

Clinical, Bacteriological And Radiological Profile Of Patients With Community Acquired Pneumonia In A Tertiary Care Hospital In South India

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KEYWORDS

ABSTRACT

BACKGROUND: Pneumonia is one of the most common infections encountered in the clinical practice. Despite being the cause of significant mortality and morbidity, pneumonia is often misdiagnosed and mistreated. Pneumonia is defined as inflammation and consolidation of lung tissue due to an infectious agent. Pneumonia that develops outside the hospital is considered community acquired pneumonia (CAP).

OBJECTIVE: To study the clinical, radiological, and bacteriological profile of patients with community-acquired pneumonia To evaluate CURB- 65 scoring system in community acquired pneumonia in tertiary care hospital.

MATERIAL AND METHOD: This study was done in DEPARTMENT OF RESPIRATORY MEDICINE, TAGORE MEDICAL COLLEGE AND HOSPITAL, CHENNAI, TAMILNADU. The period of data collection was from January 2023 to December 2023. Eighty one patients were included in the study. A detailed history and examination, chest x-ray, routine laboratory investigation and sputum culture was done for all the patients diagnosed with community acquired pneumonia. CURB65 scoring system were applied to all the patients included in this study to assess the severity and prognosis.

RESULTS: In the study it was observed that most of the patients were among 56 to 65 years of age group. The disease occurrence was more common in males. In the present study all the patients were symptomatic. The most common presenting symptom was cough and fever, followed by breathlessness(40. 7%), chest pain (22.2%) and confusion (3.7 %). Fever was equally distributed among both the age group. But cough and breathlessness was more among the older age group. The most common risk factor was smoking (43.2%) and alcohol intake (40 .7 %). The co-morbidities diabetes (29. 6%) and COPD (24.7 %) were seen predominantly in these patients. Streptococcus pneumoniae(38. 3%) was the most common etiological agent identified through sputum culture followed by gram negative organism (klebsiella and pseudomonas). Radiologically, the lower lobe was more commonly involved followed by middle lobe. There was no correlation between the causative agent and radiological appearance. The rate of ICU admission was 14%. Two patients in our study had died. CURB 65 was applied to all the patients and CURB 65 proved to be a good prognostic indicator for assessing the severity of community acquired pneumonia.

INTRODUCTION

Community-acquired pneumonia (CAP) is a common and potentially-serious illness worldwide. Sir William Osler, who is known as "the father of modern medicine," appreciated the morbidity and mortality of pneumonia, describing it as the "captain of the men of death" in the year 1918. It is the main cause of morbidity and mortality, particularly among the elderly patients and those with co-morbid conditions. The overall rate of pneumonia is about 8–15 per 1000 per year, with the highest rates at extremes of age¹.

CAP is common in both developed and developing nations. The incidence rates in most developing nations are not known. The cost of treating a patient with CAP could be as little as 150 – 350 US dollars as an outpatient and as high as 7,500 US dollars as an inpatient ². Mortality averages more than 14%, but is less than 1% in those who do not require hospital admission ³. There is therefore a need to stratify patients according to severity and to identify which patients

can be managed as outpatients, inpatients, or in the ICU. Different methods of assessment have evolved over a period of time. The CURB score (Confusion, Urea, Respiratory rate, Blood pressure) is a modified version of the British Thoracic Society (BTS) tool which relies on four parameters for scoring⁴. In 2003, Lim et al added age >65 years as a fifth prognostic variable to the CURB scoring system and turned it into a 6 - point scoring scale (0 –5) known as CURB-65, which was adopted by the BTS as a new severity assessment strategy for CAP in 2004. The cause of CAP is often difficult to establish. Despite the progress made in the diagnosis of pneumonia, it takes a few days to identify the causative micro-organism in the blood or sputum samples and the etiology of half of all patients with CAP remains uncertain.

