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Clinical Profile, Severity Assessment, and Treatment Outcomes of Patients with Community-Acquired Pneumonia in a Tertiary Care Centre.

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Abstract
Background: Community-acquired pneumonia (CAP) remains a major cause of morbidity and mortality worldwide, particularly among elderly individuals and those with underlying comorbidities. Early identification of disease severity and factors associated with poor outcomes is essential for optimizing management and reducing complications. ***Aim:*** To evaluate the clinical profile, severity, and treatment outcomes of patients diagnosed with community-acquired pneumonia admitted to a tertiary care hospital. ***Methods:*** A prospective observational study was conducted among 80 adult patients diagnosed with community-acquired pneumonia. Demographic characteristics, clinical presentation, comorbidities, laboratory findings, radiological features, and treatment outcomes were recorded. Disease severity was assessed using the CURB-65 scoring system. Outcome measures included duration of hospital stay, intensive care unit (ICU) admission, requirement for mechanical ventilation, and in-hospital mortality. Statistical analysis was performed using appropriate descriptive and inferential tests, with $p<0.05$ considered statistically significant. ***Results:*** Among the 80 patients studied, 37.5% were aged above 60 years. Fever (90.0%), cough with expectoration (85.0%), and dyspnea (72.5%) were the most common presenting symptoms. Diabetes mellitus (35.0%) and hypertension (30.0%) were the predominant comorbidities. Based on CURB-65 scores, 47.5% of patients were classified as low risk, 30.0% as moderate risk, and 22.5% as high risk. ICU admission was required in 22.5% of patients, while 12.5% required mechanical ventilation. The mean hospital stay was 7.8±3.2 days. Overall mortality was 7.5%. Higher CURB-65 scores were significantly associated with ICU admission and mortality ($p<0.001$). ***Conclusion:*** Community-acquired pneumonia predominantly affects older adults and individuals with comorbid conditions. The CURB-65 score is an effective tool for severity stratification and prediction of adverse outcomes. Early recognition of high-risk patients may facilitate timely intervention and improve clinical outcomes.

Keywords: Community-acquired pneumonia, CURB-65, Clinical profile, Severity assessment, Intensive care unit admission, Mortality, Treatment outcomes.

INTRODUCTION
Community-acquired pneumonia (CAP) is an acute infection of the pulmonary parenchyma acquired outside healthcare settings and remains one of the leading causes of morbidity and mortality worldwide. Despite significant advances in antimicrobial therapy, vaccination programs, and supportive care, CAP continues to impose a substantial burden on healthcare systems, particularly among elderly individuals and patients with chronic comorbid illnesses. The disease spectrum ranges from mild infection managed in the outpatient setting to severe pneumonia requiring intensive care unit (ICU) admission and mechanical ventilation. Early recognition of disease severity and prompt initiation of appropriate treatment are crucial determinants of patient outcomes [1,2].

Globally, lower respiratory tract infections rank among the most common infectious causes of death. The burden of CAP is particularly high in low- and middle-income countries where delayed healthcare access, undernutrition, environmental pollution, and a high prevalence of chronic diseases contribute to increased disease incidence and adverse outcomes. The annual incidence of CAP among adults has been estimated to range from 1.5 to 14 cases per 1,000 population, with substantially higher rates among individuals older than 65 years [3]. Mortality rates vary according to disease severity, ranging from less than 5% among outpatients to more than 20–30% among patients requiring intensive care support [4].

Several host-related factors have been identified as predictors of severe disease and poor prognosis. Advanced age, smoking, chronic obstructive pulmonary disease (COPD), diabetes mellitus, chronic kidney disease, cardiovascular disorders, and immunosuppression have consistently been associated with increased susceptibility to CAP and worse

clinical outcomes[5,6]. Clinical manifestations commonly include fever, productive cough, dyspnea, pleuritic chest pain, and systemic symptoms such as fatigue and malaise. However, elderly patients may present atypically, resulting in delayed diagnosis and treatment[7].

Numerous studies have evaluated the clinical profile and outcomes of CAP. Fine et al. developed the Pneumonia Severity Index (PSI), demonstrating the utility of risk stratification in predicting mortality and guiding treatment decisions[8]. Lim et al. subsequently introduced the CURB-65 score, a simple bedside tool that effectively predicts disease severity and mortality among hospitalized patients[6]. In India, studies by Bansal et al. and Shah et al. reported that advanced age, comorbid illnesses, multilobar involvement, and higher severity scores were significantly associated with prolonged hospitalization, ICU admission, and mortality among CAP patients[3,4]. Nevertheless, variations in demographic characteristics, microbial patterns, healthcare resources, and treatment practices across different regions necessitate local data to better understand disease behavior and outcomes[9,10].

