



Research Article

**A CLINICAL AND RADIOLOGICAL STUDY OF COMMUNITY ACQUIRED PNEUMONIAS
IN PATIENTS ATTENDING A TERTIARY CARE HOSPITAL, GUNTUR**

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ABSTRACT

Introduction: Community Acquired pneumonia is an acute illness acquired in the community with symptoms suggestive of Lower Respiratory Tract Infection (LRTI). Together with presence of a chest radiograph of intrapulmonary shadowing, which is likely to be new and has no clear alternative cause. Pneumonia is one of the leading causes of death and morbidity, both in developing and developed countries and is the commonest cause (10%) of hospitalization in adult and children. This study is to understand the mode of presentation, its clinical features, bacteriological and radiological features for the early detection of community acquired pneumonia, the causative agent and to study its complications. This study also involves the impact of co morbid conditions on the prevalence of type of pneumonia, its severity and its outcome. **Objective:** The present study is undertaken to study the mode of presentation, its clinical features, bacteriological and radiological features for the early detection of the community acquired pneumonias and the associated co morbidities, its impact on outcome. **Method:** 100 cases admitted in wards and ICU in Department of General Medicine in Katuri Medical College and Hospital, Guntur. After recruitment for the study a thorough physical examination is done and routine investigations were carried out to make a diagnosis of Community Acquired Pneumonia (CAP) and the results are processed and compared with similar studies. **Conclusion:** All the findings of this study were compared to similar studies done at other centres in India and abroad and available literatures were reviewed. The age group in this study varied from 27-80 years, most of them were between 30-65 years, predominantly middle and elderly age accounting for 96%. The incidence of CAP is most common in men (77%) compared to females (23%). The associated diseases in this study are COPD (35%) & DM (22.0%). The commonest presenting symptoms are cough (100%), expectoration (100%), and fever (60%) other symptoms include dyspnoea (45%), and chest pain (13%). The Sputum culture showed 23% streptococcal, 26% staphylococcus aureus, 9% pseudomonas, 13% Klebsiella, 16% normal comensals and 7% mixed, staphylococcus and klebsiella (5%), citrobacter(1%).

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INTRODUCTION

Pneumonia is an acute inflammation of the pulmonary parenchyma that can be caused by various infective and non-infective origins, presenting with physical and radiological features compatible with pulmonary consolidation of a part or parts of one or both lungs¹

Community Acquired pneumonia is an acute illness acquired in the community with symptoms suggestive of Lower Respiratory Tract Infection (LRTI). Together with presence of a chest radiograph of intrapulmonary shadowing, which is likely to be new and has no clear alternative cause².

Pneumonia is one of the leading causes of death and morbidity, both in developing and developed countries and is the commonest cause (10%) of hospitalization in adult and children³.

In the late twentieth and twenty first century newer microbial agents have emerged like - opportunistic lung infection in patients with HIV infection and in post organ transplant patients⁴.

Caryl L. Griffin, Joanne M. Sloan *et.al* (2012)⁵ studied the multilobar pneumonia was associated with increased 30-day mortality rate when compared to unilobar pneumonia. This confirms that multilobar pneumonia is an indicator of poor prognosis and that these patients, irrespective of CURB65 score, should be treated more aggressively.

210 patients (52% male) were included in this study. Median age was 76 years. 62% (no=131) were classified as unilobar

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pneumonia compared to 38% (no=80) with multilobar CAP. Multivariable analysis, after adjusting for confounders, revealed that multilobar consolidation was independently associated with 30-day mortality (odds ratio 2.25 95% CI 1.03-4.92, p=0.02). This relationship persisted for 90-day mortality (odds ratio 1.99 95 % CI 1.01-4.02, p=0.04).

Cilloniz C *et.al*, (2013)⁶ studies shows that, age does not influence microbial cause itself, whereas co morbidities are associated with specific causes such as H. influenzae and potential MDR pathogens. Mortality in the elderly is mainly driven by the presence of co morbidities and potential MDR pathogens.

Gutierrez F, Masia M *et.al* (2015)⁷ studied the influence of age and gender on the pathogens.

