subjects



**Graph-4:** Shows the distribution of data based on gender among the study subjects



**Graph-5:** Shows the distribution of data based on prognosis among the study subjects

population which was 26%. In the study done by Joshua et al in 2003 shows with predominant male involvement of 80% and female 20%. Our study also shows with male predominance of 74% and is at par with their study.<sup>13</sup>

This could be attributed to the well-established fact that cigarette smoking and alcoholism, as well as underlying lung disease e.g. COPD predispose to pneumonia and are more common in developing country like India. In this study group majority of male patients are exposed to one or more of the abovementioned predisposing factors.<sup>14</sup>

In this study 80% of the patients are from urban population

and majority were daily wage workers and manual labourers belonging to low socio-economic status. In a study done by Metlay J P et al showed that urban population with low socioeconomic status has increased incidence of CAP.<sup>15</sup>

The increased frequency of lung infection has been well documented in many epidemiological surveys. This may attributed to environmental pollution, change in the patients habits, like smoking alcoholism etc. In this study majority of patients were from low socio-economic status, which goes well with the epidemiological reviews.<sup>16</sup>

Structural lung diseases and associated diseases e.g. Diabetes altering the local lung defence mechanisms and systemic defence mechanisms, predisposing to acute lung infection had been well-documented. In a study done by Rello J et al and Restrepo M.I et al showed increased incidence of CAP and increased mortality of CAP in COPD patients.<sup>17,18</sup>

Advanced age has been associated with risk for acquiring severe CAP, particularly for those in whom comorbid conditions are also present. In this study 22% of patients had COPD, 18% had diabetes and 10% has hypertension. The COPD patients had altered cellular and structural abnormalities in the lung. The change in the bacterial flora in these patients is well supported by ineffective coughing and advanced age predisposes them to pneumonia.<sup>19</sup>

In this study among the presenting symptoms fever, cough was common 100%, expectoration in 92%, chest pain 62% and dyspnoea was the presenting symptom in 78%. In a study done by Joshua P et al, it was found showed that fever (88%) and cough (92%) has predominant symptoms with expectoration being 65% and dyspnoea with 71%.<sup>13</sup>

In this study, examination of vital data showed that 86% had tachypnea 52% had tachycardia and 88% had high-grade temperature associated with chills and rigors. In a study by Metlay J.P et al found that vital signs, tachycardia, tachypnea and high-grade fever associated with chills and rigors are well known to occur in patients with acute lung infections and more associated with pneumonias.<sup>20</sup>

## CONCLUSION

The haematological investigations showed neutrophil leukocytosis (66.12%) and other parameters were with in normal limits. The sputum examination showed 54% Grams +, 38% Gram – and 8.0% were mixed. Radiology examination showed predominant involvement of right lung with significant involvement of right middle and lower lobe which accounted for 19 patients (38%). The prognosis in this present study is good with 8% mortality rate.

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