



## Bacteriological Spectrum of Community Acquired Pneumonia

### KEYWORDS

Community acquired pneumonia (CAP), Chronic Obstructive Airway Diseases (COPD), Klebsiella.

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### ABSTRACT

**Objectives:** To determine the spectrum of organisms causing community acquired pneumonia (CAP) in patients requiring admission to tertiary care centers.

**Methods:** 100 cases of CAP admitted in tertiary care centre were prospectively studied and the clinical features, risk factors, bacteriological and radiological findings were analyzed.

**Results:** Out of 100 cases, 74% were males, 58% were aged > 50 yrs, COPD was risk factor in 30%, 30% were alcoholics, 6% were Diabetics. Sputum examination revealed Gram +ve organisms in 50% & Gram -ve organisms in 43% of cases and sputum culture was positive for Gram -ve organisms like klebsiella and E.coli in 32% and 11% respectively. Radiological findings were suggestive of bilateral lower lobe involvement in 26% of patients.

**Conclusions:** Male patients with CAP aged >50yrs having risk factors like COPD and alcoholism required admission at tertiary care centers. Sputum examination and culture results in these cases showed preponderance of Gram -ve organisms

### INTRODUCTION:

Community acquired pneumonia is an acute illness acquired in the community with symptoms suggestive of Lower Respiratory Tract Infection together with presence of a chest radiograph of intrapulmonary shadowing which is likely to be new and has no clear alternative cause.<sup>1,2</sup>

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 in adults and children.<sup>3</sup>

More and more newer microbiological agents, some of which are well known and some are very new pathogens have revolutionized the understanding of pneumonia and this led to the wide use of modern antibiotics

In the late twentieth and twenty first century newer microbial agents have emerged, like organisms leading to opportunistic lung infection in patients with HIV infection and in post organ transplant patients.<sup>4</sup> All these have led to the need for understanding of immunological status of the individual.

### AIMS AND OBJECTIVES OF THE STUDY

#### Aims and Objective of the study:

To study the mode of presentation, clinical features, risk factors, the spectrum of organisms causing community acquired pneumonia, its radiological features and to study its complications.

### MATERIAL AND METHODS:

**Source of Data:** The patients diagnosed as Community Acquired Pneumonia (CAP) admitted in Gandhi Hospital, Secunderabad.

### Method of Collection of Data

During study period June-2012 to July-2014, patients diagnosed as Community Acquired Pneumonia (CAP).

**Sample Size:** 100 In-Patients

### Selection Criteria:

#### Inclusion Criteria:

All adult patients (18yrs and above) of both genders, who are recently diagnosed as Community Acquired Pneumonia (CAP).

#### Selection criteria of patient:

Patients presenting with acute onset of fever with or without chills and rigors.

Patients having cough with expectoration, chest pain and breathlessness.

All the patients were subjected for detailed clinical examination to make a provisional diagnosis of Community Acquired Pneumonia (CAP).

- Sputum for Gram stain, AFB, and Culture were done.
- Blood for WBC Count and Differential Count were done.
- Chest X-ray done to know the Site of consolidation.
- Elisa was done to rule out HIV infection.

#### Exclusion Criteria:

Patients with Hospital Acquired Pneumonia, aspiration pneumonia and pneumonia in patients with HIV were excluded.

Ethical clearance was obtained from Gandhi Medical College ethics committee.

**RESULTS AND OBSERVATIONS**

**Study Design**

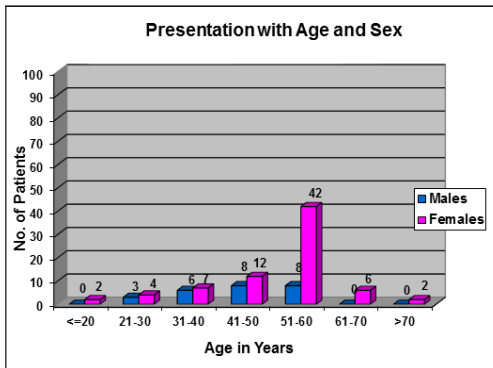
A prospective clinical study consisting of 100 Community Acquired Pneumonia (CAP) patients was undertaken to investigate the pattern of clinical, bacteriological and radiological presentation.