This study reveals overall incidence rate of CAP was 12 cases (95% CI 11.25-13.45) per 10,000 person - years. Incidence rates increased by age (p<0.0001) and they were higher in males (16 versus 9 cases per 10,000 person-years; p<0.0001). The incidence of pneumococcal pneumonia increased significantly with ageing and it was particularly high among people aged > or = 75 years (10 cases per 10,000 person-years). Very elderly people had also a 15-fold higher incidence of CAP associated with influenza virus and a 5-fold higher incidence of infections by Chlamydomphila spp., than young adults. The incidence of infections with Legionella pneumophila also increased with age and it was 10 times higher in males. In contrast, the incidence of pneumonia caused by Mycoplasma pneumoniae was unrelated to age and gender.

Antoni Torres, Willy E Peetermans, (2016)⁸ studied about the Risk factors for community-acquired pneumonia in adults in Europe: a literature review.

The overall annual incidence of CAP in adults ranged between 1.07 to 1.2 per 1000 person-years and 1.54 to 1.7 per 1000 population and increased with age (14 per 1000 person-years in adults aged ≥65 years).

Incidence was also higher in men than in women and in patients with chronic respiratory disease or HIV infection. Lifestyle factors associated with an increased risk of CAP included smoking, alcohol abuse, being underweight, having regular contact with children and poor dental hygiene. The presence of co morbid conditions, including chronic respiratory and cardiovascular diseases, cerebrovascular disease, Parkinson's disease, epilepsy, dementia, dysphagia, HIV or chronic renal or liver disease all increased the risk of CAP by twofold to fourfold.

Bello S *et.al*, (2014)⁹ study showed that Current smokers with pneumococcal CAP often develop severe sepsis and require hospitalization at a younger age, despite fewer co morbid conditions. Smoking increases the risk of 30-day mortality independently of tobacco-related co morbidity, age, and co morbid conditions. Current smokers should be actively targeted for preventive strategies.

Mortality at 30 days was 3.9%: 4.9% in current smokers vs 4.3% in nonsmokers and 2.6% in ex-smokers. Current smokers with CAP were younger (51 years vs 74 years), with more alcohol abuse and fewer cardiac, renal, and asthma diseases. Current smokers had lower CURB-65 (confusion, uremia, respiratory rate, BP, age ≥ 65 years) scores, although 40% had

severe sepsis at diagnosis. Current smoking was an independent risk factor (OR, 5.0; 95% CI, 1.8-13.5; P = .001) for 30-day mortality of pneumococcal CAP after adjusting for age (OR, 1.06; P = .001), liver disease (OR, 4.5), sepsis (OR, 2.3), antibiotic adherence to guidelines, and first antibiotic dose given < 6 h. The independent risk effect of current smokers remained when compared only with nonsmokers (OR, 4.0; 95% CI, 1.3-12.6; P = .015) or to ex-smokers (OR, 3.9; 95% CI, 1.09-4.95; P = .02)

Jayesh Dutt, Leena A Dabhi, (2014)¹⁰ studied mortality in patients significantly affected by poor control of DM, presence of co morbid conditions and risk of septicaemia and bacteraemia. A good glycaemia control reduces the chances of infections and hence a better outcome.

Darina Miteva, *et.al*, (2015)¹¹ studied Co morbidities increase the risk of in-hospital mortality of patients with CAP and need extra- attention by the physicians. The patients were on average age 59.9±17.1 years, 56.2%-male, 43.8%-female. Co morbidities had 68.3%. The most common comorbidities were: ischemic heart disease (24.5%), diabetes mellitus (23.6%), chronic heart failure (23.5%) and cerebrovascular disease (17.2%). Patients with dementia (OR 6.85; 95% CI 5.97-11.86), cancer with metastases (OR 4.33; 95% CI 1.4-13.1); cerebrovascular disease (OR 4.05; 95% CI 2.77-5.92) and chronic renal failure (OR 3.66; 95% CI 2.35-5.73) had the highest risk of dying in the hospital. The total mortality rate was 11.7%. In patients with co morbidities it was 15.8%; without comorbidities-2.9% (p<0.001). The mean Charlson Comorbidity Index (CCI) was 1.58. It was significantly higher for non survivors than for survivors (3.28 vs. 1.36 p<0,001). CCI was a good predictor of in-hospital mortality although its predictive value was lower than this of the basic scales (AUC for PSI, IDSA/ATS criteria, CURB-65, CRB-65 and CCI were 0.860; 0.845; 0.834; 0.817 and 0.717resp.)

This study is to understand the mode of presentation, its clinical features, bacteriological and radiological features for the early detection of community acquired pneumonia, the causative agent and to study its complications. This study also involves the impact of co morbid conditions on the prevalence of type of pneumonia, its severity and its outcome.

