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Research Article

Community acquired pneumonia

Clinical and bacteriological profile of community acquired pneumonia cases at a tertiary care centre in South India

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Introduction: There are very few and conflicting data regarding bacteriological aetiology of community acquired pneumonia (CAP) cases in India. **Objectives:** The main objective of our study was to determine the clinical profile and bacteriological agents causing CAP and to study their antibiotic susceptibility pattern to help the clinicians choose the appropriate antibiotic for treatment. **Methods:** A cross sectional study was involving 200 patients clinically diagnosed as community acquired pneumonia were included. A detailed proforma for clinical history was filled up for each patient. In all the patients, Chest X-ray, Blood culture and sensitivity, Sputum Gram's stain, Acid fast staining, culture and sensitivity were done. Serological studies for Mycoplasma specific IgM antibodies were also done for all patients. **Results:** Of the 200 patients, 86 (43%) yielded identifiable aetiology with 02 having mixed growth. Klebsiella pneumonia 28 (14%) was the most common isolate followed by Staphylococcus aureus 12 (6%). 14 (7%) cases were positive for Mycoplasma specific IgM antibodies. **Conclusions:** Community acquired pneumonia remains an important public health problem. There is need for further studies and also to add conventional serologic tests for atypical and viral pathogens in all patients admitted with community acquired pneumonia

Keywords: Community acquired pneumonia, Sputum culture, Klebsiella pneumonia, Staphylococcus aureus, Mycoplasma

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Introduction

Community acquired pneumonia (CAP) is defined 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 radiograph or auscultatory findings consistent with pneumonia, in a patient not hospitalized or residing in a long-term care facility for 14 days before the onset of symptoms [1]. Little information is available from India regarding prognostic factors in patients with CAP and moreover only few studies are conducted till date in India. Even with extensive laboratory testing and invasive procedures aetiology is being achieved from sputum samples is ≤50%. Despite being the cause of significant morbidity and mortality, pneumonia is often misdiagnosed, mistreated, and underestimated. The aim of our study was to determine the clinical profile and bacteriological agents causing CAP and to study their antibiotic susceptibility pattern to help the clinicians choose the appropriate antibiotic for treatment.

Materials and Methods

Two hundred patients who presented to the Department of General Medicine from October 2014 to June 2016 were studied. All the necessary clinical details were obtained in a pre-designed pre-tested proforma. Cases were selected based on certain inclusion and exclusion criteria.

Inclusion criteria: Subjects 18yrs or more. CAP diagnosed based on presence of infiltrates on chest Xray consistent with consolidation and associated with respiratory symptoms with at least two of the following four: fever, cough, purulent sputum production or leucocytosis over 10,000/ mm3.

Exclusion criteria: Patients with radiographic evidence of tuberculosis, lung malignancies, immunosuppression (HIV positive, solid organ transplant, post splenectomy), patients who have been admitted at any of the hospital in the past 14 days were excluded from the study.

Specimen collection: Sputum sample was collected from all the patients at the time of admission or within 24 hours of admission. In those patients who could not expectorate spontaneously, sputum was induced by nebulization

With 3% hypertonic saline. Two blood samples for blood culture were drawn from two different sites thirty minutes apart. 5 ml of blood sample was collected and serum was extracted for testing for Mycoplasma specific IgM antibodies.

Processing of samples: Sputum originating from lower respiratory tract containing more than 25 polymorph nuclear leucocytes and less than 10 epithelial cells per low power field were subjected to Gram's staining according to Ruhland modification. [2]. All the samples were processed as per the Clinical Laboratory Research Institute (CLSI) guidelines. Serological evaluation for Mycoplasma specific IgM antibodies were done on all patients and 20 age and sex matched controls by ELISA method using a commercially available kit (CalBiotech, India).