There are various studies conducted to describe its clinical, bacteriological, and radiological features in different population group, whether these inferences hold good for our population is a pertinent question. In view of this, we need to study CAP in our setting, and by the mode of this study we will help in early detection of disease, and clinical, bacteriological, and radiological profile of pneumonia acquired in the community admitted in our hospital. To assess, the usefulness of the CURB65 score in our hospital.

AIMS AND OBJECTIVES

AIM:

To assess the usefulness of the validated prediction rule CURB- 65 score in the management of CAP patients in our hospital. To determine the outcome in relation to the degree of severity using this scoring system. Clinical, bacteriological, and radiological profile of CAP patient admitted in our hospital.

MATERIALS AND METHODS

This Prospective observational study was conducted upon 76patients, who presented to the department of TB and Respiratory Medicine from JAN 2023- July 2023 at Tagore medical college and hospital, after ethical committee clearance

INCLUSION CRITERIA

1. Patients who were above the age of 18 years admitted at tagore medical college and gave informed consent
2. Patients who satisfied the diagnostic criteria for CAP. New and progressive pulmonary infiltrates on chest radiograph with at least two of following four:
 - Fever (temperature >37.8°C)
 - Production of purulent sputum
 - Cough (H/ O <4 weeks)
 - Leukocytosis (white blood cell count >10,000/ cumm).

Exclusion Criteria

1. Patients below the age of 18
2. Patients who did not give consent for the study
3. Patient with hospital acquired pneumonia
4. Patient with aspiration pneumonia
5. Patient with pulmonary infarction, pulmonary tuberculosis, immune- compromised and immunosuppressive treatment
6. Patients with acquired immunodeficiency syndrome.

Method of collection of data:

Eighty one patients with diagnostic features suggestive of CAP, admitted to Meenakshi medical

college hospital were included in this study. A detailed history and physical examination was done for all the patients. Patient with new or progressive pulmonary infiltrates on chest radiograph with at least two of the following four criteria: fever, cough, purulent sputum production and total leukocyte count over 10, 000/cubic mm were diagnosed to have CAP. Total leukocyte count, differential count, renal function tests, chest x- ray and serum electrolytes were done in all patients. Sputum was collected at the time of admission for gram staining and acid fast bacilli staining. Sputum containing more than 25 polymorphonuclear cells and less than 10 epithelial cells per low power field was subjected to bacterial culture using the appropriate culture media.

CURB65 scoring system was applied to all the patients included in this study to assess the severity and prognosis. The patients were given a score from 0 to 5 depending on the CURB 65 criteria. They were then classified as low risk, moderate risk and high risk. Depending on the patient's condition they were admitted as inpatient either in the ward or the intensive care unit. The patient were monitored in the ward and transferred to ICU when the need arose.

Factors which predicted transfer to ICU include d a high CURB- 65 score, cyanosis, hypothermia or fever not subsiding with treatment, and persistent hypotension. When discharged, the patient was followed up in the outpatient clinic weekly and the outcome was documented. During the follow-up visits, patients were reexamined and vital signs were cross- checked. Investigations such as serum urea, sputum culture, and full blood count were repeated for patients who were not doing well and their treatment adjusted accordingly. Repeat chest x- rays were taken at follow up to check for radiological clearance of pneumonia.

RESULTS

A total of eight one patients who fulfilled the criteria were included in the study. Their age, gender, presenting symptoms like cough, sputum, and breathlessness were noted. History of smoking and alcohol intake was noted. Associated comorbidities, sputum culture, chest radiograph findings and CURB 65 scoring were also recorded.

AGE DISTRIBUTION

In the present study, it was observed that most of the patients were among 56 to 65 years of age group who presented with community acquired pneumonia.

Among 81 patients, 23 patients were between 56 and 65 years, 17 were between 66 and 75 years and also between 36 to 45 years. The mean age was 52.62 + 14.29.

