Research Article

A STUDY OF CLINICAL, RADIOLOGICAL AND BACTERIOLOGICAL PROFILE IN COMMUNITY ACQUIRED PNEUMONIA

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A B S T R A C T

Background: Pneumonia is an infection of the lung parenchyma caused by infective and non-infective agents, with physical and radiological features compatible with pulmonary consolidation of a part or parts of one or both the lungs.

Materials and Methods: This is a descriptive cross sectional study conducted in 50 CAP patients, admitted in KGH from December 2017 to August 2019. The study included patients above 15years with fever, cough with expectoration, chest pain and dyspnea.

Results: Mean age of patients is 50.04years with males being 70%, risk factors being COPD, DM, with sputum cultures showing Streptococcus pneumonia as the most common pathogen.

Conclusion: Overall the prognosis was good in this study when appropriate antibiotics were started at appropriate time.

INTRODUCTION

Background: Community-acquired pneumonia is defined as an acute infection of lung parenchyma with symptoms and auscultatory findings consistent with pneumonia (abnormal breath sounds and/or localized rales) or presence of infiltrate on chest radiograph in a patient not hospitalized or residing in long term care facility for > 14 days before the onset of symptoms.

CAP in the community is:
Symptoms like cough, chest pain
Focal chest signs
Either of these systemic features like sweating, fevers, shivers, aches and pains and/or temperature of 38°C or more.

Definition of CAP in patients admitted to hospital:

Symptoms and signs consistent with an acute lung infection associated with new radiographic shadowing for which there is no other explanation (e.g. not pulmonary oedema or infarction).

The illness is the primary reason for hospital admission and is managed as pneumonia.

Pneumonia is a significant cause of morbidity and mortality. The death rate due to LRTI in India per 100,000 population was 89.5 in 2004. The prevalence is more in HIV infected population than in the general population and it has been rising among intravenous drug users.

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for multidrug resistance include the use of potent oral antibiotics, earlier discharge, negligent use of outpatient IV antibiotic therapy and general ageing of the population, use of immunomodulatory therapies has added to the problem of drug resistance.

This study is to understand the clinical presentation, aetiology, complications, bacteriological and radiological features for early detection of disease.

Aims & Objectives

Aim of the study

- To study the modes of clinical presentation.
- To study risk factors and outcome.
- To assess the microbiological spectrum.
- To assess prognosis and complications.

Objective of the study

The present study was to study the mode of presentation, its clinical features, bacteriological and radiological features for the early diagnosis of disease, detection of complications.

MATERIALS & METHODS

Study design: A hospital based descriptive cross sectional study

Study population: 50 CAP patients, admitted to KGH from December 2017 to August 2019

Sample size: 50

Study duration: December-2017 to August-2019

Inclusion criteria

- Age above 15 years
- Patients presenting with high-grade fever with chills, cough with expectoration, chest pain and breathlessness with a provisional diagnosis of community-acquired pneumonia according to British Thoracic Society guidelines.
- With a valid consent

Exclusion criteria

- Patients with Health-care associated pneumonia
- Patients with aspiration pneumonia
- Patients with HIV

Method of Data collection

- Sputum for AFB and Culture were done.
- Blood for WBC Count and Differential Count were done.
- CXR done to know the site of consolidation
- ELISA was done to rule out HIV infection

Statistical Method

- Chi-square, Fisher exact test have been used to test the significance of Percentage of various parameters between extreme age groups in CAP patients.
- Odds Ratio (OR) has been used to calculate the strength of relationship of clinical, radiological and bacteriological presentation.
- The Statistical software namely SPSS 11.0 was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables, charts etc.

OBSERVATIONS AND RESULTS

Age and Sex Distribution

The average age of patients was 50.04±13.02 years (range 19-80 years). There were 35(70%) males and 15(30%) females. Among them 29(58%) patients were elderly (>50years). Majority of patients were in the age group 51-60 years