Although CAP remains a common cause of hospital admission, there is limited contemporary data from many tertiary care centers regarding its clinical presentation, severity distribution, and short-term outcomes. Understanding these factors is essential for identifying high-risk patients, optimizing resource allocation, and improving patient management strategies. Therefore, the present study was undertaken to evaluate the clinical profile, severity assessment using CURB-65, and treatment outcomes among patients admitted with community-acquired pneumonia in a tertiary care hospital.

Aim

To evaluate the clinical profile, severity, and treatment outcomes of patients diagnosed with community-acquired pneumonia admitted to a tertiary care hospital.

Objectives

1) To describe the demographic and clinical characteristics of patients presenting with community-acquired pneumonia.
2) To assess the severity of community-acquired pneumonia using validated prognostic scoring systems (CURB-65/PSI) and identify factors associated with severe disease.
3) To evaluate clinical outcomes including duration of hospital stay, ICU admission, need for mechanical ventilation, and in-hospital mortality among patients with community-acquired pneumonia.

MATERIALS AND METHODS

Study Design and Setting

A prospective observational study was conducted in the Department of General Medicine of a tertiary care teaching hospital over a period of twelve months. The hospital serves as a referral center for both urban and rural populations and receives a large number of patients with respiratory illnesses. The study was undertaken after obtaining approval from the Institutional Ethics Committee, and written informed consent was obtained from all participants or their legally authorized representatives before enrollment.

Study Population

The study included adult patients admitted with a diagnosis of community-acquired pneumonia (CAP). Community-acquired pneumonia was defined as the presence of a new pulmonary infiltrate on chest radiography associated with at least two of the following clinical features: fever (>38°C) or hypothermia (<36°C), cough with or without sputum production, dyspnea, pleuritic chest pain, or auscultatory findings suggestive of pneumonia, occurring in patients who had not been hospitalized within the preceding 14 days.

Sample Size Calculation

The sample size was calculated using the formula n=Z^2 PQ/d^2. Based on the study by Bansal et al., which reported severe outcomes among approximately 24% of hospitalized community-acquired pneumonia patients, taking a confidence level of 95% (Z=1.96) and an absolute precision of 10%, the minimum sample size obtained was 70. After accounting for a 10% non-response or incomplete data rate, the final sample size was calculated as 77. Therefore, a total of 80 patients with community-acquired pneumonia were included in the study.

Inclusion Criteria

- Patients aged 18 years and above.
- Patients diagnosed with community-acquired pneumonia based on clinical and radiological criteria.
- Patients willing to provide informed consent.

Exclusion Criteria

- Hospital-acquired pneumonia or ventilator-associated pneumonia.
- Patients with active pulmonary tuberculosis.

- Immunocompromised individuals, including those with HIV infection, malignancy receiving chemotherapy, organ transplant recipients, or long-term corticosteroid therapy.
- Patients with aspiration pneumonia.
- Patients unwilling to participate in the study.

Data Collection Procedure

Consecutive eligible patients admitted during the study period were enrolled. A detailed history was obtained, including demographic characteristics, smoking status, alcohol consumption, comorbid illnesses, duration of symptoms, and previous treatment history.

A comprehensive clinical examination was performed at admission. Baseline parameters such as temperature, respiratory rate, heart rate, blood pressure, oxygen saturation, and mental status were recorded. Laboratory investigations included complete blood count, blood glucose, renal function tests, liver function tests, serum electrolytes, C-reactive protein, and arterial blood gas analysis whenever clinically indicated.

Radiological evaluation was performed using chest radiography in all patients. Additional imaging studies such as computed tomography of the chest were obtained when clinically necessary. Microbiological investigations included sputum Gram stain, sputum culture and sensitivity, blood cultures, and other pathogen-specific investigations based on clinical suspicion.

Severity Assessment

Disease severity was assessed at admission using the CURB-65 score. The score was calculated based on the presence of confusion, blood urea nitrogen >7 mmol/L, respiratory rate ≥30/min, systolic blood pressure <90 mmHg or diastolic blood pressure ≤60 mmHg, and age ≥65 years. Patients were categorized into low-, moderate-, and high-risk groups according to established guidelines.

