Pulmonary Medicine

A CLINICORADIOLOGICAL PROFILE OF COMMUNITY ACQUIRED PNEUMONIA (CAP).

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INTRODUCTION

Community acquired pneumonia remains a common and serious respiratory illness even with the advent of potent anti microbials and effective vaccines. As many as four million cases of CAP occur annually and 20% of these require hospitalization (1). The mortality among patients who require admissions to ICU, approaches 25% (3-6). C-reactive protein (CRP) is a protein made by Liver and released into blood stream in response to inflammation, normal value being < 3 mg/L (7-9).

Increasing CRP during the first 48 hours of hospitalization is a better predictor (with higher sensitivity) of respiratory decline than initial CRP levels.

CRP levels are usually lower in viral intections & superficial bacterial infections than deep baterial infections (7-9).

A delayed normalization of CRP levels is associated with a higher risk of having received antibiotic (inappropriate antibiotic) or an unfavorable clinical outcome such as mortality early treatment failure and late treatment failure (12-13).

To know the clinical stability of CAP,NLR (neutrophil) – Lymphocyte Ratio) may be used. NLR are easy to measure and easy to use (10).

NLR is simple, cheap and rapidly avilable measurement in blood routine and is associated with unfavourable clinical outcomes in adult CAP pts. NLR seems to predict severity and outcomes of patients with bacterial CAP patients (11). Normal NLR = 0.78 to 3.57%.

NLR is increased in Diabetes.
NLR is increased in hypoxic patients in patients bilateral infiltrates.

AIMS AND OBJECTIVES
1. To know the clinical and radiological profile of CAP
2. To profile the Values of CRP, NLR, CRP% in (a) complicated cases(complications like para pneumoniceffusion,need for O_2 therapy, NIV (Non- invasiveVentilation) therapy, and death) and in (b)un complicated cases.
3. To compare the values of CRP, NLR, & CRP% between complicated&un complicated cases of CAP.
4. To compare the length of the hospital stay between complicated un complicated cases of CAP.

METHODS AND MATERIALS
Study design:prospective and Descriptive
Study Population: Patients presented with CAP and got admitted to GHCCD, Visakhapatnam, Andhra Pradesh.
Study Period: From 25.03.2018 to 26.11.2020

Sample size: A total of 100 cases of were enrolled in tothis study.15 cases were excluded when their sputum CBNAAT detected MTB, 85 Cases being CAP

Inclusion Criteria:
1. Patients who were above 14 yrs of age.
2. patients with CAP
3. Patients who were willing to participate in the study.

ExclusionCriteria:
- Patients of age less than 14 years
- Patients with Hospital Acquire pneumonia (HAP)
- Patients whose sputum CBNAAT detected MTB
- Patients who were not willing to participate in the study

METHODOLOGY
All Patients admitted to the department of pulmonary medicine (GHCCD) with CAP full-filling the inclusion and exclusion criteria were taken in the study.

After obtaining written informed consent, in all these patients detailedhistory including age, sex, and presenting complaints like cough, expectoration, fever, SOB, chest pain was obtained.Co morbidities and risk factors like DM, HTN, Smoking and alcohol intake were noted.

Detailed clinical examination was done. Routine investigations were like CBP and chest xray were done for all patients. Blood samples for CRP were collected on day 1 and day 2 of the admission and were sent for laboratory.

CRP% calculated (formula $\frac{CRP_2}{CRP_1} \times 100$)

{CRP1 is CRP on day 1;CRP2 is CRP on day2}
NLR were calculated

Formula : $\frac{\text{absolute number of neutrophils}}{\text{Absolute number of Lymphocytes}} \times 100$

Length of stay of hospital stay is noted. CRP, NLR, CRP%, and length of stay of hospital were compared in between complicated and un complicated cases.

RESULTS
The present study includes 85 patients out of which males 47 (55.29%) and females 38 (44.70%)most number of cases 53 (63.85%) were in the 31-60 years age group.

