

**Clinical, Microbiological and Radiological Profile of Pneumonia Patients:
A Prospective Observational Study****Heena Pathan¹, Jiyani Hemangbhai Rajeshbhai², Anil Mathuraprasad Gupta³**¹Assistant Professor, Department of Respiratory Medicine, Smt SCL Municipal General Hospital, Saraspur, NHL Medical College, Ahmedabad, Gujarat, India²Senior Resident, Department of Respiratory Medicine, KCMRI, Bharuch, Gujarat, India³Associate Professor, Department of Respiratory Medicine, Smt SCL Municipal General Hospital, Saraspur, NHL Medical College, Ahmedabad, Gujarat, India

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Abstract**Background:** Pneumonia remains a major cause of morbidity and mortality worldwide, particularly in developing countries like India. Regional data on clinical presentation, microbiological etiology, radiological patterns, and outcomes are essential for optimizing management strategies.**Objectives:** To study the clinical, microbiological, and radiological profile of adult pneumonia patients and to determine their outcomes using severity assessment tools.**Methods:** This prospective observational study included 50 adult inpatients with clinically and radiologically confirmed pneumonia at a tertiary care teaching hospital. Detailed clinical evaluation, laboratory investigations, sputum microbiology, radiological assessment, and severity scoring using CURB-65 and Pneumonia Severity Index (PSI) were performed. Patients were followed until discharge or death.**Results:** The mean age of patients was 55.2 ± 14.3 years, with male predominance (68%). Cough (94%) and fever (78%) were the most common symptoms. Diabetes mellitus (38%) was the most frequent comorbidity. *Klebsiella pneumoniae* (26%) and *Pseudomonas aeruginosa* (20%) were the most commonly isolated organisms. Lower lobe involvement was predominant on imaging. Most patients had CURB-65 scores ≤ 2 . Overall mortality was 10%, predominantly among patients with higher CURB-65 scores and those requiring ICU care.**Conclusion:** Pneumonia predominantly affected older males and commonly presented with cough and fever. Gram-negative organisms were frequent etiological agents. Severity scores such as CURB-65 were effective in predicting outcomes and guiding the level of care.**Keywords:** Pneumonia, Community-acquired pneumonia, CURB-65, Pneumonia Severity Index, Microbiological profile.**DOI:** 10.25258/ijcpr.18.2.26

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Introduction

Pneumonia is an acute inflammatory condition of the pulmonary parenchyma and remains a major cause of morbidity and mortality worldwide. It may result from a wide range of infectious agents, including bacteria, viruses, and fungi, and affects individuals across all age groups.

Community-acquired pneumonia (CAP) continues to be a frequent cause of hospital admission and poses a significant clinical challenge despite advances in antimicrobial therapy and vaccination strategies. [1,2] The burden of pneumonia is particularly high in developing countries such as India, where it contributes substantially to healthcare utilization and mortality. Elderly individuals and patients with comorbid conditions

like diabetes mellitus, chronic obstructive pulmonary disease, and cardiovascular disease are at increased risk of severe disease and adverse outcomes. The clinical presentation, microbiological etiology, and radiological patterns of pneumonia vary widely depending on host factors and regional epidemiology, making early diagnosis and appropriate management crucial. [3]

Despite the high disease burden, there is limited contemporary Indian data detailing the integrated clinical, microbiological, and radiological profile of pneumonia patients. Moreover, the utility of severity assessment tools such as CURB-65 and Pneumonia Severity Index in predicting outcomes needs continued evaluation in local settings.

Therefore, this study was undertaken to analyze the clinical presentation, etiological profile, radiological findings, and outcomes of adult pneumonia patients admitted to a tertiary care hospital, thereby providing evidence to support early risk stratification and optimized management.

Materials and Methods

This prospective observational study was conducted at a tertiary care teaching hospital over a defined study period after obtaining approval from the Institutional Ethics Committee.

The study was performed in accordance with the principles of the Declaration of Helsinki. Written informed consent was obtained from all participants prior to enrolment. Adult patients admitted with a clinical and radiological diagnosis of pneumonia were evaluated and managed as per standard institutional protocols.

Patients aged 18 years and above with clinical features suggestive of pneumonia and radiological evidence on chest X-ray or computed tomography were included in the study. Only hospitalized patients were enrolled. Exclusion criteria comprised patients below 18 years of age, pregnant women, outpatients, and those unwilling to provide

informed consent. Patients with alternative diagnoses explaining pulmonary infiltrates were also excluded from the study. Detailed demographic data, clinical history, comorbidities, substance use, physical examination findings, laboratory investigations, sputum microscopy and culture results, and radiological findings were recorded using a structured proforma. Disease severity was assessed using CURB-65 and Pneumonia Severity Index scores. Patients were followed until discharge or death. Statistical analysis was performed using descriptive statistics. Continuous variables were expressed as mean \pm standard deviation, while categorical variables were presented as frequencies and percentages. Data analysis was carried out using Microsoft Excel.

Results

The study included 50 adult pneumonia patients with a mean age of 55.2 ± 14.3 years, predominantly males (68%). The highest proportion of cases occurred in the 56–70-year age group. Most patients were treated in the ward (74%), while 26% required ICU admission. Severity assessment showed that the majority had lower CURB-65 and PSI scores, indicating mild to moderate disease at presentation.

