



ORIGINAL RESEARCH PAPER

BACTERIOLOGICAL PROFILE AND ANTIMICROBIAL SENSITIVITY PATTERNS IN ACUTE EXACERBATION OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A TERTIARY CARE STUDY

General Medicine

KEY WORDS: AECOPD, sputum culture, antibiogram, antimicrobial resistance, COPD

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ABSTRACT

Background: Bacterial infections are an important precipitating factor for acute exacerbations of chronic obstructive pulmonary disease (AECOPD). Rising antimicrobial resistance has made empirical antibiotic therapy increasingly challenging. **Objectives:** To identify the common bacterial pathogens isolated from sputum samples of patients admitted with AECOPD and to assess their antimicrobial sensitivity patterns. **Methods:** This hospital-based cross-sectional study was conducted at a tertiary care teaching hospital over a period of 24 months. Sputum samples from 80 hospitalized AECOPD patients were subjected to culture and antibiotic sensitivity testing using standard microbiological techniques. The distribution of bacterial isolates and their antimicrobial susceptibility patterns were analyzed descriptively. **Results:** Bacterial growth was observed in a significant proportion of sputum samples, with gram-negative organisms predominating. *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* were the most frequently isolated pathogens. High sensitivity was noted to carbapenems and piperacillin-tazobactam, while resistance to penicillins and fluoroquinolones was common. **Conclusion:** Gram-negative bacteria are the predominant pathogens in AECOPD. Periodic local antibiograms are essential to guide appropriate empirical antibiotic therapy and combat antimicrobial resistance.

INTRODUCTION

Acute exacerbations of chronic obstructive pulmonary disease (AECOPD) are a major cause of morbidity, hospitalization, and mortality in patients with COPD. Among the various triggers, bacterial infections play a crucial role, accounting for approximately 40% of exacerbations in developing countries.

Empirical antibiotic therapy is frequently initiated in hospitalized AECOPD patients. However, indiscriminate antibiotic use has led to the emergence of resistant bacterial strains, reducing treatment efficacy. Knowledge of local bacterial flora and antimicrobial sensitivity patterns is therefore essential for rational antibiotic selection. This study was undertaken to evaluate the bacteriological profile and antibiotic susceptibility patterns in patients hospitalized with AECOPD.

MATERIALS AND METHODS

Study Design

Hospital-based cross-sectional observational study.

Study Setting

Sri Siddhartha Medical College & Hospital, Tumakuru, Karnataka.

Study Period

March 2024 to March 2026.

Study Population

Eighty patients admitted with a clinical diagnosis of AECOPD as per GOLD 2025 criteria.

Inclusion Criteria

Patients diagnosed with AECOPD requiring hospitalization.

Exclusion Criteria

Patients with pulmonary tuberculosis, pneumonia, bronchial asthma, malignancy, cystic fibrosis, or ischemic heart disease.

Sample Collection And Processing

Expecterated sputum samples were collected under aseptic precautions and transported to the microbiology laboratory within two hours. Samples were subjected to Gram staining, culture, and antibiotic sensitivity testing using standard microbiological protocols.

Statistical Analysis

Data were analyzed using descriptive statistics and expressed as percentages and frequencies.

RESULTS

Table 1: Sputum Culture Results

Culture Result	Number	Percentage
Growth present	34	42.5%
No growth	46	57.5%
Total	80	100%

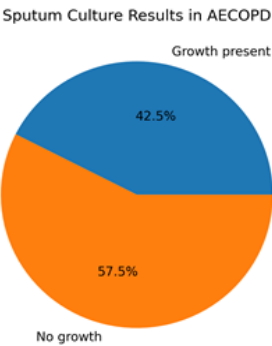


Table 2: Distribution Of Bacterial Isolates

Organism	Number	Percentage
<i>Klebsiella pneumoniae</i>	12	15.0%
<i>Pseudomonas aeruginosa</i>	6	7.5%
<i>Staphylococcus aureus</i>	6	7.5%
<i>Streptococcus pneumoniae</i>	5	6.2%
Actinobacter species	5	6.2%