1. Sex distribution
Males : 47 (55.29%)
Females : 38 (44.70%)
Total: 85 100

2. Age distribution

Age	Male	Female	Total	%
10-20	-	1	1	1.17%
21-30	7	9	16	18.82%

31-40	12	4	16	18.82%
41-50	11	9	20	23.52%
51-60	10	9	19	22.35%
61-	7	6	13	55.29%
Total	47	38	85	

In this study 8 patients(9.63%) were diagnosed to have coexisting COPD, 9 patients(10.84%)with CKD, 2 patients(2.40%) withheartdiseases 1 patient(1.20%) with carcinoma of the lung, 17 cases (20.48%)with diabetes, 18 cases (21.68%)withHTN, 7 patients(8.43%) with HIV, 12 cases (14.45%) with H_1N_1(Swine flu)

Co-morbidities

S.No	Disease	Males	Females	Total	%
i	Diabetes	10	7	17	20 %
ii	HTN	8	10	18	21.17%
iii	COPD	5	3	8	9.41%
iv	CKD	7	2	9	10.58%
v	PLHIV	3	4	7	8.23%
vi	H1N1	8	4	12	14.11%
vii	Heart disease	2	0	2	2.35%
viii	Ca lung	0	1	1	1.17%

All the patients presented with fever, cough expectoration. Dyspnoea in 57 patients (68.67%) and hemoptysis in 7 patients (8.23%) was observed

Symptoms

Symptoms	Males	Females	%
Cough	47	36	100
Expectoration	47	36	100
Fever	47	36	100
Shortness of Breath	32	25	67.05
Hemoptysis	5	2	8.23

In our study of 85 patients in CAP organisms isolated were streptococcus pneumonia, klebsiella pneumonia, staphylococcus aureus andpseudomonas.

In our study , Bilateral pneumonia on chest xray was noted in 32 patients (38.55%).
RT lung- 31 cases   (37.34%)
LT Lung - 20 cases   (24.09%)
Bilateral and Multilobar involvement– 42 cases   (50.60%)

CXR lesion distribution	Males	Females	%
Bil pneumonia	17	15	37.64%
RT lung pneumonia	20	11	36.47%
LT lung pneumonia	10	10	23.52%
Multilobar	28	14	49.41%

45 patients (52.94%) recovered without any complications like para pneumonia effusion etc.40 patients (47.05%)developed complications like

I. Parapneumoniceffusion -	9	(10.58%)
ii. Need of O2 inhalation -	23	(25.88%)
iii. Needed NIV -	4	(4.70%)
iv. Needed Intercostal tube thoracostomy -	1	(1.17%)
v. Deaths -	4	(4.70%)

COMPLICATIONS

S.No	Complication	Males	Females	Total	%
I	para Pneumonic effusion *needed ICT drainage	5 (1)	4	9	10.58% 1.17
Ii	Need of O2 inhalation	17	5	22	25.88%
Iii	Needed NIV	2	2	4	4.70%
Iv	Deaths	1	3	4	4.70%
		26	14	40	3.61%

All pts were treated with antibiotics according to their sputum culture and drug sensitivity along with supportive management includes, bronchodilators, O2 therapy and NIV.

Mean CRP value in males :-
i.   In complicated cases = 47.07 mg/L
ii.   In un-complicated cases =31.57 mg/L

Mean CRP value in Females :-
i.   In complicated cases = 48/.42 mg/L
ii.   In un-complicated cases =26.45 mg/L

Mean CRP value in complicated Cases is = 43.90 mg/L,

Comorbidities	CRP
H1N1	22 mg/L
PLHIV	29.14 mg/L
DM	43.76 mg/L

Organisms	CRP
Klebsiella	78 mg/L
Strep pneumonia	56 mg/L

CRP : Mean CRP value   CAP cases   = 40.23 mg/L
standard deviation:30.489,P value:0.060
Mean CRP Value in un complicated Cases   = 32.18 mg/L,
standard deviation:26.236,P value:0.060

T-Test

	GROUP	Mean	Std. Deviation	P VALUE
CRP	C	43.90	30.489	.060
	UC	32.18	26.236	
NLR	C	5.2524	2.94055	.720
	UC	5.0411	2.47680	
CRP%	C	85.98	84.604	.435
	UC	68.18	120.122	