| AGE	Male		Female		Total	
	N	%	N	%	N	%
<20	1	2.9	0	0	1	2
21-30	3	8.6	2	13.3	5	10
31-40	4	11.4	2	13.4	6	12
41-50	6	17.1	3	20	9	18
51-60	16	45.8	4	26.6	20	40
61-70	5	14.2	2	13.3	7	14
>70	0	0	2	13.4	2	4
TOTAL	35	100	15	100	50	100
MEAN +/- SD	50.4 +/- 13.2		50 +/-13.42		50.04 +/- 13.02	
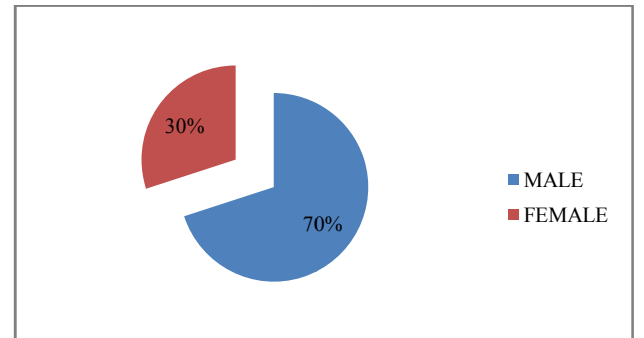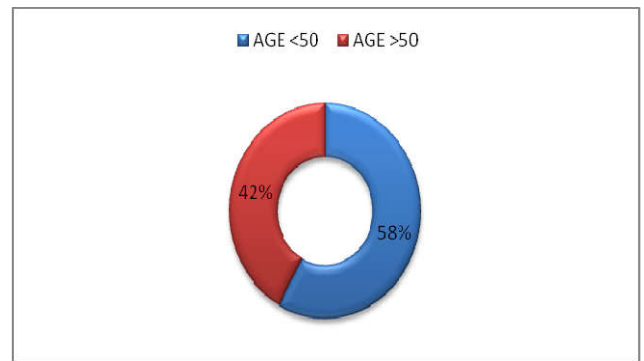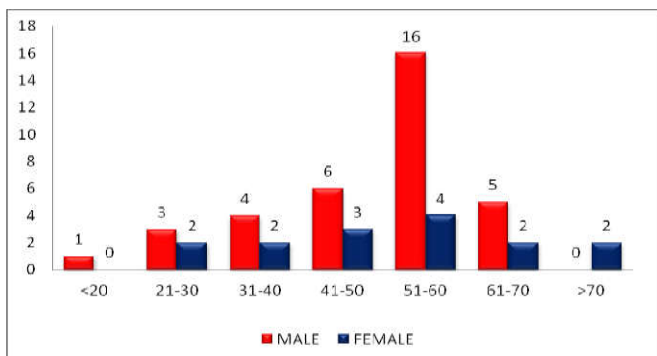
Risk Factors in Cap

The CAP was more in patients with COPD. It was a significant risk factor in elderly age group of patients (p=003).

Hypertension, DM and PTB were not risk factors for CAP in this study.

| Risk factors	AGE <50 (n = 21)		AGE >50 (n =29)		Total (n =50)		P Value
Hypertension	0	0	0	0	0	0	-
Diabetes	2	9.5	6	20.7	8	16	0.288
PTB	0	0	0	0	0	0	-
COPD	3	14.3	10	34.5	13	26	0.108
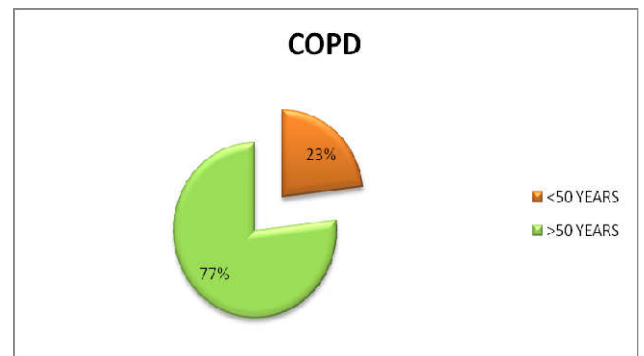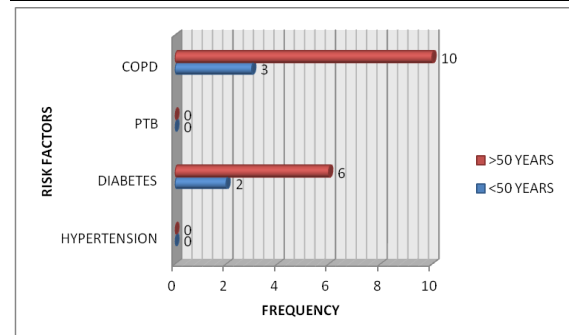
Clinical Features

There were fever, cough with expectoration (100%), chest pain (56%) and dyspnea in 46% of patients. Dyspnea was

significantly more common in elderly patients with CAP (p-0.001).