**Table 1**  
**Presentation with Age & Sex**

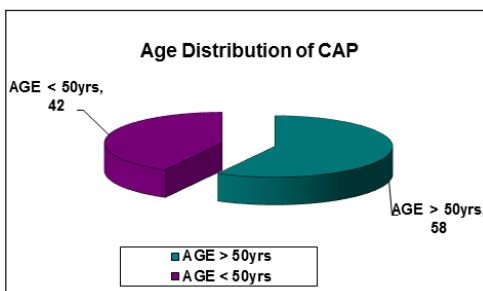
Age in yrs	Females		Males		Total	
	No.	%	No.	%	No.	%
<=20	00	00	02	02	02	02
21-30	04	04	03	03	07	07
31-40	06	06	07	07	13	13
41-50	08	08	12	12	20	20
51-60	08	08	42	42	50	50
61-70	00	00	06	06	06	06
>70	00	00	02	02	02	02

The study group consisted of 100 patients, among whom 74% were males and 26% were females. 58% were aged > 50 years.

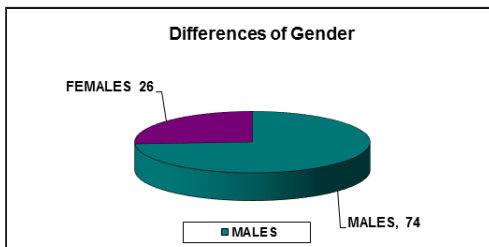
**GRAPH 1: AGE DISTRIBUTION**



**GRAPH 1a – AGE DISTRIBUTION OF CAP**



**GRAPH 1 b : GENDER DIFFERENCES**



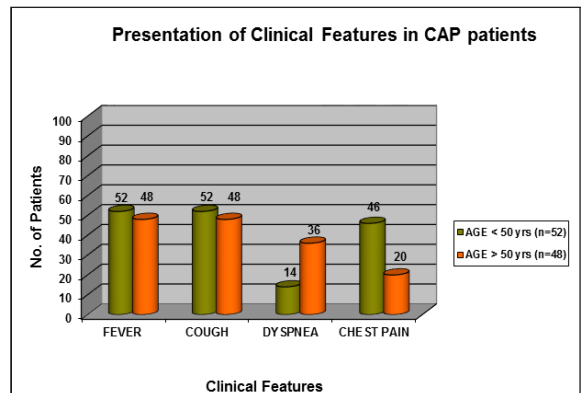
Among 100 CAP patients, 74 were males and 26 were females.

**TABLE 2**  
**PRESENTATION OF CLINICAL FEATURES IN CAP PATIENTS**

CLINICAL FEATURES	AGE < 50 yrs (n=52)		AGE > 50 yrs (n=48)		TOTAL (n=100)	
	No.	%	No.	%	No.	%
FEVER	52	100	48	100	100	100
COUGH	52	100	48	100	100	100
DYSPNEA	14	26.9	36	75	50	50
CHEST PAIN	46	88.4	20	41.6	66	66

Inference:  
Dyspnoea is significantly more common in elderly CAP patients (2.78 times more ) and chest pain is more common in younger CAP patients (2 .13 times more).

**GRAPH 2: CLINICAL FEATURES**

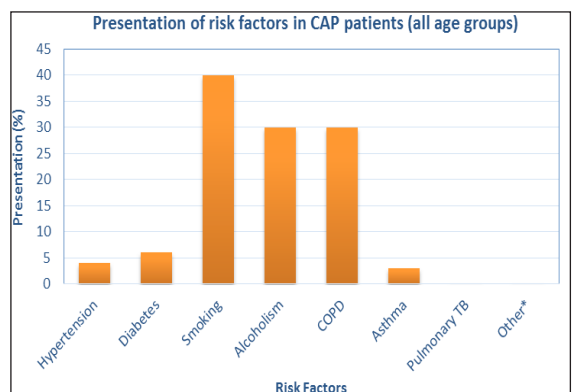


**TABLE 3**  
**PRESENTATION OF RISK FACTORS IN CAP PATIENTS**

RISK FACTORS	Age < 50 yrs (n=52)		Age > 50 yrs (n=48)		Total (n=100)	
	No.	%	No.	%	No.	%
HYPERTENSION	01	1.9	02	4.1	04	04
DIABETES	00	00	06	12.5	06	06
SMOKING	10	19.2	30	62.5	40	40
ALCOHOLISM	5	9.6	25	52.08	30	30
COPD	4	7.6	26	54.1	30	30
ASTHMA	03	5.7	00	00	03	03

