Clinico-bacteriological profile of community acquired pneumonia in a tertiary care hospital (rural based)

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Abstract
Respiratory tract infections are the most frequent of all the infections. Pneumonia is the commonest disease with a high prevalence in the community. The knowledge and identification of organisms causing community acquired pneumonia helps in early start of empirical treatment. The study was carried out to know the bacterial etiology of community acquired pneumonia and to find out the antibiotic sensitivity pattern of isolated bacteria. This study was a prospective cross sectional time based study of 174 patients carried out at tertiary care hospital. Sputum sample was collected and screened by gram's staining and inoculated on Blood agar, MacConkey's agar. Antibiotic sensitivity was performed as per CLSI guidelines by Modified Kirby Bauer method. Out of total 174 patients micro-organisms were identified in 102 patients (60%). Micro-organisms isolated in sputum were Klebsiella pneumoniae (46.22%) followed by Pseudomonas aeruginosa (21.69%). Organisms were found to be sensitive to ceftriaxone plus sulbactum, imipenem, piperacillin plus tazobactum, piperacillin and ceftazidime. Most of the patients showed good response to third generation cephalosporin's, macrolides or in a combination. Bacteriological profile of CAP varies geographically. There is a need to conduct regular prevalence and antibiogram studies to develop empirical guidelines for treatment of CAP.'

Keywords: Pneumonia, Bacteriological profile, Klebsiella pneumoniae.

Introduction
Respiratory tract infections are the most frequent of all the infections and accounts for the number of work days lost in the general population. Among them, pneumonia is the commonest disease with a high prevalence in the community and a cause of significant mortality and morbidity.[1] Pneumonia is broadly defined as any infection of lung parenchyma. Pneumonia is clinically divided into community acquired pneumonia (CAP) and nosocomial pneumonia. Infectious diseases Society of America defines CAP as "an acute infection of the pulmonary parenchyma that is associated with at least some symptoms of acute infection, accompanied by the presence of an acute infiltrate on a chest radiogram or auscultatory findings consistent with pneumonia in a patient not hospitalized or residing in a long-term care facility for more than 14 days before onset of symptoms.[1-4]

Etiology of community acquired pneumonia is generally bacterial but the microbial pattern varies from place to place and so does the antimicrobial sensitivity and emerging resistant pattern. CAP is leading cause of death in the world. But the seriousness of CAP despite a reasonably common and potentially lethal disease, often is underestimated by physician and patient alike. The treatment of CAP is complicated by growing threat of antimicrobial resistance and the tendency to rely on empirical therapy. The resistant strains of bacteria can quickly multiply and spread within the community. Recent years have witnessed the emergence of new pathogens and newer antibiotics designed to combat them.[1]

In the Indian scenario, studies on bacteriological profile are few and far between, and are mostly confined to limited geographical areas. Our study is a sincere attempt to look into various causative bacterial agents of CAP, predisposing factors and sensitivity pattern of bacteria in this geographical area. This will help to plan therapy among patients in limited facility setting.

Aims and Objectives
1. To know the bacterial aetiology of Community Acquired Pneumonia (CAP).
2. To find out the antibiotic sensitivity pattern of isolated bacteria.

Materials and Methods
This study is a prospective cross sectional time based study from August 2016 to September 2016 (2 months) carried out at tertiary care hospital in Central India.

Study Population: All patients with clinically and radiologically diagnosed pneumonia attending our hospital between above period were enrolled in study. A detailed history, clinical examination & investigation were carried out in all the cases as per proforma attached. Prior to the study the protocol was approved by the institutional ethics committee.

Inclusion Criteria: All patients of either sex over 15yrs of age presenting to Paediatrics, Medicine or Pulmonary Medicine Department with CAP who have not resided in hospital in last 14 days.

CAP was defined as new or progressive infiltrates on chest radiograph together with at least two of the following: - fever, cough, production of purulent sputum or leucocytosis > 10,000/mm^3.

Exclusion Criteria: Patients with radiographic or laboratory evidence suggestive of AIDS, Leukaemia and TB, those with chest infiltrate due to other causes such as congestive heart failure, pulmonary infarction or lung cancer, Patients receiving immunosuppressive treatment.

Collection of Specimen: All samples were collected preferably before start of antibiotics. If patient was already on antibiotics, samples were collected just prior to next dose of antibiotics. Sputum was collected.

Sputum Collection: Patient was advised to rinse mouth several times with water and to cough deeply to produce sputum from depth of lung. Spontaneously expectorated sputum specimen was collected in sterile specimen container and transported and processed immediately in hospital microbiology laboratory. Patient who could not expectorate sputum, BAL (Broncho-Alveolar) fluid was collected.