Aim of the study

1. To assess the clinical and radiological patterns of community acquired pneumonias.
2. To study the risk factors and their outcome.
3. To assess the spectrum of organisms.

Objective of the study

The present study is undertaken to study the mode of presentation, its clinical features, bacteriological and radiological features for the early detection of the community acquired pneumonias and the associated co morbidities, its impact on outcome.

PATIENTS AND METHODS

Sample Size: 100 cases admitted in wards and ICU in Department of General Medicine in Katuri Medical College and Hospital, Guntur.

Study Type: Observational study – cross sectional study

Study Period: August 2015 to October 2017.

Inclusion Criteria: Adult males and females aged more than 18 years admitted with acute and chronic respiratory symptoms presenting with pulmonary shadows in x-ray. Some of them are admitted for the first time without a background of previous pulmonary or systemic disease, while others have background of pulmonary illness like COPD. Some are admitted with background of diabetes, coronary artery disease, and chronic kidney disease.

Exclusion Criteria: Patients < 18 years were excluded. Patients with pulmonary tuberculosis and extra pulmonary tuberculosis were excluded. Patients with viral and fungal pneumonias were excluded. Patients with ventilator associated pneumonia, HIV patients with pneumonia were excluded. Ethical clearance is obtained from Katuri Medical College, Guntur.

Statistical software: Chi-square and Fisher exact test have been used to test the significance of percentage various parameters. Odds Ratio (OR) has been used to find the strength of relationship of clinical, radiological and bacteriological presentation.

p>0.05 No significance
 p<0.05 significance
 p<0.01 highly significant

Procedure: After recruitment for the study a thorough physical examination is done and routine investigations were carried out. The patients were subjected to the following examination. All the patients were subjected for detailed clinical examination to make a provisional diagnosis of Community Acquired Pneumonia (CAP)

- Sputum for Gram stain, AFB, and Culture were done.
- Blood for WBC Count and Differential Count were done.
- Chest X-ray done to know the Site of consolidation.
- ELISA was done to rule out HIV infection.

RESULTS AND OBSERVATIONS

A cross sectional clinical study in 100 patients with respiratory symptoms is undertaken to investigate the magnitude and pattern of clinical, radiological and bacteriological presentation Of Community Acquired Pneumonia admitted in department of General Medicine, Katuri Medical College and Hospital, Guntur.

Among 100 patients diagnosed as CAP 48% each were in the age group of 31-50 yrs and >50yrs respectively and remaining 4% were in the age group of <30 yrs.

Out of 100 patients studied for CAP, male were 77% (77) and female were 23% (23).

Almost all the patients had cough, expectoration 100%, dyspnoea is significantly common in elderly pneumonic patients with p < 0.001 and chest pain also common in elderly age group p < 0.05.

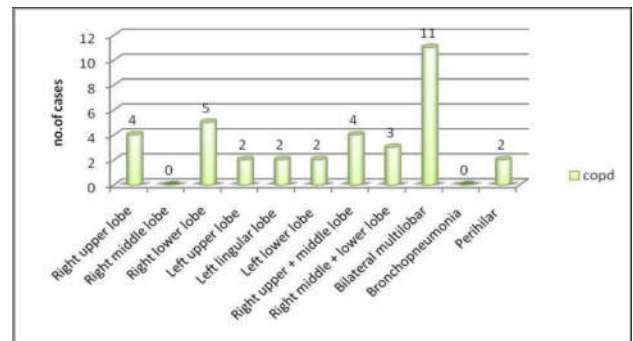
Patients with normal leukocyte count have shorter duration of hospital stay compared to marked leucocytosis patients having longer duration of hospital stay (>15 days) with significance of p < 0.001.

Sputum culture report showed Staphylococcus (26%) as the most common organism as causative agent , followed by Streptococcus (23%), no organism was found in 16%,

Klebsiella (13%), Pseudomonas (9%), mixed organisms (7%), staphy + klebsiella (5%), Citrobacter (1%).

In this study, among 35% of CAP with COPD patients, the most common organism isolated is klebsiella (9%), followed by staphylococcus (7%), streptococcus(6%), 4%each of mixed gram positive and gram negative organism, staphylococcus + klebsiella, pseudomonas (3%), citrobacter (1%), no organism was found in 1% of patients.