The CAP is significantly more common in patients with COPD and who are smokers

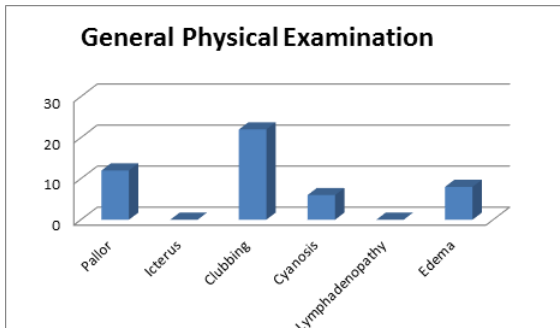
**GRAPH 3: RISK FACTORS**



**TABLE 4**  
**GENERAL PHYSICAL EXAMINATION IN CAP PATIENTS**

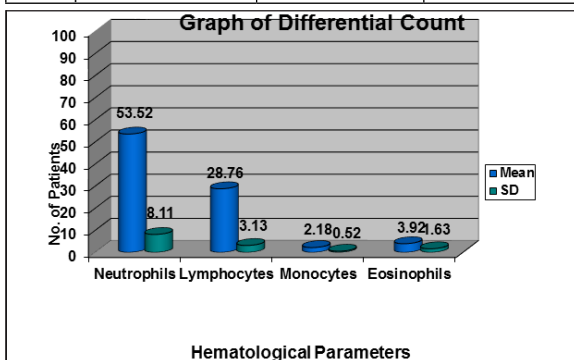
GENERAL PHYSICAL EXAMINATION	Age < 50 years (n=52)	Age > 50 year (n=48)	Total (n=100)
	No.	No.	No.
Pallor	04	08	12
Icterus	00	00	00
Clubbing	04	18	22
Cyanosis	00	06	06
Lymphadenopathy	00	00	00
Edema	00	08	08

**GRAPH ,4: GENERAL PHYSICAL EXAMINATION**



**HAEMATOLOGICAL FEATURES**

Hematological parameters	Mean	SD
Hemoglobin	11.17	1.36
Total Count	7992.60	1442.80
Neutrophils	53.52	8.11
Lymphocytes	28.76	3.13
Monocytes	2.18	0.52
Eosinophils	3.92	1.63



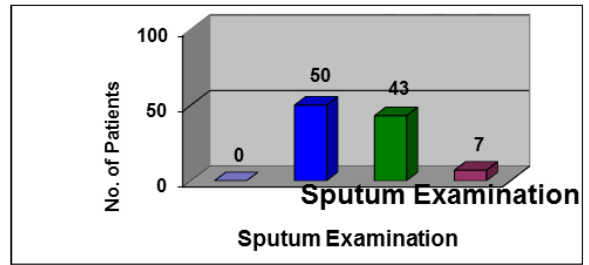
MILD LEUCOCYTOSIS WAS SEEN IN PATIENTS' BLOOD PICTURE EXAMINATION

**TABLE 7 – SPUTUM EXAMINATION**

SPUTUM EXAMINATION	NUMBER	%
AFB	-	-
GRAM POSITIVE	50	50
GRAM NEGATIVE	43	43
MIXED	07	07

50% were gram positive, 43% gram negative, mixed account for 7%.

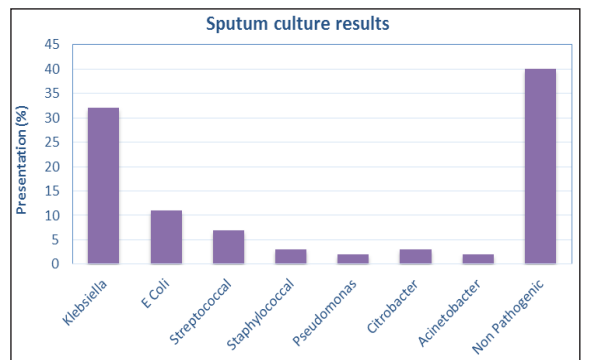
**GRAPH 7 SPUTUM EXAMINATION**



Blue – gram positive, green – gram negative, purple-mixed infections

**TABLE 8 – SPUTUM CULTURE**

SPUTUM CULTURE	NUMBER	%
KLEBSIELLA	32	32
E.COLI	11	11
STREPTOCOCCAL	07	07
STAPHYLOCOCCAL	03	03
PSEUDOMONAS	02	02
CITROBACTER	03	03
ACINETOBACTER	02	02
NO PATHOGENIC ORGANISM	40	40



