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To Assess the Clinical Radiological and Microbiological Profile of Patients with Community Acquired Pneumonia in a Tertiary Care Center in North East India and the Factors Predicting Mortality

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Abstract **Original Research Article**

Background: Pneumonia is an acute inflammation of the pulmonary parenchyma caused by various infective organisms. This study was intended in studying from 14 to 90 years with a mean age of 58.8 ± 15.73 years. Severity assessment is recognised as a pivotal step in the management of CAP. This study was intended in identifying prognostic factors to predict the mortality. The majorities (60%) of the patients were males and 40% were females. Out of 150 patients, 90(60%) were admitted to general wards and 60(40%) were admitted to the ICU. Out of the 60 patients admitted to the ICU, 45(75%) required Mechanical Ventilation. And out of these, 18 patients (12%) died. ***Conclusion:*** Demographic factors like male sex and elderly age group, clinical profile of confusion, dyspnea, tachypnea, tachycardia and hypotension, laboratory parameters of hypoalbuminemia, leucopenia, elevated BUN, hyperglycemia, high serum LDH, high CRP, acidosis, hypoxia, hypercapnea, growth of *klebsiella* and *pseudomonas* species on sputum culture and multilobar involvement on chest radiology also were associated with higher mortality.

Keywords: Cap community Acquired Pneumonia (CAP), Ldh lactate dehydrogenase, ATS American thoracic society, Idsa infectious disease society of America.

INTRODUCTION

Pneumonia was described by Hippocrates, the father of medicine in 400B.C.,as a acute inflammation of the pulmonary parenchyma which can be caused by various infective as well as non-infective origins, presenting with physical and radiological features compatible with pulmonary consolidation of a part or parts of one or both lungs [1].

The Infectious Disease Society of America defines Community Acquired Pneumonia(CAP) 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 (such as altered breath sounds and/or localized rales), in a patient not hospitalized or residing in a long-term care facility for more than 14 days before onset of symptoms" [2].

British Thoracic Society, defined Community Acquired Pneumonia (CAP) both on clinical and radiographic findings. In the absence of chest radiograph, in a community settings, CAP is defined as*: (a) symptoms of an acute lower respiratory tract illness (cough with or without expectoration, shortness of breath, pleuritic chest pain) for less than 1 week; and (b) at least one systemic feature (temperature >37.7°C, chills, and rigors, and/or severe malaise); and (c) new focal chest signs on examination (bronchial breath sounds and/or crackles); with (d) no other explanation for the illness* [3].

This study was done in Gauhati Medical College in the Department of Pulmonary Medicine to assess the clinical, radiological and microbiological profile of community acquired patients

MATERIALS AND METHODS

The present study was carried out in the department of Pulmonary Medicine, Gauhati Medical College and Hospital. The study was designated as a Prospective, observational, cohort study, which include 150 cases of CAP selected for a period of two years from August 2016 to July 2018 after fulfilling the inclusion and exclusion criteria. Ethical clearance was

obtained from the Ethical Committee of the Institution prior to the onset of the study.

Aims and Objectives: To assess the clinical, radiologic and microbiological profile of CAP.

Inclusion Criteria

1. Age>14 yrs.
2. All patients fulfilling the following definition of Community Acquired Pneumonia [7]:

a. Symptoms of an acute lower respiratory tract illness (cough with or without expectoration, shortness of breath, pleuritic chest pain) for less than 1 week

b. At least one systemic feature (temperature >37.7°C, chills, and rigors, and/or severe malaise)

New focal chest signs on examination (bronchial breath sounds and/or crackles Exclusion Criteria

1. Aspiration pneumonia
2. Pulmonary Tuberculosis
3. Immunosuppressed patients (HIV patients, solid organ transplant, post splenectomy, on steroids or chemotherapy)
4. Hospital acquired pneumonia (hospitalized within previous 14 days or developed >72 hours after admission)
5. Patient not willing to give consent
6. Age < 14 years

Method of Collection of Data

A detailed proforma was filled up for each patient, including age, sex, IP number, and detailed history, clinical examination was done. Laboratory parameters including complete blood counts, blood glucose, renal function tests, liver function tests, blood gas analysis, HIV ELISA, blood culture, ECG and routine urine examination were done. Patient was investigated for chest x-ray, sputum for gram stain, culture and sensitivity pattern and AFB. BAL, CT thorax, pleural fluid analysis was done only for required cases. All patients were clinically reassessed after 48 hours to look for development of compl0ons or to assess amount of improvement.