Clinical Features	AGE <50		AGE >50		TOTAL		P VALUE
	N	%	N	%	N	%	
Fever	21	100	29	10088	50	100	-
Cough	21	100	29	100	50	100	-
Expectoration	21	100	29	100	50	100	-
Dyspnea	4	19.04	19	65.5	23	46	0.0001
Chest pain	15	71.4	13	44.8	28	56	0.061
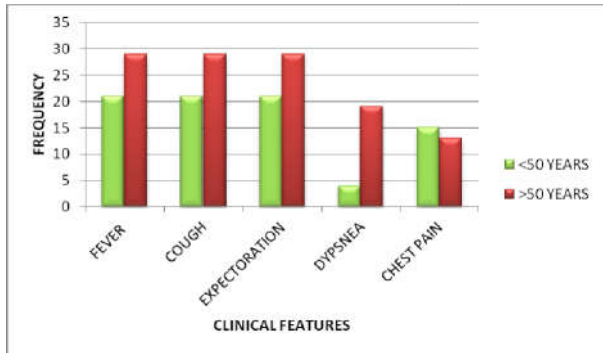
General Physical Examination Findings

On physical examination clubbing was present in 10 patients (20%) out of which 9 were aged>50years, pallor was present in 3 patients (6%) and all were aged >50years.

GPE	AGE <50		AGE >50		TOTAL		P VALUE
	N	%	N	%	N	%	
Pallor	0	0	3	10.3	3	6	0.128
Icterus	0	0	0	0	0	0	-
Clubbing	1	4.8	9	31	10	20	0.022
Cyanosis	0	0	0	0	0	0	-
Lympadenopathy	0	0	0	0	0	0	-
Edema	0	0	0	0	0	0	-
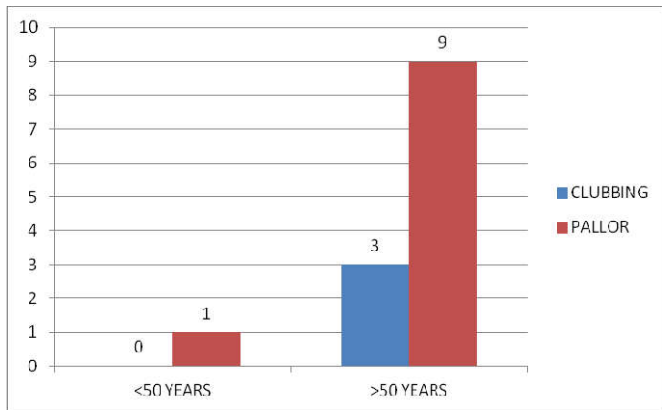
Systemic Examination Findings

On systemic examination, signs of consolidation were present in all the 50 patients (100%). Adventitious sounds were present in 40 patients (80%) of the patients.

| Clinical Sign	AGE <50		AGE> 50		TOTAL		P VALUE
	N	%	N	%	N	%	
Increased VR,VF	21	100	29	100	50	100	-
BBS	21	100	29	100	50	100	-
WP	21	100	29	100	50	100	-
Advent Sounds	16	76.1	24	82.7	40	80	0.567
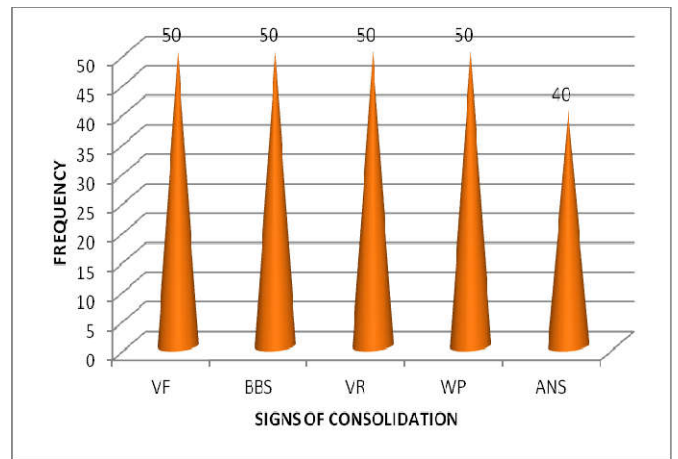
Hematological Parameters

Mild leukocytosis was seen in patients with CAP and eutrophil leukocytosis was observed in this study.