TABLE 1 : TOTAL AGE DISTRIBUTION OF POPULATION UNDER STUDY

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	81	18	75	52.62	14.290

TABLE 2 : AGE DISTRIBUTION OF POPULATION UNDER STUDY

AGE	No of patients
18- 25	2
26- 35	7
36- 45	17
46- 55	15
56- 65	23
66- 75	17
76- 85	0

GENDER DISTRIBUTION

In the present study, male predominance was seen. It was observed that 61 (75.3 %) patients were

males and 20(24. 7%) were females.

■ ■ ■ ■
GRAPH 1: SEX DISTRIBUTION

PRESENTING SYMPTOMS COUGH AND SPUTUM

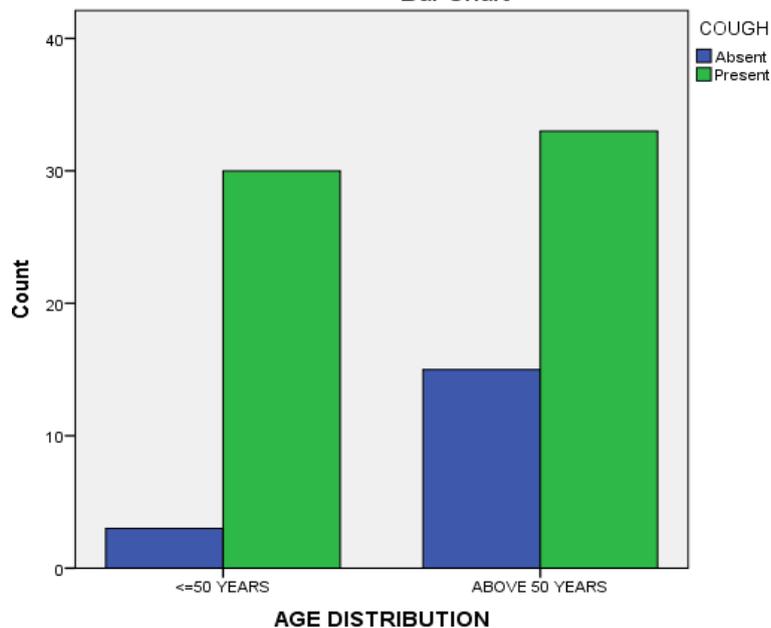
Cough with expectoration was the most common presenting symptom among the patients with CAP. 63 patients (77%) presented with cough. Cough was predominantly present in patients under 50 years of age. Most of the older patients above 50 years of age (did not have cough as the presenting symptom.

TABLE 3 : COUGH AND AGE DISTRIBUTION

AGE DISTRIBUTION	COUGH	
	ABSENT	PRESENT
<=50 YEARS	3(9.1%)	30(90. 9%)
ABOVE 50 YEARS	15(31. 2%)	33(68. 8%)
TOTAL	18(22. 2%)	63(77. 8%)

P=0. 018

GRAPH -2 STUDY POPULATION WHO PRESENTED WITH COUGH AND DISTRIBUTION WITH AGE
Bar Chart



p=0 .018

FEVER

Fever was the second most common symptom. In most of the patients, the fever was high grade . 57 patients (70.4%) presented with fever.