The patients were admitted to general wards and ICU depending on the heamodynamics of the patients. The ATS/IDSA (American Thoracic Society /Infectious Disease Society of America) was used to screen patients for ICU admission. Antibiotics were administered as per the IDSA guidelines [8].

Statistical Analysis

Statistical analysis was performed with the SPSS, version 20 for Windows statistical software package (SPSS inc., Chicago, il, USA). Appropriate test (Chi square or Fishers exact test) applied where required. The sensitivity and specificity of both the Scores-CURB-65 and PSI-SCORE was calculated.

Receiver operating characteristic (ROC) curves and areas under the ROC curves (AUC) with 95% confidence intervals were calculated for both CURB-65 Score and PSI-Score and comparison done.

RESULTS AND OBSERVATIONS

The results and observations of the data were recorded in the tabular form, bar diagram and pie diagram and statistical analysis of data was done using SPSS for MS Windows statistical software program (version 20.0) as and where indicated. Differences between the groups for categorical variables were analysed using chi-square test. P values of less than 0.05 were considered as statistically significant. A total of 150 cases who met the inclusion and exclusion criteria were included in this study.

Table I: Table showing, Age wise distribution of cases

Age group (years)	No. of patients	Percentage (%)
14-20	6	4
21-30	12	8
31-40	23	15.3
41-50	21	14
51-60	24	16
61-70	29	19.3
>71	35	23.4
TOTAL	150	100

The highest number of cases (23.4%) were seen in the age group of above 71 years. followed by 60-70 years age group. The age of the study population ranged from 14 to 90 years with a mean age of 58.8 ± 15.73 years it was observed that 58.7% cases were in the age group of more than 50 years and 41.3% cases were in the age group of less than 50 years. Lowest number (4%) of cases were seen in the age group of 14-20 years

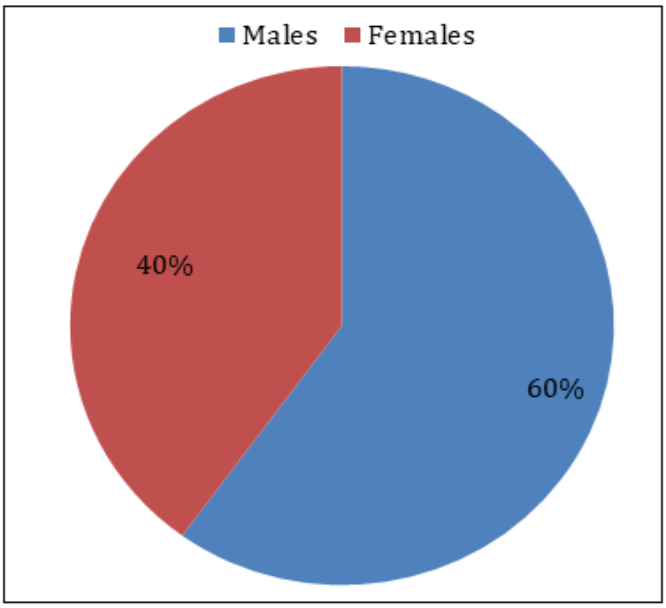

Figure 1: Pie diagram showing male and female ratio

Majority (60%) of the patients were males and 40% were females. The male: female ratio was 1.5:1. The mean age of males was 62.8 ± 15.71years and of females was 55.8 ± 15.75 years

Table II: Table showing Age-Gender wise distribution of cases along the different age groups

AGE (in years)	MALE		FEMALE		TOTAL	
	NO	Percentage (%)	NO	Percentage (%)	NO	Percentage (%)
14-20	4	4.44	2	3.33	6	4
21-30	6	6.67	6	10	12	8
31-40	12	13.33	11	18.33	23	15.3
41-50	12	13.33	9	15	21	14
51-60	15	16.67	9	15	24	16
61-70	14	15.56	15	25	29	19.3
>71	27	30	8	13.34	35	23.4
Total	90	100	60	100	150	100

From the above table it was observed that the highest number (30%) of the male cases were in the age group of more than 71 years whereas highest number (25%) of female cases were in the age group of 61-70 years. The mean age of males was 62.8 ± 15.71years and of females was 55.8 ± 15.75 years. Lowest number of cases in both the genders were seen in the age group of 14-20 years.

