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Bacteriological Profile of Community Acquired Pneumonia in a Tertiary Care Hospital

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A B S T R A C T

Pneumonia occurring in a hospital or long term care facilities remains a common and serious illness, despite the availability of potent new antibiotics and effective vaccines. Aim of the study is to identify and isolate the bacteria causing pneumonia in hospitalized patients. The present study was carried out from June 2014 to July 2015 in the department of microbiology, Smt. Kashibai Navale Medical College and General Hospital, Pune. Total 920 blood, sputum and BAL (Broncho Alveolar Lavage) samples were received during this period. All were processed for identification of bacteria as per standard microbiological procedures. 1) Out of 920 samples 280 (30.43%) grew the pathogenic bacteria. 2) Among 280 isolates *Klebsiella pneumoniae* 42.85% was the most common followed by *Pseudomonas aeruginosa* 28.57%, *Staphylococcus aureus* 21.43% and *Streptococcus pneumoniae* 7.14%. Gram negative bacilli predominate in the bacteriological profile of pneumonia.

Introduction

Community Acquired Pneumonia (CAP) occurring in a hospital or long term care facilities remains a common and serious illness, despite the availability of potent new antibiotics and other effective therapies (Aroma *et al*., 2006). CAP is defined as pulmonary infiltration of the lung revealed by radiographic examination at the time of admission, including at least two of the following

1. Fever (temp >37.8^0 C)
2. Production of purulent sputum
3. Cough
4. Leucocytosis (WBC count >10000/ cumm)[1]

The etiological agents of CAP are different in different countries. It varies with time and geographical distribution within the same country. *Streptococcus pneumoniae* is the most common etiological agent in United Kingdom, Europe, United States of America and Iraq. In India *S. pneumoniae* is most common organism in Delhi, Shimla and Mumbai whereas *Pseudomonas aeruginosa* in Ludhiana (Shah *et al*., 2010; Lode, 2007; Bansal *et al*., 2004).

CAP is diagnosed by physical examination, X-ray and laboratory investigations. Invasive methods are the most effective methods for diagnosis of CAP but it has drawback of

technical difficulty and sample contamination due to oropharyngeal secretions (Bansal *et al*., 2004; Peto *et al*., 2014). The present study was undertaken to determine the bacteriological profile of CAP.

The main aim of this study is to identify and isolate the bacteria causing community acquired pneumonia in hospitalized patients.

Materials and Methods

The present study was carried out from June 2014 to July 2015 in the department of microbiology, Smt. Kashibai Navale Medical College and General Hospital, Pune. Total 920 blood, sputum and BAL (Broncho Alveolar Lavage) samples were received during this period (Table 1). All were processed for identification of bacteria as per standard microbiological procedures.

Inclusion criteria

For CAP clinically diagnosed and radiologically diagnosed adult cases of pneumonia were included.
All specimens were collected before administration of antibiotics and processed as per standard bacteriological techniques.

Exclusion criteria

Any patient of pediatric age group.

Cases of tuberculous pneumonia screened by Zeihl Neelson stain.

Processing

Sputum and Broncho Alveolar Lavage- Gram and ZN staining were performed. In gram staining Murray Washington's grading system was followed for culturing (Koneman *et al*., 2005). ZN stain was used to rule out TB cases. Blood- five to ten ml blood was collected in blood culture bottle before administration of antibiotics. All samples were inoculated on Blood, Chocolate and MacConkey's agar. All media were incubated at 37^{o}C for 18 to 24 hrs. The bacterial growth was subjected to gram staining and biochemical reactions for identification (Koneman *et al*., 2007; Collee *et al*., 2012).