Results

A total of 200 patients were included in the study. The age of these patients ranged from 18 to 90 years and comprised of 124 male and 76 female patients. The occurrence of CAP more in males was not statistically significant (Table 1). The occurrence of CAP in patients with age 65 and above was statistically significant (Table 2) indicating that risk of CAP increases with increase in age. Smoking was found to be the most common risk factor and diabetes mellitus the most common co-morbid condition associated with CAP. 25% of patients with CAP had more than one co-morbid condition (Table 3).

Cough was the most common symptom followed by fever and then by expectoration, 10% of patients had presented with hemoptysis. 26% of patients had GI symptoms. Mean duration of cough was 5.57±4.60 days (range 0 – 20 days), and Mean duration of fever was 5.05 days±4.12 days (range 0 – 21 days). Mean duration of fever after admission to hospital 2.39 days (range 0 - 9days) indicates average defervescence time. Most common clinical sign was crepitations which was present in 94% of cases. Bronchial breathing was present in 40% of cases at admission (Table 4).

46 patients presented with very severe breathlessness and 82 did not have any breathlessness. 88 patients had muco-purulent sputum, 72 had mucoid sputum and 40 did not have expectoration. The associated symptoms

Apart from cough, fever and expectoration, 52 patients had presented with GI symptoms, 30 had chills and 34 had headache.

Most common site of involvement is lower zone followed by mid zone and least common site is upper zone. 17 patients had involvement of >1 zone on same side. 78 had involvement of both lungs. 22 had effusion at the time of admission. 12 had effusion in chest X-ray taken at 48hrs of which 08 were non tapable. In 06 patients chest X-ray showed extension of consolidation into contiguous lobe within 48 hrs. 20 patients had pattern of interstitial pneumonia. On **c**omplete hemogram most common finding was neutrophilic leucocytosis (130 patients). 24 had thrombocytosis. 40 had thrombocytopenia. With respect to complications related to CAP in our study, 32 patients needed invasive ventilatory support and 04 required noninvasive ventilation, 30 needed inotropic support, 14 had to undergo dialysis secondary to sepsis (10 had acute on chronic kidney disease and 04 were known cases of end stage renal disease). Out of 36 non survived patients 33 had sepsis and multi organ dysfunction, 02 had H1N1, and one patient died of severe coronary syndrome. Two patients required prolonged ventilator support. Same 02 patients needed tracheostomy for purpose of prolonged ventilator support but only one gave consent for the same and underwent the procedure.

Table-1: Distribution of age and sex.

		Sex		Total
		Male	Female	
Age	<65	86 (69.4%)	56 (73.7%)	142(71%)
	≥65	38 (30.6%)	20 (26.3%)	58 (29%)
Total		124 (100%)	76 (100%)	200 (100%)

Contingency Coefficient: 0.0463 p value: 0.643

Table 1 depicts that male patients were more affected when compared with females but (p value is 0.643 which is not significant) hence it infers that male sex is not a risk factor for CAP.

Table-2: CAP in relation with age 65 and more.

AGE	Percent	Frequency
<65	71	71.0
>65	29	29.0
Total	100	100.0

Chi-Square (a): 17.640 p value: <0.0001

Table 2 Depicts that 29% of patients with CAP were aged 65 & above

Table-3: Risk Factors and Co-Morbidities.

Factor	No of Patients
COPD	62
Smokers	86
DM	64
Rhinitis(Allergic/Infective)	50
Old Pulmonary TB	14
Asthmatics	12
Malignancy	08
Alcoholics	32
Home O2 Therapy	04
Hypertension	40
Cardiac Disease	20
Cerebrovascular Accident	02
Chronic Kidney Disease	10
Alcoholic Liver Disease	02
Thyroid Disorders	08
Down's Syndrome	01
Chronic Gastritis	03

Table 3 depicts many risk factors and co-morbidities of CAP most common co-morbidity is DM and most common risk factor being Smoking. 50 of 200 patients had >1 co-morbid condition mentioned above.

Table-4: Symptoms of CAP.