Table III: Table showing symptoms wise distribution of the cases

Symptoms	Number wise	Percentage (%)
Cough	143	95.33
Dry cough	43	29.37
Productive cough	100	70.63
Dyspnea	120	80
Fever	70	46.67
Chest pain	30	20
Confusion	20	13.33
Hemoptysis	15	10

The most common presenting complaint was cough which was seen in 95.33% (143) cases. Out of these 143 patients, 29.37% had dry cough and 70.63% had productive cough. Eighty percent (120) of the cases presented with dyspnea. Fever was present in 46.67% cases. Chest pain was seen in 20% cases. Confusion was present in 13.33% cases. Heamoptysis was present in 10% cases.

Table IV: Table showing distribution of cases on the basis of socio economic condition

Kuppuswami Scale	No of cases	Percent (%)
I	4	2.67
II	6	4.00
III	23	15.33
IV	47	31.33
V	70	46.67
TOTAL	150	100

As per Kuppuswami Scale 2016, the socioeconomic status of the patients were classified in five classes where highest income group was included in Class I and lowest income was included in Class-V. Highest number of cases (46.67%) were seen in Class V. Lowest number of cases (2.67%) were seen in Class I.

Table V: Table showing List of comorbidities in the patients

COMORBIDITIES	Number of patients	Percentage (%)
COPD	60	40
Congestive Heart Failure(CHF)	30	20
Diabetes	30	20
Hypertension	40	26.67
Malignancy	15	10
Renal Disease	30	20
Liver disease	30	20
Cerebrovascular Accident(CVA)	8	5.67

Out of the 150 cases, 80% (120) had atleast one pre-existing comorbidity. COPD was the most common comorbidity. It was present in 40% cases. The second most common comorbidity was hypertension which was seen in 26.67% cases. CHF was present in 20% cases. Diabetes was seen in 20% cases. CVA was present in 5.67% cases. Renal disease was present in 20% cases. Twenty percent cases also has liver disease. Malignancy as seen in 10% cases.

Table-VI-a: Table showing smoking status of the cases

Smoking status	Number of cases	Percent of cases
Never smokers	60	40
Smokers	90	60
TOTAL	150	100

The above table shows the pattern of smoking among our cases. Out of the 150 patients, 60% (90) were smokers and 40% (60) were non-smokers.

Out of the 90 smokers, 44.44% (40) were heavy smokers whereas 22.22% (20) were light smokers. Thirty three percent cases (30) were moderate smokers.

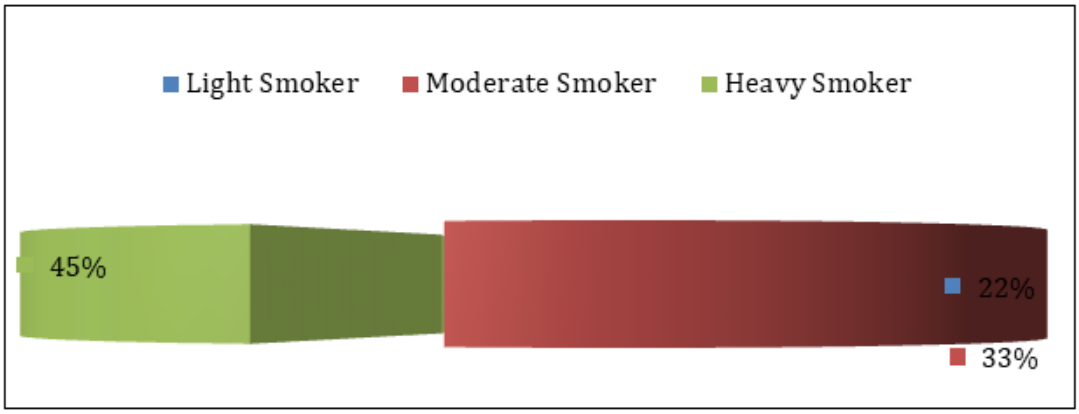

Figure II: Pie Diagram showing Distribution of the smokers on the basis of smoking index

Table VII: Table showing Distribution of vital statistics

VITALS	Number of patients	Percentage (%)
Tachycardia	60	40
Tachypnea	50	33.33
Hyperthermia	15	10
Hypotension	30	20

Tachycardia was the most common vital abnormality observed. It was present in 40% cases while tachypnea was seen in 33.33% cases. Hyperthermia was present in 10% cases. Hypotension was present in 20% cases.