Results and Discussion

Out of 920 samples 280(30.43%) grew the pathogenic bacteria (Fig. 1). Sputum Gram stain is necessary to check suitability for culture; in our study we found 21.33% saliva samples. So quality of specimen has an important role in diagnosis of CAP. Bacterial etiology was found only in 30.43% cases. Our results are consistent with Shah *et al.,* (2010) (29%), but studies of Bansal *et al.,* (2004) (75.6%) and Mythri *et al.,* (2013) (72%) were having high isolation rate. Low rate of isolation could be due to quality of sputum, prior antibiotics and lack of availability of serological methods for the detection of *Mycoplasma*, *Chlamydia*, *Legionella* and viruses. Percentage also depends on total number of samples tested we have a huge number compared to other studies, so may be affecting the positivity percentage.

In our study, total of 84.28% cases were above 50 years age with male preponderance while Shah *et al.,* (2010) reported that 67% of cases are above 50 age group. Obero *et al.,* (2007) found that the mean age group suffering from CAP was 40 years (Fig. 2). So increasing age may be one of the risk factor for pneumonia. Other risk factors are smoking, alcoholism, COPD, diabetes and chronic kidney disease (Ramana *et al*., 2013).

Among 280 isolates *Klebsiella pneumoniae* 42.85% (120/280) was the most common followed by *Pseudomonas aeruginosa* 28.57% (80/280), *Staphylococcus aureus* 21.43% (60/280) and *Streptococcus pneumoniae* 7.14% (20/280) (Table 2).

Table.1 Distribution of samples

SAMPLE	NO.
BLOOD	200
SPUTUM	480
BAL	240
TOTAL	920

Table.2 Culture results

BACTERIA NAME	NUMBER
Klebsiella pneumoniae	120
Pseudomonas aeruginosa	80
Staphylococcus aureus	60
Streptococcus pneumoniae	20
Total	280

