



THE CHANGING MICROBIOLOGICAL PATTERN OF COMMUNITY ACQUIRED PNEUMONIA

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ABSTRACT **Background:** Etiological agents of community acquired pneumonia (CAP) are different in different countries. It also varies with time and geographical distribution within same country. The aim of study was to determine bacteriological etiology & profile of CAP.

Materials and Methods: The study was done in Department of Respiratory Medicine, IRD, SMS Medical College Jaipur from July 2018 to June 2019. 90 indoor patients above 18 years were included. Routine blood investigations, chest x-ray, sputum and blood pyogenic culture and fiberoptic bronchoscopy were done.

Results: Male preponderance 66(73.3%) with mean age of 47.33 ± 14.99 years was seen. The rate of identification of microbiological etiology was 46(51.11%). Klebsiella pneumoniae 13(28.26%) was commonest pathogen.

Conclusion: Literature shows S. pneumoniae as most common pathogen, but higher incidence of K. pneumoniae has occurred in our geographical area.

KEYWORDS : Etiological agent, community acquired pneumonia, sputum culture, blood culture

INTRODUCTION

Community-acquired pneumonia (CAP), a common infectious respiratory disease responsible for significant number of outpatient visits and hospital admissions each year.^{1,2} The bacteriological profile of CAP is different in different countries and changing with time within the same country, probably due to frequent use of antibiotics, changes in environmental pollution, increased awareness of the disease and changes in life expectancy.

Streptococcus pneumonia remains the commonest organism leading to community acquired pneumonia in Europe³ and United States.⁴ Klebsiella pneumonia is most common pathogen leading to admission at medical intensive care unit in Singapore.⁵ In India also the etiological agent of CAP varies with geographical distribution.⁶⁻¹¹
Aim: To determine bacteriological etiology & profile of CAP.

METHODOLOGY

A descriptive study was done in Department of Respiratory Medicine, Institute of Respiratory Diseases, SMS Medical College Jaipur from July 2018 to June 2019. 90 indoor CAP patients were selected after applying following criteria.

INCLUSION CRITERIA

1. Patients above 18 years.
2. Patients with new or progressive pulmonary infiltrates on chest radiograph together with at least two of the following:- Fever, Cough, Production of sputum or leucocytosis $\geq 11,000/\text{mm}^3$.
3. Patient who gave valid consent.

Exclusion Criteria

1. Active case of pulmonary tuberculosis.
2. Any immunocompromised condition.
3. Chest radiographic features suggestive of congestive cardiac failure.
4. Patients having hospital acquired pneumonia/ aspiration pneumonia & ventilator associated pneumonia.

All the patients underwent chest radiograph and routine blood investigations.

Sputum was obtained at the time of initial clinical evaluation or within 24 hours of admission. In patients having no expectoration, sputum was induced by nebulization with 3% hypertonic saline. Fiberoptic bronchoscopic aspiration was performed where no sputum production after nebulization with 3% hypertonic saline. Two blood culture

samples were also obtained from each patient at the time of initial visit from different venipuncture sites and were sent for blood culture and sensitivity in blood culture medium.

Statistical Analysis

Significance was evaluated by student 't' test and/or χ^2 test and 'p' value less than 0.05 was considered as significant.

RESULTS

Out of total 90 patients, 66 (73.3%) were male. The mean age was 47.07 ± 14.50 years. Most (30%) were in age group of 51-60 years. Overall 68.9% were over 40 years of age. 58(64.4%) were from rural areas. 55(61.1%) were smokers and 20(22.2%) were alcoholic. Most common comorbidity was COPD 52(57.8%) followed by diabetes 20(22.2%). Most presented with cough(93.3%) and fever(91.1%).

On chest radiography most commonly involved was right lower lobe-38(42.2%), followed by left lower lobe- 18(20%). Sputum gram's staining revealed gram negative bacilli in 23(28.75%) patients. Table 1

Table-1: Distribution of subjects according to sputum gram's staining.

Sputum Gram's Staining	Male n (%)	Female n (%)	Total n (%)
Gram -ve bacilli	18 (22.5)	5 (6.25)	23 (28.75)
Gram +ve cocci in chains	1 (1.25)	2 (2.5)	3 (3.75)
Gram +ve cocci in clusters	1 (1.25)	1 (1.25)	2 (2.50)
Gram +ve cocci in pairs	7 (8.75)	3 (3.75)	10 (12.5)
Mixed	14 (17.5)	7 (8.75)	21 (26.25)
Few Epithelial Cells	4 (5)	3 (3.75)	7 (8.75)
Few Pus cells	12 (15)	2 (2.5)	14 (17.5)
Total	57 (71.25)	23 (28.75)	80 (100)

Most of the sputum samples 42(52.5%) were sterile and in only 38(47.5%) samples, organism could be detected. Common organisms detected were Streptococcus pneumoniae (26.31%) and Klebsiella (26.31%). Table 2

Table-2: Organism detected in sputum pyogenic culture. (n = 38)

Organism	Number	Percent(%)
Streptococcus Pneumoniae	10	26.32
Klebsiella	10	26.32
Pseudomonas	4	10.54

Streptococcus Pyogenes	3	7.89
E Coli	3	7.89
Acinetobacter	2	5.26
Enterobacter	2	5.26
H influenza	2	5.26
Staph Aureus	2	5.26
Total	38	100

Most of the blood samples 87(96.7%) were sterile and in only 3 samples, organism could be detected. The organisms detected in blood culture were Klebsiella, E coli and Pseudomonas.