Clinical Features	AGE $\leq$50 Years (n= 21)	AGE >50 Years (n=29)	TOTAL (n=50)	P Value
Hemoglobin	11.3 $+$ 1.46	11.25 $+$ 1.39	11.25 $+$ 1.39	0.90
Total count	7996.45 $+$ 1482.9	8012.6 $+$ 1462.43	8012.6 $+$ 1462.43	0.96
Neutrophils	53.8 $+$ 8.4	53.52 $+$ 8.11	53.52 $+$ 8.11	0.90
Lymphocytes	28.73 $+$ 3.18	28.76 $+$ 3.12	28.76 $+$ 3.12	0.98
Monocytes	2.15 $+$ 0.52	2.18 $+$ 0.52	2.18 $+$ 0.52	0.84
Eosinophils	4.04 $+$1.63	3.92 $+$ 1.62	3.92 $+$ 1.62	0.79
ESR	24.64 $+$ 9.51	25.3 $+$ 10.88	25.3 $+$ 10.88	0.82
RBS	128 $+$ 33.25	128.72 $+$ 3.26	128.72 $+$ 33.26	0.94

Aetiology By Sputum Culture Report

The establishment of etiological diagnosis was possible by sputum examination only in 30 (60%) patients. Sputum culture report showed Streptococcal pneumonia was more common of about 26%, Staphylococci about 12%, Klebsiella accounted about 12%, E. coli 4% , Pseudomonas 4%, mixed constituted 2% in this study (age of the patient was >50years). It was negative in 40% of cases.

Sputum Culture	Frequency (n = 50)	%
STREPTOCOCCI	13	26
STAPHYLOCOCCI	6	12
KLEBSIELLA	6	12
E COLI	2	4
PSEUDOMONAS	2	4
MIXED	1	2
NO ORGANISM	20	40
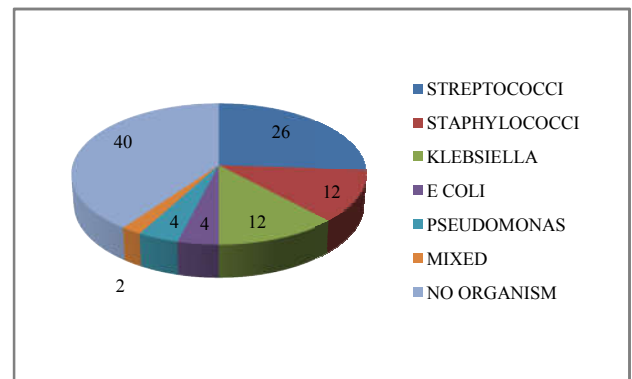
Chest X-Ray

CAP associated with COPD was observed in 13 patients (26%), right lower lobe was involved in 15 patients (30%), right middle lobe in 7 patients (14%), left lower lobe in 9 patients (18%), right upper lobe in 3 patients (6%), right

middle and lower lobe in 4 patients (8%) and left upper and lower in 5 patients (10%), bilateral in 2 patients (4%). Left upper lobe involvement was rare.

Of the 13 patients of COPD associated with CAP, Streptococcus was isolated from sputum culture in 6 patients. Staphylococcus, Klebsiella, E coli and mixed organisms from 1 patient each. No organism was isolated from 3 patients.

Patients with right lower lobe involvement no organism was isolated from 7 of these patients, Staphylococcus is isolated from 2 of these patients, Klebsiella from 2 patients and Streptococcus isolated from 3 patients and mixed organisms in 1 patient.

Patients with bilateral involvement Staphylococcus was isolated from 1 patient and no organism was isolated from 1 patient.

