

## Bacteriological Profile of Community Acquired Pneumonia

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**Abstract: Introduction:** Community acquired pneumonia (CAP) is a common health problem seen in all age groups. The risk increases with increase in the age. It has very high morbidity and mortality. Smokings, COPD, older age are risk factors for CAP. Gram negative organisms are more commonly associated with older age. Once the culture reports are obtained, the treatment has to be changed according to the identified organism.

**Aim:** To determine common aetiological (bacterial) agents for CAP in adults from sputum samples.

**Methods:** Sputum samples are obtained for culture. The sputum was inoculated on MacConkey's agar, sheep blood agar & Chocolate agar. Blood was inoculated into BHI broth and subculture was done on alternate days for 7 days. The isolates were identified by Gram's stain and biochemical tests.

**Results:** Out of 100 cases, the isolation rate was 72% from Sputum culture. The culture predominantly yielded *Klebsiella* spp followed by *S. pneumoniae*.

**Conclusion:** Gram's staining is the initial screening test. Sputum culture helps to a great extent in the diagnosis and treatment.

**Key words:** Community acquired pneumonia, sputum culture, bacteria.

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### I. Introduction:

Community-acquired pneumonia (CAP) is one of the most common infectious diseases addressed by clinicians. CAP is an important cause of mortality and morbidity worldwide.

A number of pathogens can give rise to CAP. Typical bacterial pathogens that cause the condition include *Streptococcus pneumoniae* (penicillin-sensitive and resistant strains), *Haemophilus influenzae* (ampicillin-sensitive and -resistant strains), and *Moraxella catarrhalis* (all strains penicillin-resistant). These 3 pathogens account for approximately 85% of CAP cases.

CAP is usually acquired via inhalation or aspiration of pulmonary pathogenic organisms into a lung segment or lobe.

Less commonly, CAP results from secondary bacteraemia from a distant source, such as *Escherichia coli* urinary tract infection and/or bacteraemia.

Aspiration pneumonia is the only form of CAP caused by multiple pathogens (e.g., aerobic/anaerobic oral organisms).

CAP morbidity and mortality are highest in elderly patients and in immunocompromised hosts.

There are over a hundred microorganisms which can cause CAP. The most common types of microorganisms are different among different groups of people. Newborn infants, children, and adults are at risk for different spectrums of disease causing microorganisms. In addition, adults with chronic illnesses, who live in certain parts of the world, who reside in nursing homes, who have recently been treated with antibiotics, or who are alcoholics are at risk for unique infections. Even when aggressive measures are taken, a definite cause for pneumonia is only identified in half the cases.

CAP can be diagnosed by symptoms and physical examination alone, though x-rays, examination of the sputum, and other tests are often used.

The majority of patients with CAP are treated empirically based on the most common pathogen(s) associated with the condition. But an increase in the prevalence of drug resistance to antibiotics among common pathogens has been recognized as a problem [1]. Hence, it is required to document the initial antibiotic choice based on the common pathogens isolated and antimicrobial resistance patterns in that community.

**Aim:** To determine common aetiological (bacterial) agents for CAP in adults from sputum samples.

### II. Methodology:

100 cases were selected from the patients attending the Medicine out-patient and in-patient departments of Kempegowda Institute of Medical Sciences, Bangalore.

#### Inclusion criteria:

1. A new pulmonary infiltration on chest roentgenogram on admission or within 24 hrs.

2. Clinical findings:

Major criteria- Cough, sputum production, or fever  $>37.8^{\circ}\text{C}$

Minor criteria- Pleuritic chest pain, dyspnea, altered mental status, pulmonary consolidation by examination, WBC count  $>11,000/\text{mm}^3$ .

For confirmation atleast 1 of the major criteria or 2 of the minor criteria need to be present.

**Exclusion criteria**

1. Patients with previous admission in either a private resident or a nursing home. Patients with a previous hospitalization or transfer from another hospital within 7 days of the current diagnosis of pneumonia.
2. Patients in whom chest roentgenogram abnormalities were attributed to congestive heart failure, pulmonary embolism or chronic underlying lung disease. [1]

**Method of study** – Cross Sectional Observational Clinical Study

**Sputum collection:** Early morning deeply coughed out sputum was collected in a sterile wide mouthed container.

**Sputum:** Gram's stain was done and looked for pus cells, epithelial cells and bacteria. Those specimen with  $>25$  pus cells were put into culture. The specimen was inoculated on Mac Conkey's agar, sheep Blood agar and Chocolate agar and incubated at  $37^{\circ}\text{C}$  for 18-24hrs. The growth was subjected to Gram's staining and biochemical tests for identification.

