

Original article

Clinical, etiological profile and outcome of hospitalized patients of community acquired pneumonia

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Abstract

Background: Community acquired pneumonia(CAP) is a common respiratory disease often requiring hospitalization and is a major cause of morbidity and mortality in the population, especially in the elderly and in those with comorbid diseases. The aim of the present study was to analyse the clinical,bacteriological profiles and outcome of hospitalized patients of CAP.

Methods: 50 consecutive patients over 14 years of age admitted to a teaching hospital with a diagnosis of CAP during the period between May 2016 and April 2017 were studied. Data relating to their age, gender,clinical details, CURB 65 scoring,microbiological profile,complications and outcome were recorded.

Results: Mean age of the study population was 48.1±16.11years.Maximum patients were males(70%).COPD was the most common comorbidity associated(15/50,30%).A specific etiologic diagnosis could be made only in 20 cases(40%). Streptococcus pneumoniae(18%) was the most common organism identified followed by Klebsiella(4%), Pseudomonas(4%), E.Coli (4%),Acinetobacter(4%), staphylococcus(4%).Most patients had an initial CURB 65 score of ≤ 2 (41/50,82%).Complications occurred in 21cases(42%).-Parapneumonic effusion(10,20%), acute respiratory failure(7,14%), septic shock(7,14%), ARDS(4,10%),MODS(4,10%),lung abcess(5,10%), hemiplegia (1,2%).The mean duration of hospital stay was 11.08±4.83 days.Three patients with a CURB 65 score ≥ 4 required mechanical ventilation , of them two cases succumbed to gram negative sepsis. The mortality rate was 4%.

Conclusion: Streptococcus pneumoniae is the most common cause of CAP. COPD is the most common comorbidity. Elderly age, gram negative pneumonia ,high CURB 65 score at admission are considered as poor prognostic factors in our study.

Key words: sputum culture, pneumonia, bacteriological profile

Introduction

Community acquired pneumonia is defined as an acute infection of the pulmonary parenchyma in a patient who has acquired the infection in community as distinguished from hospital acquired pneumonia It is a leading infectious disease requiring hospital admission in both western and developing countries.

It is seen in all age groups but is associated with considerable morbidity and mortality in older adult patients and in those with significant comorbidities. In the United states , pneumonia is the 6th leading cause of death. And as many as 4 million cases of CAP occur annually and 20% of them require hospitalization (1). The mortality ranges from

13.6% in hospitalized patients to 36.5% in patients admitted to ICU(2).

A number of pathogens can give rise to CAP- typical, atypical including viruses. The bacteriological profile of CAP changes from one geographical area to another geographical area and also within the same area from time to time. This could be due to differences in the frequency of use of antibiotics, awareness of disease and life expectancy(3). *Streptococcus pneumoniae* is the major etiologic agent in various parts of the world(4,5,6). Other organisms include *Klebsiella*, *Pseudomonas*, *Hemophilus influenzae* etc. And despite the advances in diagnostic techniques etiologic agent could be identified in 50% cases only(7) The outcome of CAP depends on the severity of pneumonia at presentation, the virulence of the organism and the comorbidities present. The aim of the present study conducted at a general hospital in Visakhapatnam was to study the clinical, bacteriological profiles and outcome of CAP patients admitted to our hospital.

Material and methods

The present study was conducted at NRI general hospital. It's a prospective study carried out on 50 cases of CAP admitted to either respiratory ICU or ward during the period from May 2016 to April 2017. Institute ethical committee approval was taken as well as informed consent from the patient or a close relative. Inclusion criteria and exclusion criteria used for the study were-

Inclusion criteria- >14 years of age

Presence of one or more symptoms of pneumonia

Radiographic evidence of CAP not known to be chronic.

Exclusion criteria- Patients hospitalized within past 14 days

Patients with immunosuppression

Patients having an alternate diagnosis during follow up.