Chest X Ray Findings	Frequency (n = 50)	%
COPD	13	26
Upper Lobe (R)	3	6
Middle Lobe (R)	7	14
Lower Lobe (R)	15	30
Middle & Lower Lobe (R)	4	8
Paracardiac (R)	3	6
Upper Lobe (L)	0	0
Lower Lobe (L)	9	18
Upper & Lower Lobe (L)	5	10
Bilateral	2	4
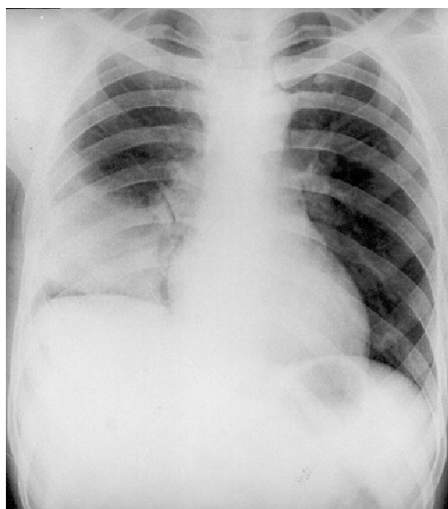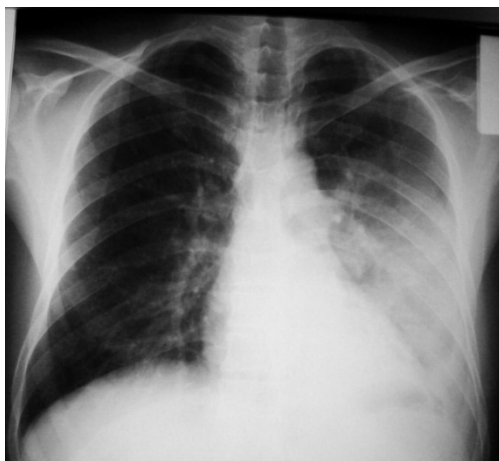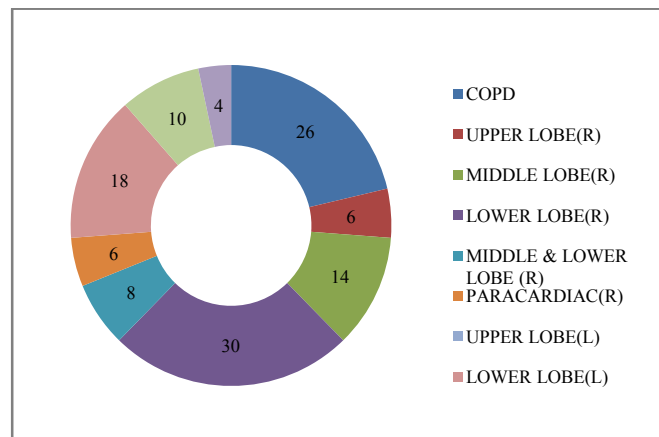
DISCUSSION

Age

In the present study 58% were elderly implying the incidence of pneumonia rises sharply with extremes of age. The mean age is 50.04 years.

Majority of patients were middle aged and elderly. Patients in the older age groups are more susceptible to Gram negative pneumonia because of the effect of aging on immunity and pulmonary defenses, underlying chronic diseases, silent aspiration, increased exposure to antibiotics and institutional care.

Age Group	Present study
>50yrs	58%
<50yrs	42%

Sex incidence

In this study of 50 patients it was observed that majority of patients were males (70%) and female population was 30%.

This could be because risk factors like smoking, alchoholism and COPD are more common in males than in females predisposing them to pneumonia.

Sex	Present study
Male	70%
Female	30%

Predisposing factors

Alcoholism, tobacco smoking, HIV infection, Renal failure, severe structural lung disease like chronic obstructive pulmonary disease bronchiectasis, cystic fibrosis, and Diabetes

are known predisposing factors. Patients with HIV have beem excluded in the study.

In this study 26% of patients had structural lung disease in the form of Chronic Obstructive Pulmonary Disease.16% of the patients had Diabetes. The COPD patients had altered cellular and structural abnormalities in the lung. The change in the bacterial flora in these patients was well supported by ineffective cough reflex and advanced age predisposing them to pneumonia.

Diabetes reduces levels of salivary fibronectin and increase colonization by gram-negative bacilli

Risk factor	Present study
Chronic obstructive pulmonary disease	26%
Diabetes	16%

Presenting complaints

In this study all the patients presented with fever, cough with expectoration 100%, chest pain in 56% and dyspnea was the presenting symptom in 46%. Hemoptysis was not a presenting complaint in our study. Dyspnea was significantly more common in elderly (p=0.001).

Symptom	Present study
Fever	100%
Cough	100%
Expectoration	100%
Dyspnea	46%
Chest pain	56%

General physical examination

In this study clubbing was present in 10 patients (20%) out of which 9 patients were aged >50yrs.Pallor was present in 3 patients (6%).

Vital signs

In this study, examination of vital data reveals that 88% had tachypnea, 62% had tachycardia and 90% had high-grade temperature associated with chills and rigours. The above mentioned vital signs, tachycardia, tachypnea and high-grade fever associated with chills and rigors were well known to occur in patients with acute lung infections.