**Statistical methods:** Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

**III. Results:**

**Table 1: Gram's stain**

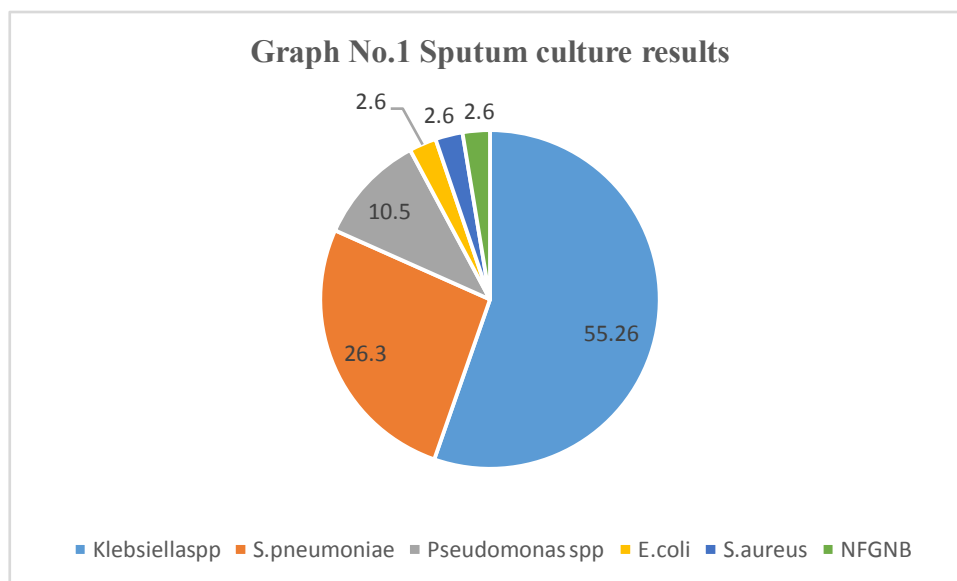
Gram's stain	Number of patients (n=72)	%
$>25$ PC $<10\text{EC/LPF}$	58	80.5%
$>25$ PC $>10\text{EC/LPF}$	14	19.4%
Not done	28	-

\*Sputum could not be obtained in 28 patients

**Table 2: Sputum culture**

Sputum culture	Number of patients (n=72)	% of organisms isolated
Normal Commensals	34	-
Organisms Isolated	38	100.0
Klebsiellaspp	21	55.26
S.pneumoniae	10	26.3
Pseudomonas spp	4	10.5
E.coli	1	2.6
S.aureus	1	2.6
NFGNB	1	2.6

Note: 2 patients samples shown isolation of 2 pathogens



#### IV. Discussion:

##### Gram's stain:

Sputum Gram's stain is necessary to check the suitability of the specimen for culture. The present study shows higher rate of isolation of potential pathogens in the specimens containing > 25 pus cells and <10 epithelial cells per LPF as compared to specimens containing > 25 pus cells and > 10 epithelial cells per LPF. This shows that isolating potential pathogens increases markedly when the specimen contains fewer epithelial cells. The study is consistent with the study of Manolito L. Chua et al 1996[2]

In the present study, aetiology was achieved only in 38 cases (38%). The low rate of isolation could be due to non-availability of sputum in all cases (28%), prior antibiotic administration, and lack of availability of serological methods for the detection of Mycoplasma, Chlamydia, Legionella and viruses.

In the present study the most common organism isolated was Klebsiellaspp followed by S.pneumoniae and Pseudomonas spp. Indian studies over the last three decades have reported higher incidence of gram negative organisms among culture positive pneumonia[3,4] While few studies from India, U.S. and UK also reported that S. pneumoniae as the common isolated pathogen in 20-35% of cases.[5,6,7,8]

#### V. Conclusion:

Identification of the specific pathogen in acute bacterial pneumonia is necessary for rational and appropriate antibiotic therapy.

In this study the sputum culture yielded the isolation of potential pathogens in 54.5% cases. Chances of isolation from sputum is more if the specimen under Gram's stain shows >25 pus cells and <10 epithelial cells per LPF.

Klebsiella species is the most common organism isolated followed by S.pneumoniae

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