Symptom	No of Patients
Cough	188
Expectoration	160
Fever	182
Chills	30
Breathlessness	116
Chest Pain	72
GI Symptoms	52
Headache And Generalised Body Pain	34
Hemoptysis	20

Data in Table 4 indicates that cough is the most common symptom followed by fever and then by expectoration, 10% of patients had presented with Hemoptysis.26% of patients had GI symptoms. Mean duration of cough is 5.57±4.60 days (range 0 - 20 days), and Mean duration of fever is 5.05 days±4.12 days (range 0 – 21 days). Mean duration of fever after admission to hospital – 2.39 days (range 0 - 9days) – indicates average defervesence time. Most common clinical sign is crepitations which was present in 94% of cases. Bronchial breathing was present in 40 % of cases at admission.

Table-5: Sputum culture results from CAP patients.

Isolate	n (%)
No Bacterial Growth	114 (57%)
Normal commensals of oral cavity	12 (6%)
Streptococcus pneumonia	12(6%)
Staphylococcus aureus	12(6%)
Klebsiella pneumonia	28(14%)
Pseudomonas aeruginosa	6(3%)
Acinetobacter baumanii	6(3%)

Table-6: Antibiotic Susceptibility pattern of the pathogens isolated.

Isolate	Most sensitive	Most resistant
Streptococcus pneumonia	Penciliin, Amoxilcillin,Piperacillin+tazobactum, Cefotaxime,	Nil
Staphyloccus aureus	Vancomycin, Linezolid, Cefotaxime,Clindamycin, Levofloxacin	Penicillins,
Klebsiella pneumoniae	Piperacillin+tazobactum, Imipenem,Tigecycline, Gentamycin, Amikacin,Meropenem	3rd generation cephalosporins,Gentamycin, Cotrimoxazole,Ciprofloxacin
Acinetobacter baumanii	Ceftriaxone, Ciprofloxacin, Gentamycin,Imipenem, Cotimoxazole	Piperacillin+tazobactum
Pseudomonas aeruginosa	Ceftazidime, Imipenem, Meropenem,Ertapenem	Penicillins,Piperacillin+tazobactum, 3rdgeneration cephalosporin, Amikacin

Out of 200 sputum samples processed, 114 (57%) did not yield any bacterial growth and 12 (6%) yielded only normal commensals of the oral cavity. Among the pathogens isolated, Klebsiella pneumoniae 28 (14%) was the most common followed by Streptococcus pneumonia 12 (6%) and Staphylococcus aureus 12 (6%). (Table 5).

Klebsiella pneumonia was found to be mostly sensitive to Piperacillin+tazobactum, Imipenem, Tigecycline and mostly resistant to third generation cephalosporins, amikacin and ciprofloxacin.

The overall antibiotic susceptibility pattern of various pathogens isolated is shown in Table 6. Only 12 (6%) out of the 200 blood culture samples yielded growth with 10(5%) being Staphylococcus aureus and remaining 2(1%) Klebsiella pneumoniae.

Out of 200 samples tested for Mycoplasma specific IgM antibodies, 14(7%) were found to be positive.