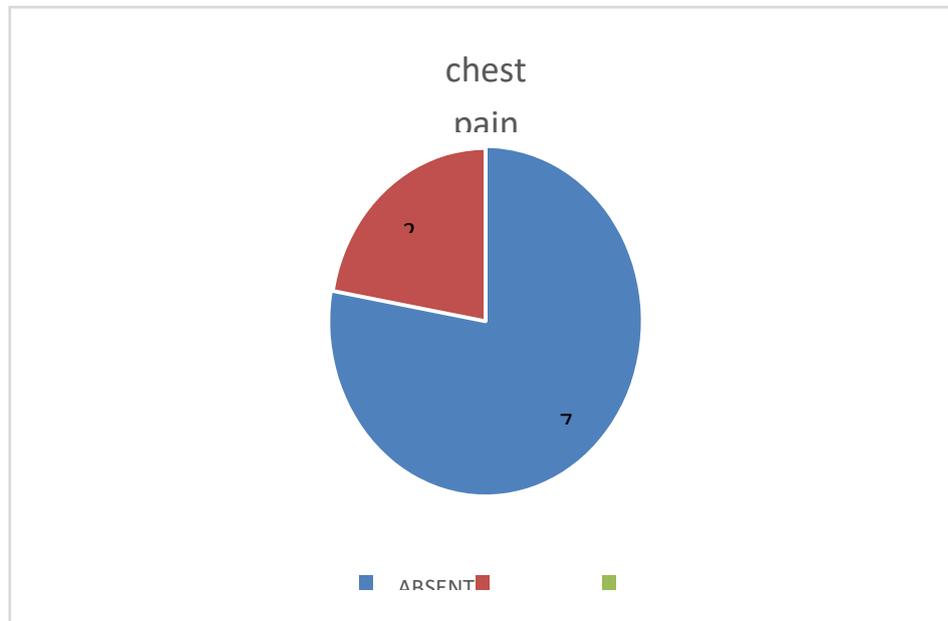
TABLE 4 : STUDY POPULATION WHO PRESENTED WITH FEVER

FEVER	NO OF PATIENTS	PERCENT
Absent	24	29.6
Present	57	70.4
Total	81	100. 0

TABLE 5 : PATIENTS WHO PRESENTED WITH CHEST PAIN

CHEST PAIN	NO OF PATIENTS	Percent
Absent	63	77.8
Present	18	22.2
Total	81	100.0

GRAPH 6 : STUDY POPULATION WHO PRESENTED WITH BREATHLESSNESS



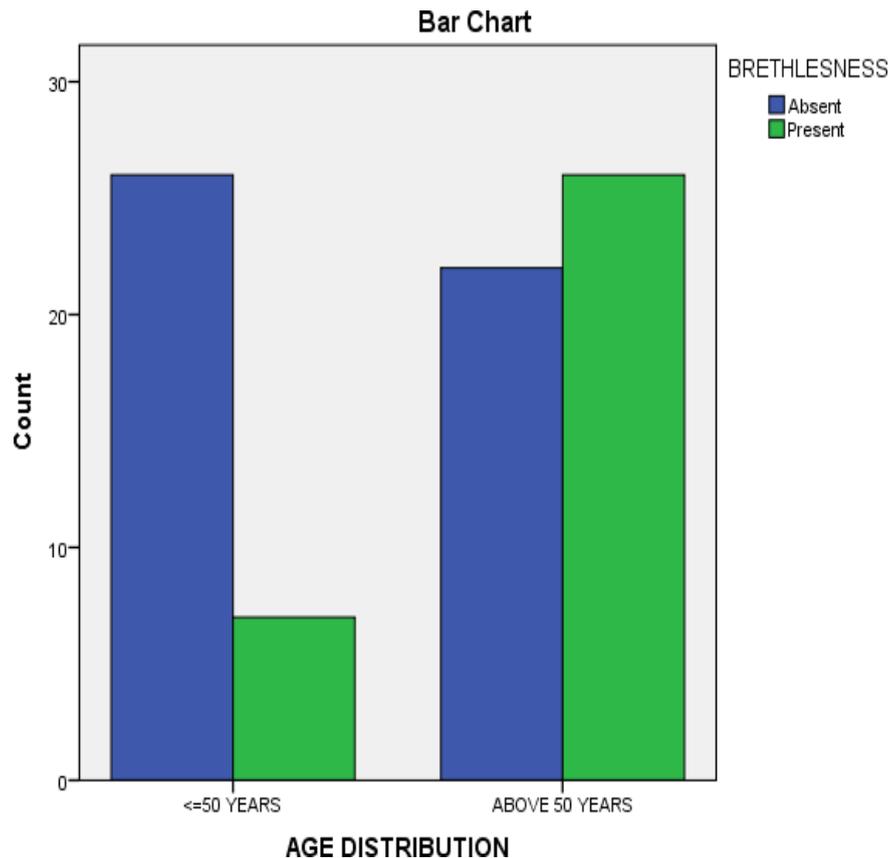
BREATHLESSNESS

Among the 81 patients only 33 patients had breathlessness. Breathlessness was more common among the patients above the age of 50 years [$p=0.003$]. Breathlessness was also more common among the patients who had associated COPD. [$p=0.030$]