Table VIII: Table showing distribution of laboratory parameters of patients

LABORATORY PARAMETERS	Number of patients (n=150)	Percentage (%)
TLC>12,000	90	60
TLC<4000	12	8
Serum ESR>10 mm/ hr	60	40
Blood urea nitrogen>20mg/dl	45	30
Serum creatinine>1.5mg/dl	30	20
Serum Bilirubin>2mg/dl	30	20
RBS>160 mg/dl	45	30
Serum albumin<3mg/dl	60	40
Serum LDH>230 U/L	45	30
Serum CRP> 10 mg/l	50	33.33
PH<7.35	40	26.66
PaO2<60 mmHg	60	40
PaCo2>45mmHg	50	33.33

From the above table, we can see that leukocytosis was present in 60% cases whereas leucopenia was present in 8%.ESR was raised in 40% cases. Thirty (30%) percent cases had elevated blood urea nitrogen although serum creatinine was elevated in 20%. Twenty percent (20%) cases were having raised serum bilirubin level. Random blood sugar was impaired in 45 cases (30%) although (20%) 30 cases were diabetic. It was because the rest 10% (15) cases had hyperglycemic state due to the acute insult .They became euglycemic with the resolution of the disease. Fourty percent (60) cases were having hypoalbuminemia. C-Reactive Protein and Lactate Dehydrogenase were raised in 30% and 33.33% cases respectively. Arterial Blood gas analysis revealed hypoxia in 40%, hypercapnia in 33.33% and acidotic ph in 26.67%.

Table IX: Table showing Radiological involvement among the patients

RADIOLOGICAL FINDINGS	Number wise	Percentage (%)
Consolidation	120	80
Interstitial infiltrates	30	20
TOTAL	150	100

From the above table we can see that lobar consolidation was present in 80% cases while interstitial infiltration was seen in 20%. Ten percent cases had a unilateral pleural effusion. Pleural fluid analysis was done and it was suggestive of parapneumonic etiology.

Table X: Tableshowing radiological pattern of lobar involvement

Consolidation	Number wise	Percentage (%)
Unilobar	75	62.5
Multilobar	45	37.5
TOTAL	150	100

Out of the 120 cases with lobar consolidation, 62.5% had unilobar involvement whereas 37.5% had multilobar involvement.

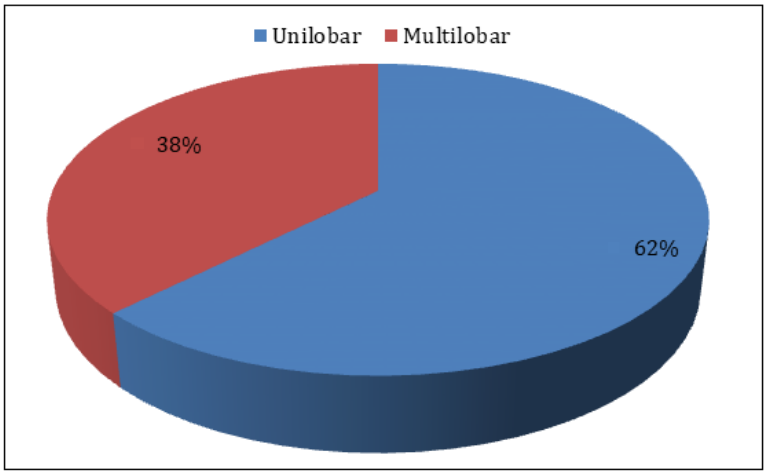

Figure III: Pie Diagram showing radiologicalpattern of lobar involvement

Sputum examination was done in all patients with productive cough (n=100). The most common organism isolated was streptococcus pneumonia in 40% cases followed by Pseudomonas Aeruginosa in 10%. Klebsiella Pneumoniae was isolated in 6% cases. Staphylococcus aureus growth was seen in 6% cases also. Rest 38% had no growth isolated.

In this study out of 150 patients, 90(60%) were admitted to general wards and 60(40%) were admitted to the ICU. The IDSA Criteria was applied to screen patients for ICU admissions. Out of the 60 patients admitted to the ICU, 45(75%) required mechanical ventilation. Out of all patients, 132(88%) survived and 18(12%) died. There was no mortality in the wards as all the critically ill patients were directly admitted to the ICU and even the indoor patients were transferred when there was clinical detoriation.

Table XI: Table showing distribution of need for ICU of patients studied

ICU Admission	Number of patients	Percentage (%)
YES	60	40
NO	90	60
TOTAL	150	100

The above table shows that out of 150 patients, 60% (90) were admitted to general wards and 40% (60) were admitted to the ICU. The IDSA Criteria was applied to screen patients for ICU admissions.

Table XII: Table showing distribution of need for mechanical ventilation

Mechanical Ventilation	Number of patients	Percentage (%)
NO	15	25
YES	45	75
TOTAL	60	100

The above table shows that out of the 60 patients admitted to the ICU, 75% (45) required mechanical ventilation. Non Invasive Ventilation was needed in 20% cases.