Data regarding patient's age, sex, detailed clinical history, comorbid illnesses was recorded. A detailed physical examination was done. In all the patients routine investigations like Hb, TC, DC, ESR, RBS, LFT, RFT were done. Radiologic evaluation was done. Sputum was sent for Gram's staining, ZN staining and aerobic bacterial culture before initiation of empiric antibiotic therapy as far as possible. In patients who could not produce sputum spontaneously, 3% NS nebulisation was used to induce sputum. Blood cultures were also sent for every patient. Two blood culture samples were drawn from 2 different sites 30 minutes apart and were inoculated on MacConkey agar and blood agar medium.

ABG was done whenever necessary. Other investigations like CT thorax, pleural fluid analysis and bronchoscopy were done as needed according to the clinical indication. Special investigations like serological tests for *Mycoplasma*, *Legionella* and H1N1 PCR were done where necessary.

Severity of pneumonia was assessed by CURB 65 score. A score ≥ 3 was considered severe. All the patients were started on an initial empiric therapy according to 2007 IDSA/ATS guidelines and once the etiology is identified by microbiological methods, therapy was modified to target the specific pathogen.

A record of complications, need for mechanical ventilation, duration of hospital stay and outcome was made. Outcome was measured in terms of whether successfully discharged or death occurred.

MS office Excel was used for the analysis of data.

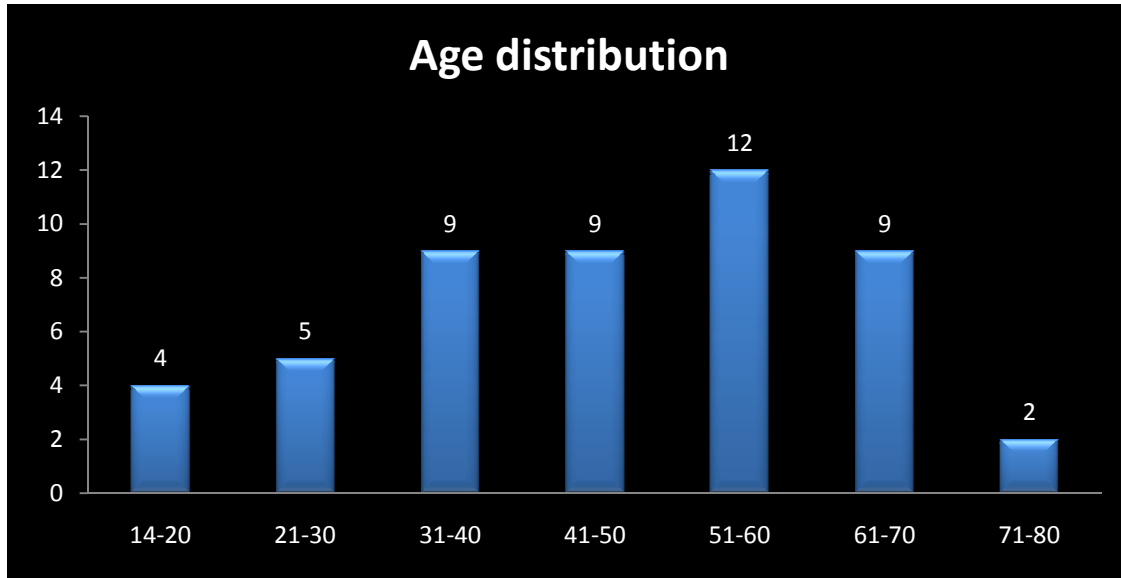
The results were presented as Mean \pm standard

deviation for quantitative variables and numbers (percentage) for qualitative variables.

Results

The mean age of the patients was 48.1±16.11 years with range from the youngest of 16 yrs to the oldest being 75 yrs of age. Majority were in the age group of 51-60 yrs (12/50 , 24%).

Figure 1



Maximum number were males (35/50 , 70%) with sex ratio being 7:3.

