



## Clinical Profile and Aetiology of Nosocomial Pneumonia in a Tertiary Care Centre

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Pneumonia is a common medical problem encountered in clinical practice and it is the leading cause of fatal infectious disease worldwide. Pneumonia is diagnosed by the presence of new lung infiltrates in the presence of evidence of infection like new onset fever, purulent sputum, leucocytosis and fall in oxygen saturation<sup>1</sup>.

Hospital acquired pneumonia (HAP) or nosocomial pneumonia is the second most common hospital acquired infection and is the leading cause of death among hospital acquired infections<sup>2</sup>. It is defined as pneumonia that occurs 48 hours or more after admission and did not appear to be incubating at the time of admission. Ventilator associated pneumonia is pneumonia that develops more than 48 to 72 hours after endotracheal intubation<sup>3,4</sup>. The most common pathogens causing HAP are gram negative bacilli such as *Pseudomonas aeruginosa* and *Acinetobacter* spp, and gram-positive organisms like methicillin resistant *Staphylococcus aureus*<sup>5,6</sup>. Hospital acquired pneumonia considerably increases the morbidity, mortality, length and cost

of hospital stay. So, efforts should be made to prevent hospital acquired infections, the best possible way to reduce in hospital morbidity and mortality

### Aim of the study

To study the clinical profile and etiology of hospital acquired pneumonia.

### Materials and Methods

Patients admitted to Institute of Chest Diseases, Government Medical college, Kozhikode developing features of pneumonia more than 48 hours after admission in the form of i) new onset fever, ii) leucocytosis/leukopenia, iii) progressive radiological infiltrates were the study population. Patients referred from other hospitals with a diagnosis of hospital acquired pneumonia were also included in the study.

**Study Design:** Observational Study

**Study period:** January 2013- July 2014

**Sample Size:** 55

**Inclusion Criteria:** Persons who develop features of pneumonia more than 48 hours after admission

to the hospital. Pneumonia was defined according to ATS diagnostic guidelines- presence of new/ progressive pulmonary infiltrates not otherwise explained, Plus any two of the following

Temperature >38°C

Leucocytosis (Total count > 11,000/mm<sup>3</sup>) or leukopenia ( Total count < 4000/mm<sup>3</sup>)

Purulent respiratory secretions

**Exclusion criteria**

- Patients admitted with community acquired pneumonia
- Onset of new symptoms less than 48 hours of hospital admission
- Children < 18 years of age

**Methodology**

The patients who met the inclusion criteria were enrolled in the study after obtaining informed consent. A sputum culture and blood culture samples were sent immediately. Endotracheal aspirates were sent for culture in case of intubated patients. Then the patients were started on broad spectrum antibiotics. Susceptibility test to extended spectrum penicillin, cephalosporins, aminoglycosides, quinolones and polypeptides were done for each gram -negative isolates. Sensitivity to penicillin and vancomycin was done if a gram-positive organism was isolated.

**Results**

Total number of patients: 55

Males :44

Females : 11

**Age group:**

< 30 yrs	31-60yrs	>60yrs
8	17	30

Fever was present in 52 out of 55 patients (94.5%). All patients had leucocytosis. Increase in the quantity or purulence of sputum/ tracheobronchial secretions was present in 51 patients (92.7%)

Out of the 55 cases of HAP, 10 patients had ventilator associated pneumonia.

Since the study was conducted in a Pulmonary Medicine department, 46 out of 55 patients had underlying lung disease.

Underlying lung disease	No of patients
COPD	21
Bronchiectasis	10
Carcinoma lung	7
Asthma	5
Interstitial lung disease	3

The remaining 9 patients were referred from other hospitals with a diagnosis of hospital acquired pneumonia.

**Other risk factors**

Presence of other comorbidities also increases the risk of developing pneumonia. 16 out 55 (29%) patients in this study were diabetics.

The number of patients with long term inhaled or systemic steroids was 23 (42%)

30 out of 55 patients (54.5%) who had HAP were current or ex-smokers.

**Early vs Late onset HAP**

Hospital acquired pneumonia can be further classified into early onset (less than 96 hours of hospital admission) and late onset (more than 96 hours) HAP.

In this study 10 patients had early onset HAP and the remaining 45 patients had late onset HAP.

**Microbiological diagnosis**

Endotracheal aspirates were sent in the 10 patients with VAP and in the remaining 45 patients sputum was sent for bacteriological culture and drug sensitivity testing. Blood culture was sent in all the patients.

A positive culture was obtained in 33 out of 45 sputum samples (73.3%)

The organisms isolated in sputum culture were the following

Organism	Number of cases
Acinetobacter spp	12
Pseudomonas aeruginosa	8
Klebsiella pneumoniae	5
Enterobacter spp	3
Staphylococcus aureus	2
Proteus species	2

On the other hand, a positive microbiologic diagnosis was obtained in 9 out of 10 patients with VAP from endotracheal aspirate.