Discussion

This study included 200 cases of CAP selected on the basis of fulfilling the inclusion and exclusion criteria. Patients in this CAP study had wide range of age distribution varying from 18 to 90 in males and 18 to 82 in females; the mean age was 54.33±16.87. Againage is very important risk factor for development of pneumonia. In this study 29% of patients with CAP were aged 65 & above. 68% of patients were aged 50 & above and test statistics were significant with p value of <0.0001 indicating that risk of CAP increases with increasing age. Similar findings were seen in few other studies also [3, 4, 5]. The maximum numbers of cases of CAP (67%) were in the more than 50 years age group. This is in accordance to the earlier studies and in community based studies in Finland, the rate of CAP increased for each year of age over 50 years [6]. In this study 62% of patients were males and 38% were females even though male patients was affected in more number this result was statistically insignificant (p value 0.643) to conclude that male sex was a risk factor. This ratio was almost similar to other studies [3,4,5]. Though different risk factors have identified from India [7] and the West [8], the most common risk factor was smoking. Next most common risk factor was Rhinitis either allergic/infective. Diabetes mellitus (DM) was most common co-morbid condition in our study with 64 patients followed by chronic obstructive pulmonary disease (COPD) with 62 patients. Of the listed comorbidities, 25% of patients had >1 co-morbidity. In study by S. Bansal et al COPD was most common comorbid condition and DM was very minimal only 4.2% [3]. Pulmonary disorders followed by Congestive heart failure were common co-morbidities in other studies [4,5]. Most common symptoms in our study cohort was cough followed by fever and expectoration, 59% of patients complained of some degree of reathlessness and 23% had very severe breathlessness, 26% of patients gave history of GI symptoms in the form of vomiting, loose stools and decreased appetite.10% patients complained of hemoptysis during period of illness. 44% of patients had mucopurulent type of sputum, 36% of patients had mucoid type of sputum and 20% did not give any complains of expectoration. The pattern was almost similar in patients under study by S. Bansal et al but GI symptoms were noticed more in patients included in our study [3]. On complete hemogram

Most common finding in our study is neutrophilic leucocytosis (65 patients), 12 had thrombocytosis and 20 had thrombocytopenia. In study by S.Bansal et al only 11.45% had leucocytosis [3].

In our study, the rate of isolation of pathogens from sputum culture and blood culture was 43% and 6% respectively. Previous Indian studies showed sputum culture positivity in 10-33% of patients [9, 10, 11]. Blood culture positivity of six per cent observed in our study is much lower than observed by others 10-24% [12, 13]. Among the isolated pathogens Klebsiella pneumoniae was the most common. 14% of patients had Klebsiella pneumoniae in their sputum.

Streptococcus pneumoniae was grown only in 6% of patients. In study by S. Bansal et al they had different results sputum culture was positive in 71.2% and Streptococcus pneumoniae was the most common isolated organism followed by Klebsiella pneumonia [3]. In study by Aydogdu et al most common pathogen was Methicillin sensitive Staphylococcus aureus followed by Streptococcus pneumoniae and rest of organisms resemble our study results [5]. In a study by Shah et al [14] from Kashmir, Pseudomonas aeruginosa was found to the most common organism followed by Staphylococcus aureus. In another study by Menon et.al [15] from Kerala, Streptococcus pneumonia was found to be common organism. These findings emphasises the need for further studies to know the most common organism causing CAP in that particular area.

Antibiotic susceptibility pattern in our study revealed Klebsiella pneumonia to be mostly sensitive to piperacillin+tazobactum, imipenem and tigecycline, resistant mostly to third generation cephalosporins, gentamycin and ciprofloxacin. Staphylococcus was found to be mostly sensitive to vancomycin, linezolid, and clindamycin resistant to penicillin group of drugs. Streptococcus was found to be sensitive almost all the penicillin group of drugs. Even though Klebsiella pneumoniae was the common pathogen isolated it could not be isolated in any of patients who died. In 24 of 36 patients who died, Pseudomonas was the organism isolated followed by Acinetobacter being the causative agent in 07 and Staphylococcus aureus in the other 05 cases. The antibiotic susceptibility pattern in CAP patients in our hospitals was in comparison with overall antibiogram of our hospital. Serum from 14 (7%) out of the 200 patients were positive

For Mycoplasma specific IgM antibodies. Most of these patients were less than 40 years of age and had either presented with features suggestive of interstitial pneumonia or extra-pulmonary symptoms such as nausea, vomiting and loose motions. Our results are in co-relations with the finding in the study by Bansal et.a[3]. Dey et.al [16] had reported 35% positivity to Mycoplasma pneumonia specific IgM antibodies in his study. More number of studies is required to look for Mycoplasma as a causative agent for CAP.

Conclusion

CAP remains an important public health problem. The clinico-bacteriological profile of CAP in our centre is different from rest of India. There is need for further studies and also to add conventional serologic tests for atypical and viral pathogens in all patients admitted with CAP.

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