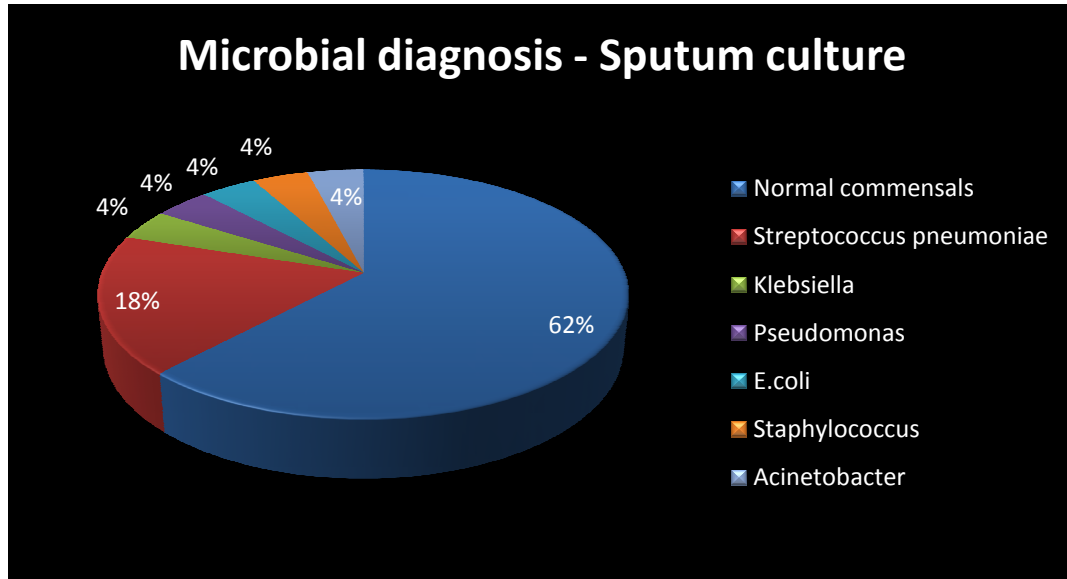
Fever and cough(100%) were the most common presenting symptoms while varying grades of dyspnoea(70%), hemoptysis(10%), chest pain(20%) ,confusion(8%)were observed in some cases.

COPD was the most common comorbid condition occurring in 15 out of 50 cases comprising 30%. Diabetes, hypertension and chronic liver disease each occurring in 10 cases(20% each) , CKD (7/50,14%), CVA(3/50,6%), CHF and seizure each in 2 cases(4% each) were the other comorbidities. 21 patients(42%) had no comorbid illness at presentation, 17 (34%)

had atleast 1, whereas 12 (24%) had more than 1 comorbidity. These details are shown in Table 1.

Overall microbial diagnosis by various means could be established in only 20 cases(40%) . Sputum was most common source of organism isolation(19/50 , 38%). Streptococcus pneumoniae was the most common organism isolated in 9 cases(18%) , Pseudomonas , Klebsiella, E.coli, Acinetobacter, Staphylococcus were identified each in 2 cases (16%).Mycoplasma pneumonia was diagnosed in one case by the high serum IgM titre.

Figure 2



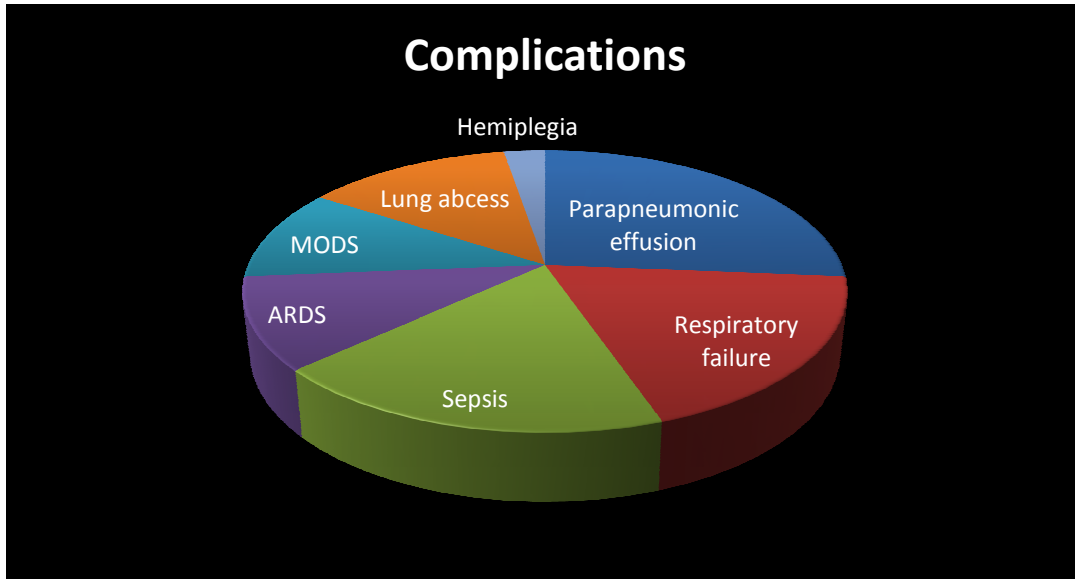
Blood culture was positive only in 4 cases(8%) with Streptococcus being isolated in 3 cases (6%) and Staphylococcus in 1 case(2%). FOB was done in 2 cases and the bronchial washings obtained were positive for Klebsiella in 1 case (2%) and Staphylococcus in 1 case(2%). A detail of this is shown in Table2.