Systemic examination

In this study, the examination of respiratory system revealed features of pneumonia. Bronchial breath sounds, increased VF and VR and WP were seen in all 50 patients. Inspiratory crackles were seen in 80% of patients.

Investigations

Haematological tests

In the present study mean Hb is 11.25g/dL.

In this study, mild Leukocytosis was present with a mean Neutrophil percentage of 53.52 %.

ESR was elevated in 13 (26%) patients with a mean value of 25.3mm/1st hr.

Sputum culture

In the present study, an organism was identified in 60% cases. Streptococcus pneumonia is the most common pathogen in CAP accounting for 26% followed by Staphylococcus aureus and Klebsiella in 12% patients each. Pseudomonas and E. coli constituted about 4% each and mixed infection in 2% cases.

No organism was isolated in 40% of cases. Decreased sputum positivity is due to (a) patients unable to expectorate due to altered sensorium (b) prior administration of antibiotics (c) nonproductive cough.

Chest X-ray

CAP associated with COPD was observed in 13 patients (26%), right lower lobe was involved in 15 patients (30%), right middle lobe in 7 patients (14%), left lower lobe in 9 Patients (18%), right upper lobe in 3 patients (6%), right middle and lower lobe in 4 patients (8%) and left upper and lower in 5 patients (10%), bilateral in 2 patients (4%). Left upper lobe involvement was not observed.

Of the 13 patients of COPD associated with CAP, Streptococcus was isolated from sputum culture in 6 patients. Staphylococcus, Klebsiella, E coli and mixed organisms from 1 patient each. No organism was isolated from 3 patients. Patients with right lower lobe involvement no organism was isolated from 7 patients, Staphylococcus is isolated from 2 patients, Klebsiella from 2 patients and Streptococcus from 3 patients and mixed organisms in 1 patient.

Patients with bilateral involvement Staphylococcus was isolated from 1 patient and no organism was isolated from 1 patient.

Radiography is mainly used to identify the severity of illness, determining the need for diagnostic studies and selecting an antibiotic agent.

Treatment

All the patients were treated with empirical antibiotics and later tailored to sensitivity pattern according to clinical response along with supportive therapy like bronchodilators, PPI therapy, antipyretics. DVT prophylaxis was given in critical ill patients. Patients were educated about their illness. Seven patients (14%) succumbed to death out of whom five patients were elderly. COPD was a risk factor in 71% of the deceased patients. Staphylococcus was isolated in 42% of the deceased while no organism was isolated in another 42%.

86% of the patients recovered without any complications. These patients responded to the treatment and were discharged after confirming the resolution with chest x-ray at the time of discharge.

Poor prognostic factors include age over 50 years, history of COPD or smoking, Staphylococcal pneumonia, hypotension, leukocytosis, and respiratory failure and undetermined etiology.

Prognosis

In our study prognosis was good. The mortality rate is 14%. Factors predicting mortality are age over 50 years, respiratory failure, hypotension, leukocytosis, Staphylococcus pneumonia and undetermined microbial aetiology. The aetiology remained undetermined in 42% of patients who died during hospitalization.

This emphasizes the need for further evaluation in patients with poor prognostic factors at the time of admission to establish the aetiology, start specific treatment and hence reducing mortality.

CONCLUSIONS AND SUMMARY

1. The age group in this study varied from 19-80 years, most of them were between 51- 65years, 58.0% of the patients were elderly (>50 years).
2. The incidence of CAP was most common in men (70%) compared to females (30%).
3. The associated diseases in this study were COPD (26%) and Diabetes (16%).
4. The most common presenting symptoms were fever (100%), cough (100%), expectoration (100%), other symptoms include dyspnea (46%) and chest pain (56%).
5. The respiratory signs like BBS, increased VR & VF, and WP were present in all subjects.
6. The hematological parameters showed neutrophil leukocytosis (53.52%), mean value of ESR was 25.3mm/1st hr
7. The sputum culture showed 26% S. pneumoniae, 12% S.aureus, 12% Klebsiella, 4% E-Coli, 4% Pseudomonas and 2% mixed and no organism was identified
8. Radiology showed COPD in 26% of cases. Right lung preponderance for consolidation was noted with 30% cases showing consolidation in the Right Lower lobe
9. Antibiotics were started at an appropriate time in an appropriate dosage.
10. The prognosis was good in this present study.
11. There was a need for serologic tests, urinary antigen tests and molecular methods for atypical bacteria and viral pathogens in patients admitted with CAP.

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