Table XIV: Table showing distribution of mortality of patients studied

MORTALITY	Number of patients	Percentage (%)
YES	18	12
NO	132	88
TOTAL	150	100

Out of 150 patients, 88% (132) survived and 12% (18) died. There was no mortality in the wards as all the critically ill patients were directly admitted to the ICU and even the indoor patients were transferred when there was clinical detoriation.

Table XV: Table showing comparison of the factors between survivors and non survivors group

Factors		No of Patients	Survivors	Non-Survivors	P Value
AGE	<=50	62	59	3	0.0387
	>50	88	73	15	
SEX	F	60	57	3	0.0396
	M	90	75	15	
COUGH	Absent	7	6	1	>0.05
	Dry	43	39	4	
	Productive	100	77	13	
FEVER	A	80	73	7	>0.05
	P	70	59	11	
HEMOPTYSIS	A	135	122	13	>0.05 -
	P	15	11	4	
CHEST PAIN	A	120	110	10	>0.05
	P	30	22	8	
DYSPNEA	A	30	29	1	<0.0001
	P	120	103	17	
CONFUSION	A	130	129	1	0.002
	P	20	03	17	
TACHYCARDIA	A	90	87	3	0.002
	P	60	45	15	
TACHYPNEA	A	100	98	2	0.0007
	P	50	34	16	
HYPERTHERMIA	A	135	126	9	>0.05
	P	15	6	9	
HYPOTENSION	A	120	111	1	0.02
	P	30	13	17	
COMORIBIDITY	A	30	30	0	0.024
	P	120	102	18	
COPD	A	90	85	5	0.042
	P	60	47	13	
CHF	A	130	124	6	0.001
	P	20	8	12	
LIVER DISEASE	A	139	124	15	>0.05
	P	11	8	3	
DIABETES	A	120	114	6	0.01
	P	30	18	12	
Renal Failure	A	120	108	12	>0.05
	P	30	24	6	
CVA	A	142	128	14	>0.05
	P	8	4	4	
MALIGNANCY	A	137	127	10	>0.05
	P	13	5	8	
SMOKING STATUS	A	60	57	3	0.04
	P	90	75	15	
Light Smoker		20	19	1	
Moderate smoker		30	28	2	
Heavy Smoker		40	28	12	<0.0001
HYPERTENSION	A	110	98	12	>0.05
	P	40	34	6	
SOCIOECONOMIC CONDITION	CLASS V	70	61	9	0.02
	CLASS IV	47	43	4	
	CLASS III	23	20	3	
	CLASS II	6	5	1	
	CLASS I	4	3	1	
Pa02<60mmHg	A	90	88	2	0.01
	P	60	44	16	

Factors		No of Patients	Survivors	Non-Survivors	P Value
Bilirubin>2	A	120	110	10	>0,05
	P	30	22	8	
TLC>12,000	A	60	52	8	>0.05
	P	90	80	10	
TLC<4000	A	108	99	9	<0.0001
	P	12	3	9	
RBS>160mg/dl	A	105	99	6	>0.05
	P	45	33	12	
SODIUM<130mmol/l	A	110	105	5	>0.05
	P	40	27	13	
ALBUMIN<3mg/dl	A	90	87	3	0.0001
	P	60	45	15	
BUN>20mg/dl	A	90	85	5	>0.05
	P	60	47	13	
Serum LDH>230U/l	A	105	102	3	<0.001
	P	45	30	15	
pH<7.3	A	110	107	3	<0.001
	P	40	25	15	
PaCO2>45mmHg	A	100	95	5	0.0004
	P	50	37	13	
ESR>10mm/hr	A	90	78	12	>0.05
	P	60	54	6	
CRP>10gm/dl	A	110	106	4	<0.0001
	P	40	26	14	
Sr.Cr> 1.5mg/dl	A	110	104	6	>0.05
	P	40	28	12	

SPUTUM CULTURE	Klebsiella	6	2	4	0.019
	No growth	38	35	3	>0.05
	Pseudomonas	10	4	6	0.0002
	Staphylococcus	6	6	0	>0.05
	Streptococcus	40	35	5	>0.05
RADIOLOGICAL	Interstitial	30	23	7	>0.05
	Lobar	120	109	11	
UNILOBAR	A	75	60	15	>0.05
	P	75	72	3	
MULTILOBAR	A	105	102	3	<0.0001
	P	45	30	15	

The above table depicts the comparison of the factors between mortality group and the survivor group. The values which were statistically significant are described below:-

AGE: High incidence of mortality was observed in the age group of above 50 years.