This study has 35 COPD patients with CAP of which most common radiological presentation is bilateral multilobar compared with non COPD patients, (p< 0.05).



Graph COPD and Radiological report

Sputum culture in 22 patients with Community Acquired Pneumonia associated diabetes revealed klebsiella as most common organism – 6 cases, staphylococcus and pseudomonas each of 4 cases, 3 each of streptococcus and staphylococcus + klebsiella each and mixed gram positive and gram negative in 2 cases.

Among 100 Community Acquired pneumonia patients 22 were diabetic and 78 were non diabetic. Of them the most common pattern of radiological presentation is bilateral multilobar pattern 10 cases, followed by right lower lobe pneumonia. This has more significance than non-diabetic with p < 0.05.

Among 32 patients with smoking and Community Acquired pneumonia compared with non-smokers the most common organism isolated was klebsiella (9%) with significance (p=0.003) followed by streptococcus (7%), staphylococcus (5%), mixed organism (4%).

Out of 100 patients radiologically proven as CAP, predominantly right upper lobe is seen in 17%, followed by bilateral multilobar (16%), right lower lobe (13%), right middle lobe (12%), right upper + middle lobe (10%), right middle + lower lobe (8%), left lower lobe (7%), bronchopneumonia and left upper lobe each of 5%, perihilar (4%), left lingular lobe (3%).

Among 100 patients of CAP with comorbidities COPD patients were seen to have longer duration of hospital stay of ≥15days (p<0.001).

Table Age and duration of hospital stay in this study

AGE in years	Duration of Hospital Stay in day			Total
	5 – 9 days	10 – 14 days	>15 days	
< 30	04 (4%)	0%	0%	4%
31 – 50	42(42%)	05(5%)	01 (1%)	48%
>51	15(15%)	19(19%)	14(14%)	48%
Total	61(61%)	24(24%)	15(15%)	100%

Of total 100 patients admitted in hospital for CAP, 61% were in the duration of 5-9 days, 24%were in the duration period of

10-14 days, and 15% were in the hospital for >15 days. Increased duration of hospital stay (≥ 15 days) is seen in elderly patients (>51 yrs) ($p < 0.001$).

Out of 100 patients treated for Community Acquired Pneumonia 4 (4%) died of which 3 were of hospital duration ≥ 15 days, 1(1%) in the duration of 10-14 days.

DISCUSSION

Community Acquired Pneumonia is a common medical problem in tropical countries like India. This study consisted of 100 patients admitted in Katuri Medical College and Hospital, Guntur. All cases met inclusion and exclusion criteria.

There are many studies done in different parts of the world on community Acquired Pneumonia. Few of the important studies are considered for comparison purpose and comparative study is discussed.

In the present study 48% each were in elderly age group of >51 years and middle aged group of 31-50 yrs of the total cases.

It is well documented that pneumonia is commonly occurring disease in the community & its incidence rises sharply with extremes of age.^{12,13}

In this study group patients below 18 years were not included, but majority of patients were middle aged and elderly. In the study of Dey & others they have found out that patients aged > 50 years are more as compared to less than 50 years. Our study is on par with their study.

Table Comparison studies of age group in CAP

Age Group (yr)	Ajay Savaliya <i>et.al</i> ¹⁴	Present study
< 30	28%	4%
31 – 50	37%	48%
> 51	55%	48%

In this study of 100 patients it was observed that majority of patients are males 77% in comparison to the female population which was 23%.

Table Comparison studies of sex incidence in CAP

Sex incidence	Ajay Savaliya <i>et.al</i> ¹⁴	Present study
Male	72%	77%
Female	28%	23%

This could be attributed to the well-established fact that cigarette smoking and alcoholism, as well as underlying lung disease e.g. COPD predispose to pneumonia and are more common in developing country like India. In this study group majority of male patients are exposed to one or more of the above-mentioned predisposing factors.

In this study among the presenting symptoms, cough with expectoration was common 100%, fever 60%, dyspnoea 45%, and chest pain 13%

Table Comparison studies of symptoms in CAP

Symptoms	Ajay Savaliya <i>et.al</i> ¹⁴	BOMA GIRIRAJ <i>et.al</i> ¹⁵	Present study
Cough	98%	90.4%	100%
Expectoration	52%	40.4%	100%
Dyspnoea	7%	25%	45%
Fever	93%	84.1%	60%
Chest pain	67%	35.2%	13%

Structural lung diseases and associated diseases e.g. Diabetes altering the local lung defense mechanisms and systemic defense mechanisms, predisposing to acute lung infection has been well-documented.