TABLE 6 : BREATHLESSNESS AND AGE DISTRIBUTION

AGE DISTRIBUTION	BREATHLESSNESS	
	PRESENT	ABSENT
<=50 YEARS	26(78. 8%)	7(21.2%)
ABOVE 50 YEARS	22(45. 8%)	26(54. 2%)
TOTAL	48(59. 3%)	33(40. 7%)

$p=0.003$



DISCUSSION:

Age/Sex:

Among 81 patients with CAP, 61 (75.3%) patients were males and 20 (24.7 %) were females, with male predominance. The male to female ratio is 2 :1. Mean age of patients was 52.62 ± 14.290 years.48(59. 3 %) patients belonged to > 50 years of age group. Pneumonia is more common in the older age group of patients. This is comparable to Shah et al ⁶⁶ and Jain et al ⁶⁷ where the mean age was 53. 68 and 52. 36 respectively. The higher incidence of CAP among the males and elderly above age of 50 may be because of risk factors like smoking, alcohol intake and associated comorbidities like COPD, cardiovascular diseases are more common in these patients as noted by Lieberman et al ⁶⁸.

Presenting Complaints:

The most common presenting symptom in our study group was cough (77 .8 %) and fever (70.4%), followed by breathlessness (40.7 %), chest pain (22.2 %) and confusion (3.7%). It was similar to the study done by Shrestha et al⁶⁹ where out of 100 patients studied, 76 patients presented with cough whereas 64 patients presented with fever, 43 % had breathlessness and 31 % had chest pain. In another study conducted by Shah et al most of the patients presented with fever (95%) and cough (99%). In a study done by Jain et al, majority of the patients presented with cough (92. 5%) , fever (90%), dyspnea (59 .2 %) and followed by chest pain and altered mental status (14 .2 % and 3 . 3%, respectively).

There was no difference in the occurrence of fever among different age groups however, cough and breathlessness [p=0.003] was more common among the older age group and COPD patients [p=0. 030].

Predisposing Factors;

The predisposing factors for CAP observed in our study were smoking (43 .2 %), alcohol intake (40. 7%),diabetes (29.6%) and COPD (24.7 %).

	Abdulla BB	Shah BA	Jain	Present Study
Smoking	72%	65%	40.8%	43.2%
Alcohol	30%	32%	12.5%	40.7%
COPD	48%	57%	35.8%	24.7%
Diabetes	28%	13%	6.7%	29.6%

The most common risk factor associated with CAP was smoking followed by alcohol which was similar to the studies done by Shah et al and Abdulla et al ⁷⁰.

The co morbidities associated with CAP were diabetes and COPD, which was comparable to the studies by Jain et al, Bansalet al⁷¹ and Shah et al. Similar results were observed in another study done on the western population by Fang et al ⁷² in Baltimore, US.

SPUTUM CULTURE

In this study, sputum stain and culture showed that 75.3% of patients had culture growth of organism. Streptococcus pneumoniae (38.3%) was the most common organism isolated followed by Klebsiella (13.6%) and Pseudomonas (9.9%).

In a study done by Shah et al, causative organism was recoverable only in 29% of the cases. Pseudomonas aeruginosa (10%) was the most commonly grown organism followed by staphylococcus aureus (7%), E. coli (6%) and Klebsiella (3%) in their study.