SEX: The male gender was found to be associated with higher risk of mortality.

SYMPTOMS: Higher incidence of mortality was observed in those patients who presented with confusion and dyspnea.

SOCIOECONOMIC STATUS: It was observed that there was increased number of deaths in lower socioeconomic condition

COMORBIDITIES: Presence of comorbidities was associated with higher risk of mortality. Out of these, in my study, COPD, CHF and Diabetes cases exhibited a higher risk of mortality.

SMOKING: It was associated with higher risk of mortality and the heavy smokers have the highest risk.

VITALS: Tachycardia, Tachypnea and Hypotension were observed to be associated with high incidence of mortality.

Arterial Blood Gas Analysis: The mortality group had high incidence of Hypoxia, acidosis and hypercarbia.

LABORATORY PARAMETERS: Leucopenia, Hyperglycemia, hypoalbuminemia, raised LDH and high CRP was associated with higher mortality cases.

RADIOLOGICAL FINDINGS: Mortality group was observed to have high incidence of multilobar presentation on chest skiagram.

SPUTUM GROWTH: The mortality cases showed significant growth of *klebsiella* and *pseudomonas* on sputum culture.

DISCUSSION

A total of 150 cases who fulfilled the inclusion and exclusion criteria were enrolled in this study. The age of the study population ranged from 14 to 90 years with a mean age of 58.8 ± 15.73 years. There were 58.7% cases above 50 years of age while the rest 41.3% cases were below 50 years. Similar observation was seen in the study done by Dey *et al*., [3]. The age of the study population ranged from 15 to 85 years. Mean age was 55.8 ± 25.23 years and 59% cases were above 50 years. This study highlights that pneumonia is more common in the elderly age group. Similar results were seen in the study by Buzzo AR *et al*., [4] and Joshua *et al*., [5]. In the present study. 60% were males while 40% were females. In the study by Bansal *et al*., [6], 71.48% cases were males and 28.52% were females. In most of the studies including our study, the incidence of pneumonia was more in males compared to females. This could be attributed to cigarette smoking and alcoholism, as well as underlying lung disease e.g. COPD which predisposes to pneumonia and are more common in developing countries like India .

In our study, highest number of male cases (30%) were in the age group of above 71 years while the highest number of female cases (25%) were in the age group of 61-70 years. Similar observation was seen in Bansal *et al*., [6] where the highest number of male cases (34%) were in the age group of above 65 years and the highest number of female cases were in the age group of 60-70 years. Meteley *et al*., [7], also observed in their study that the highest number of cases of both genders were above 65 years. Thus the incidence of pneumonia increases in both genders in the elderly age group.

Cough was the most common presenting symptom (95%) in our patients. It was followed by breathlessness (80%). In the study conducted by Diwaker *et al*., [8], cough was present in 95%, dyspnea in 86% and fever in 83% cases In Mac Fartane *et al*., [9] "study of aetiology & outcome of CAP", cough was the most frequent symptom seen in 96% of the patients followed by dyspnea (86%). Fever was present in 46.67% patients of our study .In the study by Jagadeesh *et al*., [10] fever was present in 70% cases. Chest pain was present in 20% of our patients. Jagadeesh *et al*., observed chest pain in 15% cases

Kuppuswami Scale was used for socioeconomic stratification of cases. Maximum number of cases (46.67%) in our study were observed in low socioeconomic class (Class V). Similar observation was noticed by LKAM Thorne *et al*., [11]. However in one study by Conchita *et al*., [12] they found no difference in the incidence of pneumonia between high and low socioeconomic class. This dissimilarity in observation with our study might exist due to different geographical area. That study was conducted in Belgium which is a developed nation.In our study, cases of all groups of socio economic status were present though the number of low socio economic status was higher. The association of pneumonia with low socioeconomic condition may occur due to factors like overcrowding, illiteracy, malnutrition, improper sanitation, inadequate vaccination, prevalence of smoking, alcoholism, inability to afford medical treatments and higher exposure to infectious agents.

Eighty percent (80%) cases in our study had atleast one comorbidity.In the Diwaker *et al*., [11], eighty three (83%) cases had one or morecomorbidity. Shah BA *et al*., [13] in his study observed that comorbidities were present in 89% cases. Out of the 120 patients with comorbidities, it was observed that 50% had COPD, 26.67% had hypertension and 20% were diabetic. In Diwaker *et al*., 13.3% were diabetic, 8.3% had hypertension and 1.7% had COPD.