In this study of 100 patients 35% had COPD, 22% had diabetes. The COPD patients had altered cellular and structural abnormalities in the lung. The change in the bacterial flora in these patients is well supported by ineffective coughing and advanced age¹⁶ predisposes them to pneumonia. The comorbidities of this study were compared to Vinay dharmadhikari *et al*⁴⁹

Table comparison studies of co morbidities in this study

Co morbidities	Present study	Vinay dharmadhikari <i>et.al</i> ¹⁷
COPD	35%	23%
Diabetes	22%	19%
CKD	7%	1%
Smoking	32%	52%

In the present study it is found that staphylococcus aureus being more common pathogen in CAP accounting for 26%. Next common is streptococcal pneumonia, which accounts for 23%. No organism was isolated in 16%.

Table sputum culture reports of pneumonia in different studies

Sputum culture	Ajay Savaliya <i>et.al</i> ¹⁴	Kejriwal.A <i>et.al</i> ¹⁸	R. S. Pushpa Kumari <i>et.al</i> ¹⁹	Present study
Streptococcus	-	56%	46%	23%
Staphylococcus	21%	3.3%	24%	26%
Klebsiella	10%	1.3%	14%	13%
Pseudomonas	12%	11.1%	4%	9%
No growth	46%	-	-	16%
Mixed	-	16.7%	4%	7%

Diaz A *et al* (2007)¹⁹ study showed that the most frequent pathogen isolated in adult CAP was streptococcus pneumonia. Chest film showing infiltrates is necessary to establish the diagnosis of pneumonia. Radiographic changes usually cannot be used to distinguish bacterial from non-bacterial pneumonia, but they are often important for evaluating the severity of illness, determining the need for diagnostic studies and selecting antibiotic agent. In the present study we got chest x ray report as consolidation of right upper lobe (17%) followed by bilateral multilobar (16%) as the most common presentation, right lower lobe (13%), right middle lobe (12%), right upper and middle lobe(10%), right middle and lower lobe (8%), left lower lobe (7%), left upper lobe and bronchopneumonia each of 5%, perihilar (4%), left lingular (3%)

R. S. Pushpa Kumari *et.al*²⁰ study showed right lower lobe as most common presentation (26%), right middle lobe (18%), right upper lobe (6%), right middle and lower lobe (10%), right paracardiac (6%), left lower lobe (16%), left upper and lower lobe (14%), bilateral involvement in (4%).

All the patients were treated with antibiotics (oral and IV antibiotics) of their sensitivity along with supportive therapy like IV infusion, bronchodilators, analgesics, education about their illness. All the patients responded to the treatment and were discharged after confirming the resolution with chest x-ray at the time of discharge.¹⁶ Some patients with co morbidities and elderly required ventilator support along with

antibiotics (9 cases) of which 4 deaths occurred. Recommended empirical antibiotics for community acquired pneumonia.²¹

SUMMARY AND CONCLUSION

This study entitled “A Clinical and Radiological Study of Community Acquired Pneumonias in patients attending a tertiary care hospital, Guntur” was carried out at Katuri Medical College and Hospital, Guntur.

All the findings of this study were compared to similar studies done at other centres in India and abroad and available literatures were reviewed. The age group in this study group varied from 27-80 years, most of them were between 30-65 years, predominantly middle and elderly age accounting for 96%. The incidence of CAP is most common in men (77%) compared to females (23%)

- The associated diseases in this study are COPD (35%) & DM (22.0%).
- The commonest presenting symptoms are cough (100%), expectoration (100%), and fever (60%) other symptoms include dyspnoea (45%) and chest pain (13%).
- The haematological value showed leucocytosis (35%).
- The Sputum culture showed 23% streptococcal, 26% staphylococcus aureus, 9% pseudomonas, 13% Klebsiella, 16% normal comensals and 7% mixed, staphylococcus and klebsiella (5%), citrobacter (1%)
- Radiology showed preponderance of the rt. lung involvement and rt. Upper, middle and lower lobe accounting for about 42%.
- Medical line of treatment in appropriate time and with appropriate antibiotics and ventilator support in few patients. Duration of hospital stay increased in patients with co morbidities.
- Patients requiring ICU treatment in this present study include 15 (15%) of which 11 (11%) required ventilator support mortality encountered in 4(4%).

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