Processing of Specimens: All sputum samples were screened by Gram's staining. All specimens were inoculated on Blood agar, MacConkey's agar and incubated at 37^0 C. The plates were examined for growth after 24 hrs. The bacteria were identified by standard bacteriological tests.[5] Antimicrobial sensitivity was performed as per CLSI guidelines by Modified Kirby Bauer Method. MRSA was reported by the growth and morphology on blood agar plate, gram staining, catalase test, coagulase test and resistance to 30 microgram cefoxitin disc on mueller-hintton agar.[5,6]

Results

Among 174 patients 104 were males (59.77%) and 70 (40.22%) were females. Maximum patients were in age group 51-60yrs in males (18.96%) and in females (16.09%). Symptoms on presentation in decreasing order of frequency were cough, fever, crepitations, expectoration and bronchial breath sound (Table 1).

Table 1: Symptoms and sign of patients (n=174)

Symptoms and signs	No.	%
Cough	165	94.82
Fever	156	89.65
Crepitation	141	81.03
Bronchial Breath Sound	123	70.68
Expectoration	130	74.71
Pleuritic Chest Pain	87	50
Dyspnoea	62	35.63
Pallor	45	25.86
Cyanosis	34	19.54
Haemoptysis	3	1.72

In our study the culture was positive in 60 cases in males (n=104) (57.69%) and 42 in females (n= 70) (60%). In our study the most frequent pathogen was Klebsiella pneumoniae (46.22%) followed by Pseudomonas (21.69%). (n=106) * Out of 104 plates, 2 plates showed 2 different organisms grown on culture (Table 2).

Table 2: Organisms grown on culture

Organisms	No.	Percentage
Klebsiella pneumoniae	49	46.22
Pseudomonas aeruginosa	23	21.69
Candida	3	2.83
Staphylococcus aureus	6	5.66
Streptococcus pyogenes	11	10.37
MRSA	7	6.6
Enterobacter	1	0.94
Acinetobacter	1	0.94
Non-fermenter	5	4.71
Total	106	100

Antimicrobial sensitivity pattern:

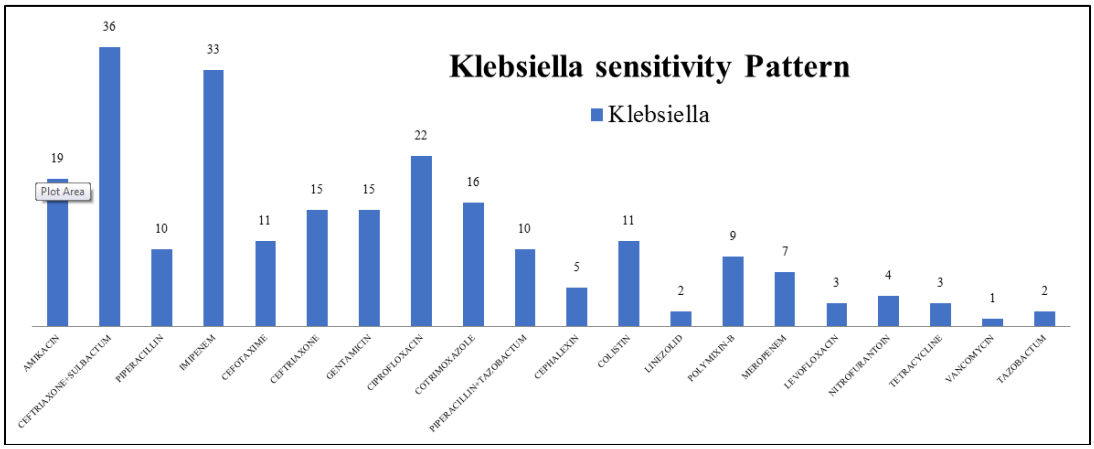

Fig. 1: Klebsiella sensitivity pattern

Klebsiella pneumoniae showed sensitivity to ceftriaxone - sulbactum (73.46%) followed by imipenem (67.34%) and ciprofloxacin (44.89%) (Fig. 1).

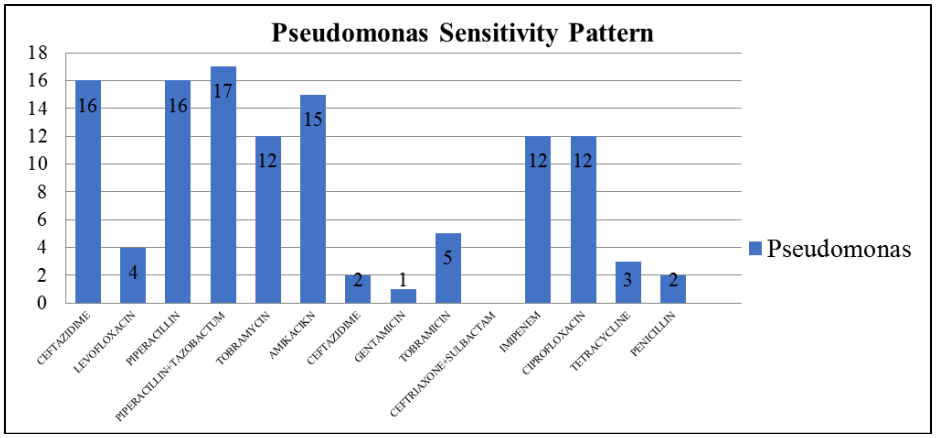

Fig. 2: Pseudomonas sensitivity Pattern

Pseudomonas showed sensitivity for piperacillin + tazobactum (73.91%), piperacillin and ceftazidime (69.56% each) (Fig. 2).