Outcome Measures

The primary outcomes assessed were:

- Duration of hospital stay.
- Requirement for intensive care unit admission.
- Requirement for mechanical ventilation.
- In-hospital mortality.

Secondary outcomes included the association of demographic, clinical, laboratory, and radiological variables with disease severity and adverse clinical outcomes.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using Statistical Package for Social Sciences (SPSS) software version 26.0. Continuous variables were expressed as mean ± standard deviation or median with interquartile range depending on data distribution. Categorical variables were presented as frequencies and percentages.

Comparisons between groups were performed using the Student's t-test or Mann–Whitney U test for continuous variables and the Chi-square test or Fisher's exact test for categorical variables. Factors associated with adverse outcomes were evaluated using univariate analysis, followed by multivariate logistic regression when appropriate. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee prior to commencement of the study. All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Confidentiality of patient information was maintained throughout the study, and participation was entirely voluntary.

RESULTS

Table 1. Distribution of Study Participants According to Age Group (n=80)

Age Group (years)	Frequency (n)	Percentage (%)
18–30	10	12.5
31–45	16	20.0
46–60	24	30.0
>60	30	37.5
Total	**80**	**100.0**

The majority of patients (37.5%) were aged above 60 years, indicating that CAP was more common among elderly individuals.

Table 2. Baseline Clinical Characteristics of Patients with Community-Acquired Pneumonia (n=80)

Variable	Frequency (n)	Percentage (%)
Fever	72	90.0
Cough with expectoration	68	85.0
Dyspnea	58	72.5
Chest pain	20	25.0
Hemoptysis	6	7.5
Smoking history	34	42.5
Diabetes mellitus	28	35.0
Hypertension	24	30.0
Chronic obstructive pulmonary disease	18	22.5

Fever and productive cough were the most common presenting symptoms, while diabetes mellitus was the most prevalent comorbidity.

Table 3. Severity Assessment Based on CURB-65 Score (n=80)

CURB-65 Category	Score	Frequency (n)	Percentage (%)
Low Risk	0–1	38	47.5
Moderate Risk	2	24	30.0
High Risk	≥3	18	22.5
Total		**80**	**100.0**

Nearly one-fourth of patients belonged to the high-risk category, indicating a substantial burden of severe pneumonia requiring closer monitoring.

Table 4. Clinical Outcomes of Community-Acquired Pneumonia Patients (n=80)

Outcome Variable	Frequency (n)	Percentage (%)
ICU admission	18	22.5
Mechanical ventilation	10	12.5
Clinical recovery and discharge	74	92.5
In-hospital mortality	6	7.5
Mean duration of hospital stay (days)	7.8 ± 3.2	—

Most patients recovered and were discharged successfully. The overall mortality rate was 7.5%.

Table 5. Association Between CURB-65 Severity Category and Clinical Outcome

CURB-65 Category	ICU Admission n (%)	Mortality n (%)	Total	p value
Low Risk (0–1)	1 (2.6)	0 (0.0)	38	
Moderate Risk (2)	5 (20.8)	1 (4.2)	24	
High Risk (≥3)	12 (66.7)	5 (27.8)	18	
Total	**18**	**6**	**80**	**<0.001**

Chi-square test.

Higher CURB-65 scores were significantly associated with increased ICU admission and mortality ($p<0.001$), demonstrating the usefulness of CURB-65 in predicting adverse outcomes among CAP patients.

DISCUSSION

The present prospective observational study evaluated the clinical profile, severity, and outcomes of 80 patients admitted with community-acquired pneumonia (CAP) in a tertiary care hospital. CAP continues to be a significant cause of hospitalization among adults, particularly in elderly individuals and those with underlying comorbidities. The findings of the present study are largely consistent with previously published literature.

In the present study, the majority of patients (37.5%) were aged above 60 years, indicating a higher burden of CAP among older adults. Similar findings were reported by Jain et al., who observed that the incidence and hospitalization rates for CAP increased substantially with advancing age, particularly among individuals older than 65 years[1]. Fine et al. also identified advanced age as an important determinant of disease severity and mortality in CAP[2]. The increased

susceptibility among elderly individuals may be attributed to age-related decline in immune function, reduced mucociliary clearance, and a higher prevalence of chronic illnesses.