Fig.1 Sex distribution of cases

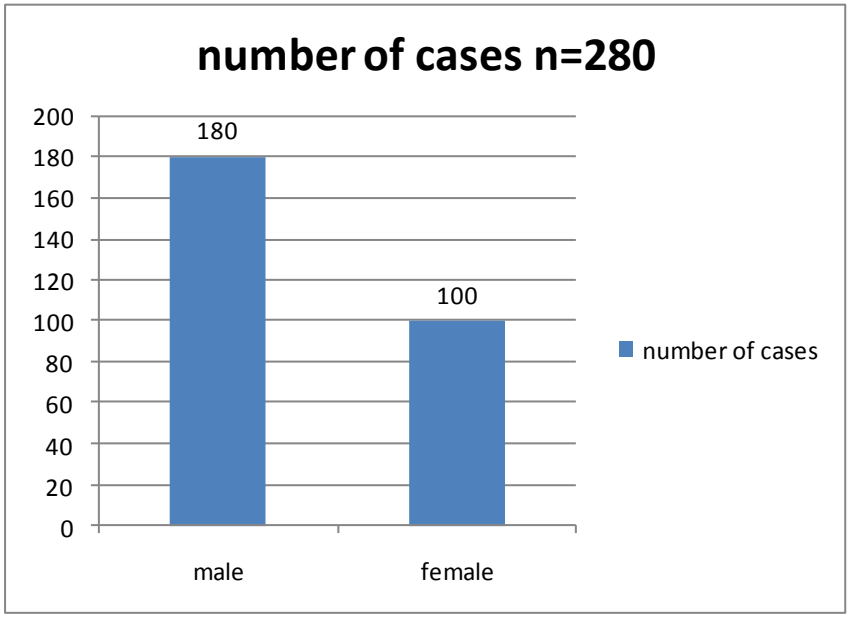


Fig.2 Age wise distribution of cases

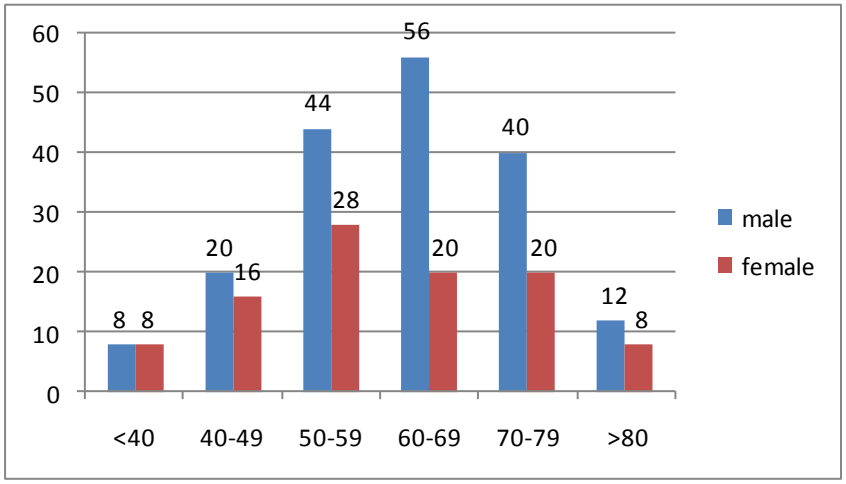
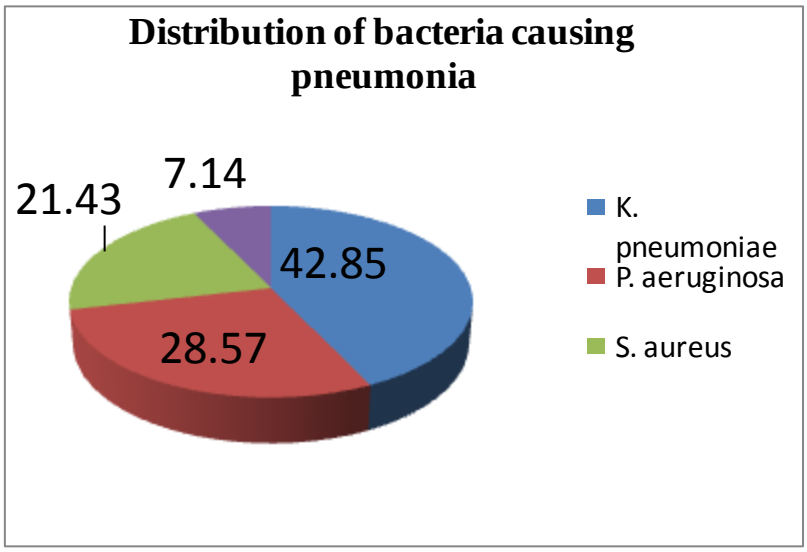


Fig.3 Distribution of bacteria causing pneumonia



Shah *et al.,* (2010) reported *Pseudomonas aeruginosa* (34.48%) as the most common pathogen followed by *Staphylococcus aureus* (24.14%). Mythri *et al.,* (2013) reported that the most common pathogen was *Klebsiella* spp followed by *S. pneumoniae* and *P. aeruginosa*. Ramana *et al.,* (2013) revealed that *Klebsiella pneumoniae* (45.1%) was the predominant followed by *Citrobacter freundii* (12.9%), *Pseudomonas aeruginosa* (9.6%) and *Staphylococcus aureus* (9.6%).

Oberoi *et al.,* (2006) have reviewed three decades scenario for culture positive pneumonia cases in India. They have reported higher incidence of gram negative organisms among culture positive pneumonia. In our study we have also seen the predominance of gram negative organisms (Fig. 3).

In conclusion Gram negative bacilli predominate in the bacteriological profile of pneumonia. In our tertiary care hospital

Klebsiella pneumoniae was the most common pathogen causing CAP followed by *Pseudomonas aeruginosa*. There is need to perform other serological tests to identify atypical and viral pathogens in all patients admitted with CAP. Identification of etiological agent in CAP is very important to start the appropriate antimicrobial drug. It is essential because indiscriminate use of antibiotics had led to wide spread emergence of multidrug resistant pathogens. The profile of bacterial agents varies with the geographical area, so it is necessary to do the surveillance to find out the exact causative agents. This will help to form the proper antibiotic policy for that particular hospital, which in turn will reduce the patient mortality and morbidity.

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