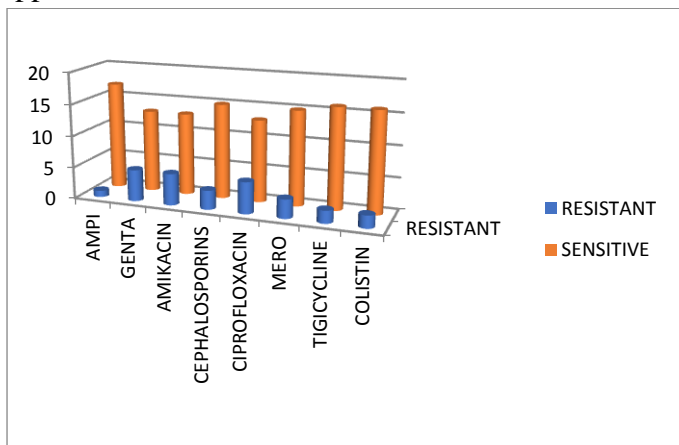
Organisms isolated from endotracheal aspirate were the following

Organism isolated	No of patients
Acinetobacter spp	6
Klebsiella pneumoniae	2
Pseudomonas aeruginosa	1

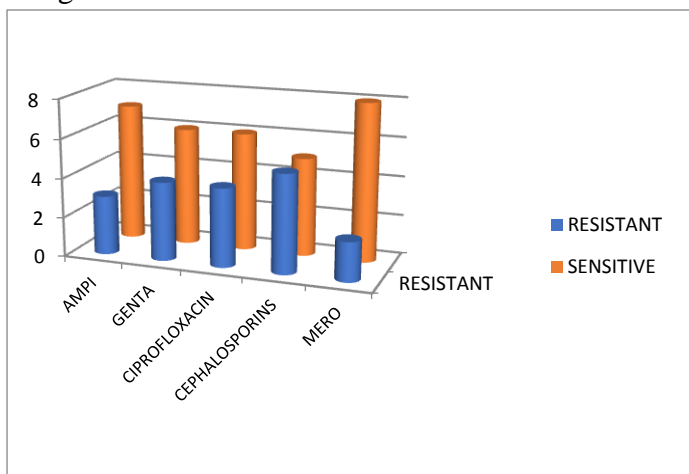
One patient had a positive blood culture and staphylococcus aureus was isolated.

Acinetobacter was the most common organism isolated from HAP patients in this study.

**Fig 1:** Drug sensitivity pattern of Acinetobacter spp.



**Fig 2 :** Drug sensitivity pattern of Pseudomonas aeruginosa



**Outcome**

The overall mortality in patients with HAP in this study was 27% (15 out of 55). There was a 60% mortality among ventilated patients (VAP), compared to 20% mortality among non-ventilated patients

**Discussion**

In this study conducted in a tertiary care Pulmonary Medicine department, it was found that majority of patients were males. Increasing age was also found to be a risk factor for HAP. In a study by Celis R et al it was found that age above 70 years was found to be a risk factor<sup>7</sup>. Other risk factors for HAP was found to be tobacco smoking and diabetes mellitus. Since the study was conducted in a Pulmonary Medicine department majority of patients (83.6%) had an underlying lung disease, and COPD was the most common lung disease.

Microbiological diagnosis was possible in 73% of patients with HAP and Acinetobacter spp. was the most common organism isolated followed by Pseudomonas aeruginosa. Pseudomonas aeruginosa was the most common gram-negative bacilli isolated in a study by Jones RN on hospital acquired pneumonia<sup>5</sup>.

There were 10 patients with ventilator associated pneumonia in this study. The normal host defence is bypassed when the patient is Intubated and mechanically ventilated, predisposing the patient to develop ventilator associated pneumonia. It is also associated with high morbidity and mortality, as the patients are critically ill. The mortality rate among VAP patients in this study is 60%. In a study on mortality in VAP patients by Blot S et al, the reported mortality was between 35 and 51%<sup>8</sup>. Majority of patients in this study had underlying lung disease as well as comorbidities like diabetes mellitus and chronic steroid use which may have contributed to the development of pneumonia as well as associated morbidity and mortality.

**Conclusion**

Gram negative bacteria is the predominant microbiological agent of hospital acquired pneumonia. Most common organisms isolated were Acinetobacter spp and Pseudomonas. Tobacco smoking, diabetes mellitus and use of chronic systemic or inhaled steroids were the predominant risk factors for development of hospital acquired pneumonia. Presence of chronic

lung disease like COPD is also a significant risk factor for HAP. As with previous data, this study also suggest the use of initial empirical antibiotics against gram negative bacilli , for treating hospital acquired pneumonia.

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