Most patients had an initial CURB score ≤ 2 (41/50,82%).

Complications occurred in 21 patients(42%) . Parapneumonic effusion occurred in 9 cases (18%), respiratory failure in 7(14%), ARDS in 4(8%), septic

shock in 7(14%) , MODS in 4(8%), lung abscess in 5 (10%) and hemiplegia in 1 (2%). Of the 7 cases who developed respiratory failure, 4 patients could be managed successfully with non invasive ventilation whereas 3 required invasive MV. These 3 patients had an initial CURB 65 score of ≥ 4 .Of the 3 intubated and mechanically ventilated,only 1 patient survived. Gram negative sepsis and MODS was the cause of death in those two and they had an initial CURB 65 score of 5.Klebsiella was isolated in one case and Acinetobacter in the other .

Figure 3



The mean duration of hospital stay was 11.02 ± 4.83 days.

Out of the 50 patients, 48 patients improved and were discharged home and 2 patients died. The mortality rate in the present study was 4%. These details are shown in Tables 3 and 4.



Table 1

Demographic profile and baseline characteristics of the study population(n=50)	
	n(%)
Mean age (range)	47 (16-75)
Sex	
Males	35 (70%)
Females	15(30%)
Presenting symptoms	
Fever	50 (100%)
Cough	50(100%)
Sputum	42(84%)
Breathlessness	35(70%)
Chest pain	10(20%)
Hemoptysis	5(10%)
Diarrhea	3(6%)
Altered sensorium	4(8%)
Comorbid illnesses	
COPD	15(30%)
Chronic kidney disease	7(14%)
Diabetes mellitus	10(20%)
Hypertension	10(20%)
Heart failure	2(4%)
Seizure disorder	2(4%)
Cerebrovascuar accident	3(6%)
Chronic liver disease	10(20%)
CURB 65 Score	
0-1	23 (46%)
2	18(36%)
≥3	9(18%)

Table 2

Microbial diagnosis (n=50)	
	n(%)
Sputum culture	
Normal commensals	31 (62%)
Organisms isolated	19(38%)
Streptococcus pneumoniae	9(18%)
Klebsiella pneumoniae	2(4%)
Pseudomonas	2(4%)
E. coli	2(4%)
Staphylococcus aureus	2(4%)
Acinetobacter	2(4%)
Serological methods	
Mycoplasma pneumoniae	1(2%)
Total	20(40%)
Blood culture	
Streptococcus pneumoniae	3(6%)
Staphylococcus	1(2%)
Bronchial washings	
Klebsiella	1
Staphylococcus	1

Table 3

Complications	n (%)
Parapneumonic effusion	10(20%)
Respiratory failure	7(14%)
ARDS	4(8%)
Septic shock	7(14%)
MODS	4(8%)
Lung abscess	5(10%)
Hemiplegia	1(2%)

Table 4

Outcome measures	
	n (%)
Died during hospitalization	2(4%)
Discharged	48(96%)
Mean duration of hospital stay	11.02±4.83 days
Need for mechanical ventilation	7(14%)
Invasive	3(6%)
Non invasive	4(8%)

Discussion

The present study was undertaken to evaluate the clinical, bacteriological profiles and outcome of CAP patients admitted to our hospital. Previous studies conducted in India (3) and other parts of world(7,10) have observed an increased incidence of CAP in individuals over 50 years of age. But in our study 54% of the study population were less than 50 years of age and 78% were less than 60 years. Majority of them were daily wage workers and were from low socioeconomic status. Occurrence of pneumonia in working age adults is associated with work absenteeism (8,9). Concordant with other studies(4) ,CAP was more common in males (70%) in our study. This high frequency can be attributed to the habits of smoking and alcoholism in males.