Table 1: Clinical Profile and Comorbidities of Pneumonia Patients

Parameter	Number (%)
Presenting symptoms	
Cough	47 (94.0)
Fever	39 (78.0)
Dyspnea	25 (50.0)
Chest pain	19 (38.0)
Comorbidities	
Diabetes mellitus (DM)	19 (38.0)
Hypertension (HTN)	13 (26.0)
Chronic obstructive pulmonary disease (COPD)	6 (12.0)
History of tuberculosis	5 (10.0)
Asthma	4 (8.0)
Congestive heart failure (CHF)	3 (6.0)
Chronic liver disease (CLD)	3 (6.0)
Hypothyroidism	2 (4.0)
No comorbidities	27 (54.0)

More than half of the patients had no comorbidities; however, diabetes mellitus was the most frequent associated condition. Tobacco chewing and smoking were common substance use habits, reflecting potential risk factors contributing to disease severity. 11 patients (22%) had pleural effusion. Microbiological analysis revealed positive sputum cultures in most patients, with Gram-

negative organisms predominating. *Klebsiella pneumoniae* was the most commonly isolated pathogen, followed by *Pseudomonas aeruginosa*. Other organisms included *Escherichia coli*, *Streptococcus* species, *Acinetobacter*, and *Staphylococcus aureus*. Sputum acid-fast bacilli positivity was detected in a small proportion of patients (6%), indicating coexistent tuberculosis.

Table 2: Microbiological Profile, Severity Assessment, and Outcome

Variable	Number (%)
Sputum culture	
Klebsiella pneumoniae	13 (26.0)
Pseudomonas aeruginosa	10 (20.0)
Escherichia coli	7 (14.0)
Streptococcus species	7 (14.0)
Acinetobacter species	5 (10.0)
Staphylococcus aureus	3 (6.0)
No growth	5 (10.0)
CURB-65 score	
1–2	42 (84.0)
≥3	8 (16.0)
Outcome	
Discharged	45 (90.0)
Death	5 (10.0)

Among the 50 participants, the Pneumonia Severity Index (PSI) risk class were distributed as follows: 8% had a PSI score of I, 16% had a PSI score of II, 36% had a PSI score of III, 20% had a PSI score of IV, and 20% had a PSI class of V.

Radiological evaluation showed predominant involvement of the lower lobes, particularly the left and right lower lobes. Computed tomography detected consolidation more accurately than chest radiography. Clinical resolution occurred earlier than radiological resolution in most cases. Overall, 90% of patients were discharged successfully, while mortality was 10%, occurring exclusively among patients with higher CURB-65 scores and those requiring intensive care.

Discussion

Pneumonia continues to be a significant cause of morbidity and mortality, particularly in developing countries. In the present prospective observational study, the clinical, microbiological, and radiological characteristics of adult pneumonia patients were evaluated, along with disease severity and outcomes. The findings provide insight into the local epidemiology of pneumonia and reinforce the importance of early risk stratification and appropriate management. [4,5]

The mean age of patients in this study was in the mid-fifties, with a clear male predominance. Similar age and gender distributions have been reported in several previous studies, suggesting that middle-aged and elderly males are more commonly affected. This trend may be attributed to higher exposure to risk factors such as smoking, occupational hazards, and comorbid illnesses among males. The increased incidence observed in older age groups highlights the vulnerability of this population, likely due to age-related decline in immune function and higher prevalence of chronic diseases. [6,7]

Cough and fever were the most frequent presenting symptoms, followed by dyspnea and chest pain, which is consistent with classical descriptions of pneumonia. However, dyspnea was present in only half of the patients, indicating that reliance solely on respiratory distress may delay diagnosis in a substantial proportion of cases. Diabetes mellitus emerged as the most common comorbidity, reflecting the growing burden of non-communicable diseases in India. Diabetes is known to impair host immune responses and has been associated with increased susceptibility to infections and worse outcomes in pneumonia. Other comorbidities such as hypertension, chronic obstructive pulmonary disease, and prior tuberculosis further emphasize the role of underlying illnesses in disease severity. [8,9]

Microbiological analysis revealed a predominance of Gram-negative organisms, with *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* being the most frequently isolated pathogens. This pattern differs from Western literature, where *Streptococcus pneumoniae* remains the most common etiological agent, but aligns with several Indian studies reporting a higher prevalence of Gram-negative bacteria. These findings may reflect regional variations in pathogen distribution, antibiotic usage patterns, and healthcare-associated risk factors, underscoring the need for region-specific empirical antibiotic policies. [10]

Radiologically, lower lobe involvement was the most common finding, which is in accordance with previous studies. Computed tomography was more sensitive than chest radiography in detecting the extent of disease, especially in patients with inconclusive X-ray findings. Clinical resolution was observed earlier than radiological resolution, reaffirming that radiographic changes may lag behind symptomatic improvement and should not be the sole criterion for assessing treatment response. [11]

Severity assessment using CURB-65 and Pneumonia Severity Index proved valuable in predicting outcomes. Most patients had lower scores and favorable outcomes, while higher scores were strongly associated with ICU admission and mortality. All deaths occurred among patients requiring intensive care, highlighting the prognostic significance of these scoring systems. The overall mortality rate in this study was comparable to that reported in similar hospital-based studies. [12] Despite its strengths, this study has certain limitations, including a relatively small sample size and single-center design, which may limit generalizability. Nevertheless, the findings contribute meaningful local data and emphasize the importance of early diagnosis, microbiological evaluation, and severity-based management in improving outcomes of pneumonia patients.

Conclusion

The study evaluated the clinical, microbiological, and radiological characteristics of pneumonia patients, focusing on key outcomes. Clinically, pneumonia was most prevalent in males aged 56-70, with cough and fever as the primary symptoms. *Pseudomonas* was the most common pathogen associated. Radiological findings revealed that consolidation was primarily in the lower lobes, with CT scans providing more accurate detection. While most patients were discharged successfully, higher CURB65 scores and ICU admissions correlated with increased mortality, underscoring the importance of early risk assessment.

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