Chronic obstructive pulmonary disease (COPD) was the most common underlying co-morbid condition observed in 40% cases of our study. In J. P. Metley *et al*., [7] COPD was present in 70% cases.In Bansal *et al*., [6] COPD was present in 68% cases. The change in the bacterial flora in these patients is well supported by ineffective coughing and advanced age predisposes them to pneumonia.

In our study, 40% had tachycardia, 33.33% had tachypnea, 10% had high-grade temperature associated with chills and rigors and 20% had hypotension. It was similar to Jagadeesh *et al*., [10] where 40% had tachypnoea, 50% had tachycardia and 30% had high-grade temperature associated with chills and rigors.

Blood haemogram revealed leucocytosis in 60% cases whereas leucopenia in 8% cases. This observation was similar to Joshua *et al*., [7] where leucocytosis was present in 58% and leucopenia in 4% cases. Blood Urea Nitrogen was elevated in 30% cases of our study. Similar observation (40%) was done in Irfan *et al*., [15]. Serum bilirubin was raised in 13.33% cases. In Luque *et al*., [16 it was present in 15% cases. Fourty percent (40%) cases of the present study had hypoalbuminemia .It was similar to Joshua *et al*., [7] where it was seen in 45% cases. In the present study, random blood sugar levels (RBS>160 mg/dl) and serum LDH (LDH>230 U/l) were elevated in 40% and 30% cases respectively. It was similar to P. C. Chen *et al*., [17] where elevated Random Blood sugar and raised

serum LDH were found in 50% and 30% cases respectively. Arterial blood gas analysis showed hypoxia, acidosis and hypercapnia in 40%, 26.67 and 30.33% cases respectively. In M. Lazzerini *et al*., 18] hypoxia, acidosis and hypercapnia were present in 60%, 40% and 39% respectievely.

Out of the 150 cases, lobar involvement was seen in 80% cases and interstitial involvement in 20%. It can be compared with the study by Jagadeesh *et al*., [18] where 73% had lobar involvement and 27% had interstitial pattern. Multilobar pattern was seen in 30% cases whereas unilobar pattern was seen in 50%.These results were comparable to Luque *et al*., [22] in which 28% cases had multilobar and 60% cases had unilobar presentation. Bansal *et al*., [17] had also similar observation.

Sputum culture revealed streptococcus growth in majority (26.67%) of cases while pseudomonas was seen in 6.67% cases. Klebsiella species was isolated in 4% cases. In Jagadeesh *et al*., [18] streptococcus was present in 56% while pseudomonas was seen in 14%. Klebsiella was isolated in 10%. This difference may be explained by the different geographical location of both the studies. However results were similar to Bansal *et al*., [17] where streptococcus was isolated in 40%, pseudomonas in 8% and klebsiella in 4% cases.

Out of 150 patients, 60% (90) were admitted to respective/general wards whereas 40% (60) were admitted to the ICU based on the IDSA Criteria. In Diwaker *et al*., [5], ICU admission was 45% and wards admission was 55%. Luque *et al.,* [22] observed in their study that38%cases were admitted to the ICU.

Out of the 60 patients admitted to the ICU, 75% cases required mechanical ventilation. It can be compared with Diwaker *et al*., [5] where 80% cases required mechanical ventilation. Similar observation was done by Khalid *et al.,* [22] where 61.34% required mechanical ventilation.

The mortality rate in our study was observed to be 12%. The mortality rate can be compared with the studies conducted by Irfan *et al*., [14], Bansal *et al*., [17] The mortality rate was 11% in both the studies.Similar observation was done by Luque *et al.*, [22] where mortality rate was 12%

Comparison of the factors was done between mortality group and the survivor group.The values which were statistically significant are described ---

Increasing age has been defined as a independent predictive facto (p value <0.05) for mortality of pneumonia in many previous studies and this observation was also done in our study. Out of the 18 mortalities, 83.33% cases were in the age group of above 50 years .Similar observation was done in the study conducted by Bansal *et al*., [17] where 80% of the mortality group belonged to the age group of above 50 years.

Male gender has been identified as a independent predictive factor for mortality of pneumonia in previous studies and this association (p value< 0.05) was also observed in our study. Out of the 18 mortality cases, there were 83.33% males. This observation can be compared with the study by J. P. Metley *et al*., [19] where 80% males were present in the mortality group.

Dyspnea has been found as a predictive factor (p-value <0.0001) for mortality of pneumonia in our study and similar observation was also done in previous studies. Dyspnea was observed in 94.44% of the casualities. Similar observation was seen in Steer J *et al*., [20] where 100% patients in the mortality group had dyspnea.