COPD was found to be coexisting with CAP in 30 % of our patients , having the highest ratio, followed by diabetes ,hypertension , chronic liver disease each occurring in 20% of the patients. Similar observations were made by Bansal et al(4)in India and Moine et al(10) in France. CAP in COPD patients is associated with greater severity and worser outcomes(16). Despite the use of conventional and invasive procedures , a specific etiologic diagnosis

could be established only in 20 cases i.e. 40%. Sputum culture positivity was seen in 19 cases(38%).Another case of Mycoplasma was diagnosed serologically by a high IgM titre. In a study conducted by Shah et al in northern India , microbial diagnosis could be done in only 29%. However ,other studies have reported higher rates of microbial isolation: 75.6% in Shimla(4), 47.7% in Chandigarh(11) and other parts of world, 62% in United Kingdom(5), 68% in Singapore(12) and 56% in Philippines(13). This low rate could be due to inappropriate sputum collection, non productive cough in atypical pneumonias and frequent use of antibiotic in the community. If serological testing or multiplex PCR for atypical organisms were done on a routine basis the diagnostic yield would have been better.

Blood culture positivity observed in the present study was 8% which is comparable to that reported in other studies 5-17%(14,15).Streptococcus pneumoniae was the most frequent organism isolated in blood culture(6%).

Our study found that Streptococcus pneumonia was the most common bacterial etiology, obtained in 18% followed by Klebsiella (4%), Pseudomonas (4%),

E.coli (4%), Staphylococcus (4%), Acinetobacter (4%). Several studies from India (4,11) and across the world : UK (5), US(6,), Iraq (17) also identified the same to be the commonest pathogen.

However some studies, over the last 30 years, have reported higher incidence of gram-negative organisms among culture- positive pneumonias [23,24]. Shah et al(3) reported pseudomonas to be most common pathogen accounting for 35 % of their patients. The complication rate observed in our study was 42% with pleural effusion being the most common occurring in 10 patients. This is concordant with the findings of Nwosu et al (18) who also mentioned pleural effusion to be common in CAP patients. Other complications were in the form of acute respiratory failure (7/50, 14%) , ARDS(4/50, 8%) ,septic shock (7/50, 14%),MODS (4/50), lung abscess (5/50).

Interestingly , a 16 year old female who was admitted with bilateral pneumonia and respiratory failure and mechanically ventilated , developed right sided hemiplegia during hospital stay. CT brain showed infarcts. She was diagnosed to be having Mycoplasma pneumonia. Occurrence of neurologic complications in Mycoplasma pneumonia has been well described in the literature especially in children

and in adults less than 21 years of age (19,25).Encephalitis,meningitis,transverse myelitis, acute demyelinating encephalomyelitis, cranial nerve palsies, polyradiculitis,thrombo embolic stroke were the described complications(20).

The mortality rate observed in our study was 4%. 96% patients improved and were discharged home and 2 patients died. Those 2 patients had an initial CURB65 score of 5, had bilateral involvement of lungs and required mechanical ventilation. MODS was the cause of death. In comparison to other studies ,which reported a mortality rate of 21-25%(21,22) the mortality rate observed in our study is low . This might be because majority of the study subjects had an initial CURB65 score of ≤ 2 (82%) .To conclude, Streptococcus pneumoniae is the most common cause of CAP. COPD is the most common predisposing condition for CAP.A high CURB 65 at admission is a predictor of poor outcome. Though rare,neurological complications such as hemiplegia in CAP patients should be investigated for the possibility of Mycoplasma infection. Performance of serological tests or Multiplex PCR for atypical organisms on a routine basis can provide definitive diagnosis in more number of cases.

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