40% ARE CULTURE NEGATIVE, AMONG ISOLATED KLEBSIELLA AND E.COLI ARE MORE COMMON

**TABLE 9 – CHEST X-RAY RESULTS**

XRAY REPORT	NUMBER	%
EMPHYSEMATOUS CHANGES	30	30
RIGHT UPPER LOBE	04	04
RIGHT MIDDLE LOBE	14	14
BILATERAL LOWER LOBES	26	26
LEFT UPPER LOBE	01	01
LEFT LOWER LOBE	14	14
RIGHT PARA-CARDIAC	01	01

**CXR:** CAP associated with COPD constituted 30%, bilateral lower lobes more common constituting about 26%. Right middle lobe and left lower lobe involvement was about 14%, right upper lobe was seen 4% cases, right para-cardiac in 1%.

## DISCUSSION

**Community acquired pneumonia (CAP)** is a common medical problem in tropical countries like India. This study consisted of 100 patients admitted to Gandhi Medical College & Hospital Secunderabad. All cases met inclusion and exclusion criteria. There are many studies done in different parts of the world on community acquired pneumonia. Few of the important studies are considered for comparison purpose and comparative study is discussed.

In the present study, Of the total cases that occurred between the age group of 20 - 80 years, 58% of the patients were aged >50yrs. It is well documented that pneumonia is commonly occurring disease in the community & its incidence rises sharply with extremes of age.<sup>17,25</sup> In this study group patients below 14 years were not included, but majority of patients were middle aged and elderly. In the study of Dey & others they have found out that patients aged > 50 years are more as compared to less than 50 years. Our study is on par with their study.

In this study of 100 patients, it was observed that majority of patients were males (74%) in comparison to the female patients who were 26%. In the study conducted by Joshua et al it was found that 80% were males and 20% were females. 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 which are more common among men in developing countries like India. In this study group majority of male patients were exposed to one or more of the above mentioned predisposing factors.<sup>27</sup>

In this study 88% of the patients are from urban population and majority were daily wagers and manual laborers belonging to low socio-economic status. The increased frequency of lung infection has been well documented in many epidemiological surveys.<sup>8,29</sup> This may be 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.

Structural lung diseases and associated diseases e.g. Diabetes altering the local lung defense mechanisms and systemic defense mechanisms, predisposing to acute lung infection has been well-documented. Pneumonia is predisposed by any condition that reduces or suppresses the cough, impairs mucociliary activity and local defense mechanisms viz.-phagocytic activity of alveolar macrophages and neutrophils. In this study 36% of patients had structural lung disease and associated disease. Among this 30% had COPD, 6% had diabetes. The COPD patients have altered cellular and structural abnormalities in the lung. The change in the bacterial spectrum in these patients is well supported by ineffective coughing and advanced age predisposes them to pneumonia

In this study among the presenting symptoms fever with chills & rigors, cough with expectoration was common 100%, chest pain 66% and dyspnoea was the presenting symptom in 50%. In Mac Fariane study etiology & outcome of CAP, cough was the most frequent symptom. The other symptoms were fever 86%, chest pain 62% and haemoptysis 15%. Joshua et al found fever in 88%, cough in 92%, expectoration in 65%, and dyspnoea in 71% of the cases respectively. Dyspnoea is significantly more common in elderly CAP patients (2.78 times more) and chest pain is more common in younger CAP patients (2.13 times)

In this study clubbing is significantly more common 22%, pallor was present in 12 patients (12%). Cyanosis was present in 6% and bilateral pedal edema in 8% of patients respectively.

In this study, examination of vital data reveals that 86% had tachypnoea, 92% had tachycardia and 88% had high-grade temperature associated with chills and rigors. The above mentioned vital signs, tachycardia, tachypnoea and high-grade fever associated with chills and rigors are well known to occur in patients with acute lung infections.