Length of stay in hospital :-
Average Length of stay in Hospital in Complicated cases 13.35 days
Average length of stay in hospital in non complicated   9 days

CRP%
In complicated cases:-
Mean CRP % in males   :   120.19
Mean CRP % in Females :   66.07

In un complicated cases:-
Mean CRP % in males   :   55.26
Mean CRP % in Females :   45.83

Mean CRP% in complicated cases:- 85.98
Standard deviation:84.604, p value :0.435
Mean CRP% in uncomplicated cases:- 68.18
Standard deviation:120.122, p value :0.435
CRP% in H1N1 cases = 79.16%
CRP% in PLHIV = 128.57%
CRP% in   Diabetic CAP = 76.47%
(* CRP% = CRP day2/CRP day1   x 100)

NLR
Mean NLR in Hypoxic patients :
Males =   5.72%
Females = 4.79%
Mean NLR in Bil infiltrates = 4.96%
Mean NLR in multilobar
Involvement = 4.83%

Comorbidities	NLR
H1N1	4.26%
PLHIV	4.41%
DM	5.87%
Organisms	NLR
IN Klebsiella pneumonia	1.56%
In Streptococcal Pneumonia	5.20%

Mean NLR in Hypoxic pts Males 5.72, Females 4.79
Mean NLR in Bil infiltrates 4.96

Mean NLR in complicated cases:- 5.2524
Standard deviation: 2.94055, p value : 0.720
Mean NLR in uncomplicated cases:- 5.0411
Standard deviation: 2.47680, p value : 0.720
Mean NLR in complicated cases = 5.2524%
standard deviation:2.94055, P value:0.720
Mean NLR in un Complicated cases = 5.0411%,
standard deviation: 2.47680, P value: 0.720

DISCUSSION
CAP remains a common and serious respiratory illness despite the availability of potent antibiotics and effective vaccines. In the recent years, the epidemiology, prognosticators and modalities of treatment of pneumonia have been frequently studied. Community acquired Pneumonia is occurring more often in elderly patients associated with co-morbidities like COPD, DM, renal failure, CHF. The risk factors

included smoking, alcohol intake, andother associated co-morbidities like DM, COPD; Radiological study showed bilateral involvement & multilobar involvement is more common.(42 cases 50.60%)

In the present study males 47 (55.29%), Females 38(44.70%) where as in the study done by Cornelis : male 60.75%, Female 39.24%, in the study done by Nikolavos Dimitrios : male 65.4%, Female 34.6%, in the study done Emanuel catau della study male 61.5%, Female 38.5%, in the study by Ulrich thiem : Male 51.2%, Female 48.82%, in the study done by Josu Curbelo : male 57.79%, Female 42.20%. so CAP is more common in males in the present study which is in agreement with other studies.

Most commonly involved age group in this study was 31-60 – 39 patients, 45.88%. Economically Productive age group is involved.

In this study co morbidities were :
Diabetes Mellitus - 17 - 20%
COPD - 8 - 9.41%
CKD - 9 - 10.58%
Heart diseases - 2 - 2.35%
Ca lung - 1 - 1.17%
PLHIV - 7 - 8.23%
H1N1 - 12 - 14.11%

In the study done by Cornelis :
Diabetes Mellitus - 68 - 17.21%
COPD - 131 - 33.16%
CKD - 37 - 9.36%
Heart diseases - 94 - 23.79

In the study done by Emanuel :
Diabetes Mellitus - 60 - 30.8%
COPD - 88 - 45.1%
CKD - 45 - 23%
Heart diseases - 58 - 29.7%

In the study done by Ulrich Thiem :
CKD - 119 - 30.4%
Heart diseases - 261 - 66.8%

In the study done by Jose Curbelo :
Diabetes Mellitus - 25 - 16.23%
COPD - 48 - 31.16%
CKD - 22 - 14.28%

In the present study diabetes and COPD are the predominant comorbidities and in cuncurrance with other studies.