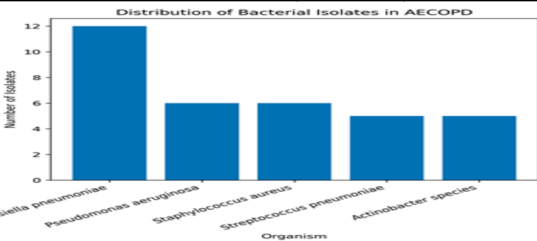


Table 3: Antibiotic Sensitivity Pattern – Gram Negative Isolates

Antibiotic	Sensitivity
Imipenem	High
Piperacillin–Tazobactam	High
Amikacin	Moderate–High
Fluoroquinolones	Low–Moderate

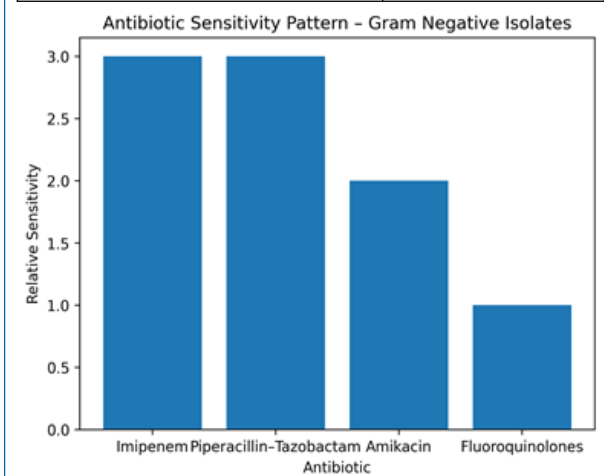
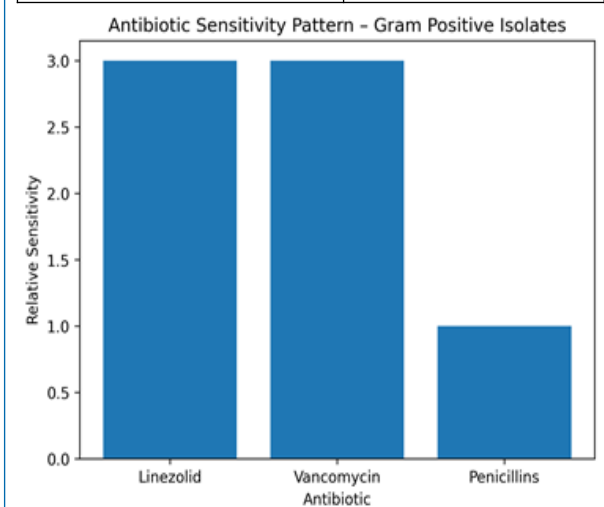


Table 4: Antibiotic Sensitivity Pattern – Gram Positive Isolates

Antibiotic	Sensitivity
Linezolid	High
Vancomycin	High
Penicillins	Low



DISCUSSION

This study demonstrates that bacterial infection remains a significant contributor to AECOPD, with gram-negative organisms predominating. *Klebsiella pneumoniae* was the most common isolate, followed by *Pseudomonas aeruginosa*, consistent with findings from other Indian studies.

High sensitivity to carbapenems and piperacillin–tazobactam suggests their continued effectiveness in severe cases. However, resistance to commonly used antibiotics such as penicillins and fluoroquinolones raises concerns regarding empirical therapy. These findings highlight the importance of sputum culture-guided antibiotic selection.

CONCLUSION

Gram-negative bacteria are the predominant pathogens in hospitalized AECOPD patients. Regular surveillance of bacterial profiles and antimicrobial sensitivity patterns through institutional antibiograms is essential to guide empirical therapy and reduce antimicrobial resistance.

REFERENCES (PARIPEX-appropriate:8–10)

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