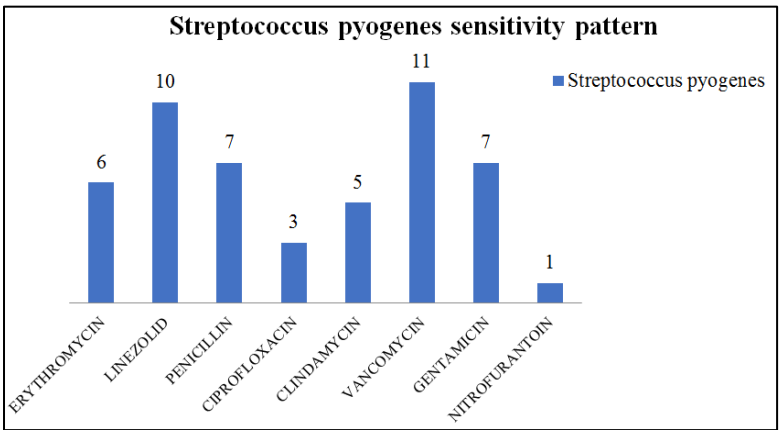

Fig. 3: Streptococcus pyogenes sensitivity pattern

Streptococcus showed sensitivity for vancomycin (100%), linezolid (90.90%), ciprofloxacin (63.63%) and gentamycin (63.63%) (Fig. 3).

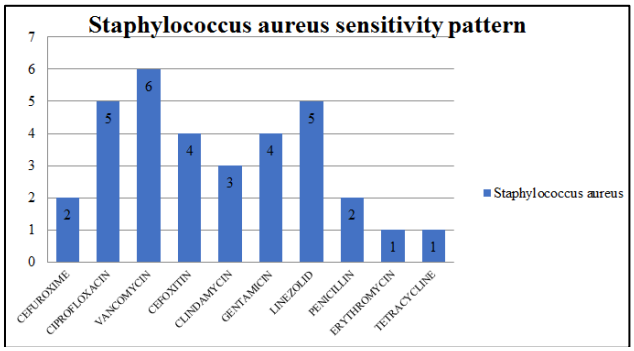

Fig. 4: Staphylococcus aureus sensitivity pattern

Staphylococcus (C –ve) showed sensitivity for vancomycin (100%), ciprofloxacin and penicillin (83.33% each) (Fig. 4).

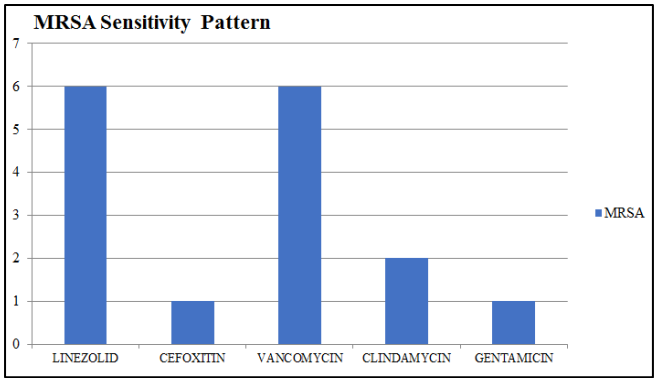

Fig. 5: MRSA sensitivity pattern

Methicillin resistant staphylococcus aureus (MRSA) showed sensitivity for linezolid and vancomycin (85.71% each) (Fig. 5). Non fermental growth showed sensitivity for cephalexin (80%) and imipenem (60%). Enterobacter showed sensitivity for amikacin, cotrimoxazole, imipenem, ceftriaxone, gentamicin, Pi, P+T (100%) Acinobacter showed sensitivity for amikacin, ciprofloxacin, cephalexine and ceftriaxone (100%).

Discussion

The role of microbiology lab in diagnosis of CAP remains very important. The common age group affected in the present study was 51-60 years. Other studies have also reported similar findings i.e. Acharya VK et al[1] In our study, bacterial growth was found positive in 60%. It correlates with study of Gupta et al.[7] In present study, the most frequent pathogen was Klebsiella pneumoniae followed by Pseudomonas aeruginosa. Similar reports were reported by other studies.[1,4,8] In our study, most of the patients showed good response to third generation cephalosporin's, macrolides or in a combination. It correlates well with study of Acharya VK et al.[1]

Limitations

In present study, only bacterial causes of Community Acquired Pneumonia were included. Further studies can include tests for viral & atypical pathogens. Relevant outcomes such as speed of response, subsequent relapse rates, and harmful antibiotic effects and health economic burden of different antibiotic treatment regimens, were not assessed. As per the standard operating protocols of the microbiology laboratory here sensitivity was done only to a group of relevant antibiotics once a specific organism was cultured, based on spectrum of antibiotics as per the literature and local practice.

Conclusion

Bacteriological profile of CAP varies geographically. There is a need to conduct regular prevalence and antibiogram studies to develop empirical guidelines for treatment of CAP.

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