In this study Symptoms were :
Cough , Expectoration and fever present in all patients shortness of breath present in 57 patients (67.05%), hemoptysis present in 7 patients (8.23%), where as study done by Emanuela Catau della showed shortness of breath 160 patients (82%), fever 88 patients (45.1%)

In the present study complications occurred were :
Parapneumonic effusion - 9 - 10.58%
O2 needed - 22 - 25.88%
NIV needed - 4 - 4.70%
ICT needed (inter costal tube thoracostomy) - 1 - 1.17%
Deaths - 4 - 4.70%

Where as in the study done by Cornelis :
deaths were   - 15 (3.79%), in the study done Nikolaos Dimitrios : number of deaths 2 (7.7%), in the study done by Emmanuel Catau Della NIV needed 29 patients (14.9%), in the study Ulrich Thiem : Number of deaths 76/891 (19.4%), in the study Jose Curbello : Deaths 12 (7.79%).

CRP measurements are useful in the first week in the follow up of treatment for severe CAP. A delayed normalization of CRP levels is associated with a higher risk of un-favorable clinical outcome such as mortality,need for oxygen therapy, NIV therapy and complicated para pneumonic effusions or empyema

Increasing CRP during the first 48 hours of hospitalization is a better predictor (with higher sensitivity) of respiratory deterioration than initial CRP levels.

CRP levels are usually lower in viral infections
In this study mean CRP in complicated cases 43.90 (std. deviation 30.489, pvalue: 0.060) mean CRP in un-complicated cases 32.18 (std. deviation 26.236, p value :0.060) where as in the study done by Ulrich Thiem Mean CRP in died patients 100.8 + or – 87.3 mg/L, in the study done by E.Garcia Vazquez : mean CRP L.pneumophila 25 mg/L, in the study done by Jose Curbelo : CRP in died patients 18.8 mg/L vs 13.4 mg/L, in the study done by Cornelio : CRP 142 mg/L, in the study done by Nikolaos Dimitrios : CRP minimum 0.40 mg/dl, maximum 42.58 mg/dl.

Hence means CRP is highter in pneumonia with complications than uncomplicated pneumonias which is in agreement with other studies, considering death to as a complcation.

NLR is simple, cheap and rapidly available measurement in CBC and increased NLR is associated with unfavorable clinical outcomes in adult CAP patients. NLR seems to predict severity and outcomes of patients with bacterial CAP .

NLR is increased in DM
NLR is increased in hypoxic pts in pts bilateral infiltrates.
In this study mean NLR in complicated case was 5.2524% (std deviation:2.94055, p value :0.720) and mean NLR in un-complicated cases was 5.0411%, (std deviation:2.47680, p value :0.720) where as in the study done by Jose Curbelo : NLR 16.8 Vs 10.5, in the study done by cornelis NLR was 28.3, in the study done by Nikolaos Dimitrios Pantzaris NLR minimum 1.4, maximum 34.7, in the study done by Emanuela Catau della NLR values in which patients who showed more than 28.3%, all patients were died. NLR in our study is not increased as much as with other studies.

Combined use of CRP& NLR may predictdisease severity in patients with CAP better than individual investigation alone.

Mean CRP % in complicated cases 85.98, standard deviation: 84.604, p value :0.435 mean CRP% in un complicated cases 68.18, standard deviation:120.122, p value :0.435

4 deaths only out of 85 cases occurred.
CASE 1 : G. Durga Rao Male:55∆ Bilateral Pneumonia with ARDS H_1N_1 Positive, Copd
CASE 2: G. Adi Lakshmi Female : 50∆ Bilateral Pneumonia with CTD ILD
CASE 3:Usha Mandal   Female: 55∆ Bilateral Pneumonia Left Lung abscess , HTN Diabiates, Hypothyroid, AKI
CASE 4: G. Naga Mani Female: 24∆ Bilateral Pneumonia With Hyper Thyrodism

Case	CRP	NLR	CRP %
Case 1	48	7.08	50
Case 2	96	4.70	50
Case 3	96	9.22	50
Case 4	48	4.47	50

CONCLUSIONS
1. Most of the CAPs occurred in 30 to 60 year age group with male preponderance.
2. Bilateral and multi lobar pneumonia more common.
3. CRP, CRP% are useful in predicting the severity and unfavourable outcomes in CAP : NLR is not informative in the present study.

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