Regarding clinical presentation, fever (90%), cough with expectoration (85%), and dyspnea (72.5%) were the most common symptoms observed in the present study. These findings closely resemble those reported by Shah et al., who documented cough, fever, and breathlessness as the predominant presenting complaints among hospitalized CAP patients[3]. Likewise, Bansal et al. found productive cough and fever to be the most frequent manifestations of CAP[4]. The consistency of these findings supports the classical clinical presentation of pneumonia despite variations in geographical and demographic characteristics.

Comorbid illnesses were common in the present study, with diabetes mellitus (35%) and hypertension (30%) being the most prevalent conditions. Similar observations were made by Torres et al., who demonstrated that chronic medical disorders significantly increase the risk of hospitalization and adverse outcomes in CAP[5]. Shah et al. also reported diabetes mellitus as one of the most frequent comorbidities among Indian patients with CAP. The presence of these conditions may impair host immune defenses and contribute to increased disease severity[3].

Severity assessment using the CURB-65 scoring system revealed that 22.5% of patients belonged to the high-risk category. Lim et al., who originally developed the CURB-65 score, demonstrated that increasing scores were associated with progressively higher mortality and greater healthcare utilization[6]. Comparable distributions of severity categories have been reported in several hospital-based studies, emphasizing the usefulness of CURB-65 as a simple bedside prognostic tool.

With regard to outcomes, 22.5% of patients required ICU admission and 12.5% required mechanical ventilation. These findings are comparable to those reported by Restrepo et al., who observed ICU admission rates ranging between 15% and 25% among hospitalized CAP patients[7]. The requirement for intensive care generally reflects severe pulmonary involvement, respiratory failure, or the presence of systemic complications.

The overall in-hospital mortality observed in the present study was 7.5%. This mortality rate is similar to that reported by Bansal et al. and Shah et al., who documented mortality rates ranging from 6% to 10% among hospitalized CAP patients[3,4]. Although advances in antimicrobial therapy and supportive care have improved outcomes, mortality remains substantial, particularly among elderly patients and those with severe disease.

A significant association was observed between higher CURB-65 scores and adverse outcomes, including ICU admission and mortality ($p<0.001$). Patients categorized as high risk demonstrated markedly greater rates of intensive care requirement and death compared to low-risk patients. Similar findings were reported by Lim et al. and Fine et al., both of whom demonstrated that severity assessment tools effectively predict clinical outcomes and guide treatment decisions[2,6]. The present findings therefore reinforce the prognostic value of CURB-65 in routine clinical practice.

Overall, the results of the present study are in agreement with previous national and international studies. The study highlights that CAP predominantly affects elderly individuals with underlying comorbidities and that disease severity at presentation is a key determinant of clinical outcome. Early identification of high-risk patients through validated severity scores may facilitate timely intervention, appropriate resource allocation, and improved patient survival.

Limitations

The present study has certain limitations that should be considered while interpreting the findings. First, the study was conducted at a single tertiary care center with a relatively small sample size of 80 patients, which may limit the generalizability of the results to the broader population. Second, the study focused on short-term in-hospital outcomes and did not include long-term follow-up after discharge; therefore, late complications, readmissions, and long-term mortality could not be assessed.

Third, microbiological confirmation of the causative pathogen was not available in all patients, which restricted the evaluation of pathogen-specific clinical characteristics and outcomes. Additionally, treatment practices and antimicrobial regimens were determined by the treating physicians and were not standardized, which may have influenced clinical outcomes.

Finally, as an observational study, causal relationships between risk factors and outcomes cannot be definitively established. Larger multicentric studies with longer follow-up periods are warranted to validate these findings and provide more comprehensive insights into the management and prognosis of community-acquired pneumonia.

CONCLUSION

Community-acquired pneumonia remains a significant cause of hospitalization, particularly among elderly individuals and patients with underlying comorbidities such as diabetes mellitus and hypertension. In the present study, fever, productive cough, and dyspnea were the predominant clinical manifestations. Nearly one-fourth of patients presented with severe disease according to the CURB-65 scoring system, and these patients experienced significantly higher rates of ICU admission and mortality.

The overall in-hospital mortality was 7.5%, highlighting the continuing burden of CAP despite advances in diagnosis and treatment. The findings demonstrate that the CURB-65 score is a simple and effective tool for early risk stratification and prediction of adverse outcomes. Timely identification of high-risk patients, prompt initiation of appropriate therapy, and close monitoring may improve clinical outcomes and reduce mortality. The study emphasizes the importance of severity assessment in guiding management decisions and optimizing resource utilization in patients with community-acquired pneumonia.

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