Confusion has been defined as an independent predictive factor of mortality in many previous studies and significant association (p value <0.002) was seen in our study also. Ninety four percent of the patients in the mortality group had confusion. This was similar to Abisheganaden J *et al*., [26] where confusion was present in 100% mortality cases. Similar association was seen in the study by Irfan *et al.,* [14].

The initial vital signs are critical information to understand the patient's health condition, in particular, the severity of acute illness and how well the body copes to it. Tachycardia, hypotension and tachypnea were independently associated (p<0.05) with mortality in our patients. Similar observation was done in the study by Jagadeesh *et al*., (p value <0.05) [18].

Comorbid conditions have been a well-recognised risk factor (p value <0.05) for death due to pneumonia. Ninety percent cases of the mortality group had one or more pre -existing co-morbidity. Similar observation were seen in Bansal *et al*., [17] where comorbidities were present in 94% patients of the mortality group.

Among the 8 comorbidities evaluated in our study, COPD, congestive heart failure and diabetes were significantly predictive (p<0.001) of mortality among the patients. In the study by Jagadeesh *et al*., [18]. COPD, Diabetes, liver disease and CHF were found to have significant association.

COPD was the most common comorbidity observed in our study population. It was present in 72.22% mortality cases. In the study by Bansal *et al*., [17], it was present in 80% of the mortality cases.

CHF had significant association (p value <0.05) with the mortality group. It was present in

66.67% of the mortality group. In the study by R. W. Thomsen *et al*., [21] study, 60% cases in the mortality group were associated with heart failure.

Significant association (p value<0.05) was also seen with diabetes .It was present in 66.66% patients of the mortality group. This was similar to the study by Jagadeesh *et al*., where it was present in 70% of the mortality patients.

Low socioeconomic condition was associated with significant risk (p value <0.001) of mortality in our study. Majority (90%) patients of the mortality group were of low socioeconomic condition. The results were similar to LKAM Thorn *et al*., [21] where 60%mortality cases belonged to the low socioeconomic status.

High mortality rate was observed among smokers.In our study,it was present in 83.33% patients of the mortality group.Similar results were seen in the Bansal *et al*., [17] where 80% of the mortality group were smokers.

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Leukopenia was associated significantly with mortality (p value <0.0001). It was present in 50% cases of mortality group. Similarly, in the study by Irfan *et al.*, [14] it was present in 40% patients of mortality group.

Albumin is a marker of the nutritional status of the body. Hypoalbuminemia was present in 88.89% of the mortality group and it had significant association. Similar result was seen in Jin Liang Liu *et al*., [22] where it was present in 90%mortality cases.

Blood Urea Nitrogen (BUN) level is an important biochemical parameter showing renal hypoperfusion. Elevated BUN (>20mg/dl) was present in 83.33% cases of the mortality group and it was found to be an independant predictive marker of mortality. Similar observation were seen in the Evrim Eylem *et al*., [23] where it was seen in 80% mortalities.

Elevated blood glucose was an important clinical indicator of CAP severity in many previous studies which was also seen in our study. Hyperglycemia was present in 88% of the mortality cases. In 2012, LEPPER *et al.*, [24] found, in a large prospective multicentre cohort study of CAP, that hyperglycaemia was strongly associated with mortality in CAP patients. So, earlier detection of patients with hyperglycemia and proper management may result in lower than expected mortality from pneumonia.

Serum LDH is a marker of cellular injury**.** In our study, 83.33% cases had raised serum LDH level. Similarly in the study by **Jin Liang Liu *et al*.**, it was found in 80%of the mortality cases.

CONCLUSION

This study is an epidemiological study to understand the incidence of Community Acquired Pneumonia. Community-acquired pneumonia (CAP) is a major cause of morbidity and mortality in developed countries. The factors which have been found to be independently associated with mortality in the present study can be grouped into demographic, clinical, socio-economic condition, smoking habitus, presence of co-morbidities, laboratory profile., microbiologic and radiological profile. Demographic factors included male sex and elderly age group. Clinical profile were confusion, dyspnea, tachypnea, tachycardia and hypotension. Laboratory parameters include hypoalbuminemia, leucopenia, elevated BUN, hyperglycemia, high serum LDH, high CRP, acidosis, hypoxia, hypercapnea. Growth of *klebsiella* and *pseudomonas* species on sputum culture and multilobar involvement on chest radiology also had significant association with mortality

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