Fibreoptic bronchoscopy was done in 10 patients. The organisms detected in bronchoalveolar lavage culture were klebsiella(2), Pseudomonas(2) and S. Pneumoniae(1) and rest 5 were sterile.

DISCUSSION

Age and sex distribution in our study were comparable with study done by S. Bansal et al⁶ who reported mean age of 52.77 ± 18.1 years. There were 71.4% males. 74% were over 40 years of age. Older age predilection may be due to waning of immunity and greater predisposing risk factors as age progresses. Male preponderance could be explained by fact that addictions like smoking and alcoholism, as

Table 3 Organisms found in different studies.

Organism	LarryG. Reimer ¹²	Bansal et al ⁶	Capoor et al ⁷	Aroma et al ⁸	Shah et al ¹⁰	Chintaman et al ¹¹	Prasad et al ⁹	Present Study
Streptococcus Pneumoniae	15-76%	35.8%	35.3%	32.8%	3.45%	7.14%	13.33%	26.31%
Klebsiella	3-14%	22%	20.5%	11.7%	10.35%	42.85%	29.09%	26.31%
Pseudomonas				30.9%	34.48%	28.57%	18.18%	10.52%
Streptococcus Pyogenes		7.5%	5.8%		3.45%			7.89%
E Coli	6-20%	11%			20.69%			7.89%
Acinetobacter				5.9%	3.45%			5.26%
Enterobacter								5.26%
H influenzae			8.8%				4.8%	5.26%
Staph Aureus	3-14%	17%	23.5%	1.4%	24.13%	21.43%		5.26%

In our study only (3.3%) blood culture samples reveals etiology while rest comes out to be sterile was comparable with Shah et al¹⁰ (6%) and Bansal et al⁶ (8.57%). While study done by Aroma et al⁷ shows 22% positivity. BAL reveals klebsiella in 2, Pseudomonas in 2 and S.pneumoniae in 1 culture.

So in our study, microbiological diagnosis was done in 46 cases (38 in sputum, 3 in blood culture, 5 in BAL) only.

The rate of identification of microbiological etiology was lower in our study(51.11%) as compared to other studies done in India and other parts of world: 75% in Shimla⁶, 62% in UK¹³, 68% in Singapore¹⁴, and is comparable to 56% in Philippines.¹⁵

Though literature shows that Streptococcus pneumoniae as the most common etiological agent, but studies¹⁶⁻¹⁹ have reported a higher prevalence of gram negative organisms in culture positive pneumonias. Our study shows that Klebsiella was most common- 13 (sputum-10, blood-1, BAL-2) etiological agent in our geographical area followed by Streptococcus pneumonia-11(sputum-10, BAL-1). The majority of patients in whom gram negative bacteria was isolated were over 50 years of age, smokers or alcoholics or had COPD.

The low rate of identification of microbial etiology can be explained due to lack of availability of serological methods of detection for both atypical (mycoplasma, chlamydia, legionella) and viral pathogens. Old age, smoking, alcoholism and COPD impair pulmonary defenses predispose to CAP probably by Gram negative bacteria.

CONCLUSION

Community Acquired Pneumonia is amongst the most common infectious disease that we come across in our clinical practice. The incidence and etiology of CAP varies with geographical distribution.

The yield for causative agent detection in our study was low (51.1%), so there is a need for further serologic tests for atypical and viral pathogens in all patients admitted with CAP. Our observations will be helpful to monitor the trends of CAP in the population of the region and will help the treating chest physicians to start rational empirical treatment for CAP patients, keeping in mind the higher prevalence of gram -ve organisms (Klebsiella) in our geographical area.

well as underlying lung disease e.g. COPD predispose to pneumonia.

In our study smokers were 61.1%, similar to Shah et al¹⁰ and S. Bansal et al⁶ and COPD was the most common comorbidity 57.8% similar to S. Bansal et al⁶ and Shah et al.¹⁰

In our study, right lower lobe (42.2%) was most commonly involved, similar to Bansal et al.⁶

In our study, sputum gram's staining revealed gram negative bacilli (28.75%) in most of the cases while Larry G. Reimer et al¹² reported gram positivity in 76% and gram negativity in 14% of the cases.

The sputum positivity in our study was only 47.5% which is comparable to Prasad et al⁹ 48% and Aroma et al⁸ 32%. Sputum culture shows streptococcus pneumonia(26.31%) and klebsiella (26.31%) as the most common organism.

Study done by S. Bansal et al⁶, Capoor et al⁷ and A. Oberoi et al⁸ revealed Streptococcus Pneumoniae, Shah et al¹⁰ revealed Pseudomonas aeruginosa, while Chintaman et al¹¹ and Prasad et al⁹ has revealed Klebsiella as a predominant etiological agent. Table 3

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