Shrestha et al in their study showed that 24% of the patients had sputum culture growth, of which streptococcus pneumonia (15%) was the maximum organism followed by Pseudomonas aeruginosa (5%) and E. coli (3%).

Ruiz M et al ⁷³ in their study on CAP had sputum culture growth in 46% of the patients, of which streptococcus pneumonia (29%) was the maximum grown organism followed by Haemophilus influenzae (11%).

The variation in the sputum yield may be because of

- Inadequate sample collection
- Prior antibiotics use
- Unproductive cough
- Culture method
- Time of sample collection

The bacterial profile of Community acquired pneumonia has been varied in different geographic areas. Streptococcus pneumoniae has been identified as the commonest organism causing CAP all over the world ⁷⁴ but some studies, over the last three decades, have reported higher incidence of gram-negative organisms among culture-positive pneumonias ⁷⁵. Most of the patients from whom gram-negative bacteria was isolated were over 50 years of age, smokers or had COPD. It has been reported that old age, smoking and COPD impair pulmonary defenses and pre-dispose to CAP caused by gram-negative bacteria.

Radiological distribution

The most common lobe that was involved in our study group was the lower lobe, 51 (63%). Among the lower lobes, right lower lobe 32 (39.5%) was more common than the left lower lobe 19 (23.5%). Bilateral involvement was present in 4 (4.9%), left upper lobe involvement in 4 (5%), right middle lobe 12 (14.8%), right upper lobe 4 (5%). Para-pneumonic effusion was present in 6 (7.3%) patients.

In the study by Jain et al the lobar distribution was Right lower lobe 48.3%, Left lower lobe 15.8%, multiple lobar involvement 12.5%, Right upper lobe 7.8%, Left middle lobe 6.7%, Right middle lobe 5.8%, Left upper lobe 3.3%.

This is comparable to our study as both show lower lobe predominance and right was more commonly involved than the left. Chest x-ray showing infiltrates is necessary to establish the

diagnosis of pneumonia. But x- ray changes could not be used to distinguish the causative organism.

ASSESSMENT OF SEVERITY AND PROGNOSIS OF CAP USING CURB 65 SCORING SYSTEM

In this study, death was noted in two patients. The severity of the disease and prognosis was assessed by using CURB 65 scoring system. The association between severity of CAP and CURB65 scoring was statistically significant with a p value=0.023. The rate ICU admission was 14.8 %. It also showed that as the score increases the rate of ICU admission also increased. This was also statistical significant [p=0 .041]

The rate of ICU admission in study by Mbata et al ⁷⁶ and Man et al⁷⁷ was 10 % and 4%. These variation in the rates may be because of the variation in protocol in different hospitals which vary from country to country.

In the study by Mbata et al showed that CURB -65 has high negative and low positive predictive values at all cut -off points. The sensitivity was high at a low CURB-65 score and specificity was high at a high CURB-65 score. The mortality rate in the study was 15 % (12 patients).

Moghaddam et al ⁷⁸ in their study comparing CURB 65 and PSI scoring system concluded that CURB 65 is a better predictor of mortality and the need for ICU admission in patients with community acquired pneumonia.

The findings of these study suggest that severity assessment using CURB-65 should be done in all patients with CAP and is suitable for use in the emergency department because of the simplicity of its application and the ability to identify low- risk patients.

CONCLUSION:

In conclusion of the study

- The most common age group for CAP was 56 to 65 years.
- The disease occurrence was more common in males
- Most of the patients presented with cough and high grade fever. Breathlessness was more common among the older age group and COPD patients.
- Smoking and alcohol intake were the most common risk factors with CAP in these patients.
- The most commonly associated co -morbid conditions were Diabetes mellitus and COPD in these patients.
- Streptococcus pneumoniae was the most common organism isolated from sputum culture. Gram negative organisms was the second most common isolated organism
- CURB 65 was applied to all the patients. CURB 65 proved to be a good prognostic indicator.
- Limitation of the study was inadequate sample size.

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Conflict of Interest: None

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