### 9. Investigations:

In the present study anemia was found in 12 patients amounting up to 12 % (mean 11.17), neutrophilic leucocytosis was found in 53%. In the study conducted by Joshua & Micheal they found leucocytosis in 58% of the cases.

In the present study, sputum examination showed Gram +ve organisms (50%), Gram-ve organisms (43%) and mixed (07%). In the results of sputum examination in the study done by Larry G. Reimer they found that 76% of the cases were Gram+ve, 14% Gram-ve and 10% mixed. In the present study, the number of cases which are Gram-ve on sputum examination are more than comparative study probably because 36% of patients underlying conditions like COPD and DM.

In the present study it is found that in 40% cultures no pathogen was isolated. *Klebsiella pneumoniae* being more common pathogen isolated accounting for 32%. Next common is *E.coli*, which accounts for 11%. Streptococcal about 07% *Pseudomonas* and others constituted about 10%. This observation is different from that of study done by Larry G. Reime & others where streptococcal (15-76%) followed by staphylococcal (3-14%) were isolated and in the study of Sanraj K. Basi streptococcal was about 73% and Staphylococcal 32%.

In this study 40% are culture negative.

Although *Streptococcus pneumoniae* is most common, other organisms must also be considered in light of the patient's risk factors and severity of illness.

In most cases, it is most useful to think of the potential causes as either "typical" bacterial pathogens or "atypical" organisms.

The former category includes *S. pneumoniae*, *Haemophilus influenzae*, and (in selected patients) *S. aureus* and gram-negative bacilli such as *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. The "atypical" organisms include *Mycoplasma pneumoniae* and *Chlamydia pneumoniae* (in outpatients) and *Legionella* spp. (in inpatients) as well as respiratory viruses such as influenza viruses, adenoviruses, and respiratory syncytial viruses. The atypical organisms cannot be cultured on standard media, nor can they be seen on Gram's stain. Data suggest that a virus may be responsible for up to 18% of cases of CAP that require admission to the hospital.

The frequency and importance of atypical pathogens have significant implications for therapy. These organisms are intrinsically resistant to all beta-lactam agents and must be treated with a macrolide, a fluoroquinolone, or a tetracycline.

Chest film showing infiltrates is necessary to establish the diagnosis of pneumonia. Radiographic changes usually cannot be used to distinguish bacterial from non bacterial pneumonia, but they are often important for evaluating the severity of illness, determining the need for diagnostic studies and selecting antibiotic agent. In the present study we got chest x ray report as consolidation associated with COPD 30%, bilateral involvement in 26% , right upper and middle lobe 18% , left lower lobe 14%, right paracardiac 2%.

All the patients were treated with antibiotics of their sensitivity along with supportive therapy like IV infusion, bronchodilators, analgesics (SOS), education about their illness. Twenty six patients had pleural effusions; three had empyema, one patient developed lung abscess.

#### Limitations:

Further tests were not done on culture negative cases to find out whether they were atypical organisms.

#### CONCLUSIONS

The age group in this study group varied from 27-80 years, most of them were between 30- 65 years of which 58.0% were elderly (>50 years)

- The incidence of CAP is more common in males compared to females
- Most of the patients in this study group are from urban population.
- The associated diseases in this study are DM (6%) & COPD (30%).
- The commonest presenting symptoms are fever (100%), cough (100%), expectoration (100%), other symptoms include chest pain(66%) and dyspnoea (50%).
- The hematological parameters showed neutrophilic leucocytosis (53%).
- The sputum examination showed Gram +ve in 50%, Gram -ve in 43% and mixed in 7% of cases.
- The Sputum culture showed Klebsiella in 32%, E.coli in 11%, Streptococci in 7%, staphylococci and citrobacter in 3% each of cases. Pseudomonas and acinetobacter was cultured in 2% each. No organism was cultured in 40% of patients.
- Radiology showed preponderance of bilateral lower lobe involvement accounting for about 26%.
- 26% cases were complicated by pleural effusions, 3% had empyema and 1% had lung abscess.
- Medical management of patients having underlying conditions like COPD, DM, alcoholism etc with appropriate antibiotics at tertiary care centers can lead to better outcomes.

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