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# Original Research

## To determine CURB 65, CRP level and PSI score in patients of pneumonia- A clinical study

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***ABSTRACT*:**
**Background:** Community acquired pneumonia (CAP) is a common disorder with an incidence of about 20% to 30%. The present study was conducted to determine CURB 65, CRP level and PSI score in patients of pneumonia. **Materials & Methods:** The present study was conducted on 100 patients of pneumonia of both genders. A complete case history and thorough clinical examination was performed. CURB 65 and PSI score was determined within 48 hours of admission. hSCRP level was assessed with ELISA which was repeated on 5$^{th}$ and 7$^{th}$ day. **Results:** Age group <20 years had 12, 21-30 years had 13, 31-40 had 16, 41-50 had 12, 51-60 had 18 and >60 years had 24 patients. Out of 100 patients, males were 64 and females were 36. 88 patients were conscious while 12 were confused. The difference was significant (P< 0.05). On day 1, minimum hsCRP 1 level was 65.32 which increased to 98.9 on 5$^{th}$- 7$^{th}$ day. hsCRP 2 was 10.2 on day 1 which increased to 99.9 on 5$^{th}$ – 7$^{th}$ day. Out of all PSI class, IV exhibited 2 deaths and V had 1 death. The difference was significant (P< 0.05). CURB class III had 1, IV had 1 and V had 1 death. The difference was significant (P< 0.05). **Conclusion:** CURB 65 is easiest to remember and apply although it is less accurate, it appears superior when quicker decisions are required. PSI is also accurate scoring system in predicting morbidity in terms of requirement of ICU admission.
**Key words:** CURB 65, PSI, Pneumonia, hsCRP.

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### INTRODUCTION

Community acquired pneumonia (CAP) is a common disorder with an incidence of about 20% to 30% in developing countries compared to an incidence of 3% to 4 % in developed countries. The incidence varies markedly with age, being much higher in the very young and the elderly.[1] It is estimated that India together with Bangladesh, Indonesia and Nepal account for 40% of global acute respiratory infection; 90% of mortality is due to pneumonia, mostly bacterial in origin.

Community-acquired pneumonia (CAP) is a complex and evolving inflammatory disease and critical clinical deterioration can result from various processes: respiratory failure, circulatory failure, de-stabilization of a preexisting comorbidity, appropriateness of initial antibiotic therapy, or hospital acquired illnesses. It is not surprising that no single clinical rule has sufficient operating characteristics to be useful in this wide spectrum of evolution profiles.[2]

Streptococcus pneumonia is the most commonly isolated pathogen responsible for 35% to 60% of cases.[3] Studies reported during the last two decades from India have also reported a higher prevalence of Klebsiella pneumoniae among culture positive pneumonias. The prevalence of Mycoplasma pneumonia has been reported to be 35% in adults11 and 27.4% in children. The pneumonia 60 severity index (PSI) is adopted by the American Thoracic Society and used in a wide scale in North America, which was introduced in 1997, by Fine et al. as a product of the pneumonia PORT study of ambulatory and hospitalized patients with CAP. The CURB-65 is a six-point scoring system (0–5) based on both clinical and laboratory parameters (confusion, serum urea, respiratory rate, blood pressure, and age >65 years) for assessing patients.[4] The

present study was conducted to determine CURB 65, CRP level and PSI score in patients of pneumonia.

## MATERIALS & METHODS

The present study was conducted in the department of Internal Medicine. It comprised of 100 patients of pneumonia of both genders. The study was approved from institutional ethical committee. All participants were informed regarding the study and written consent was obtained.

Data related to participants such as name, age, gender etc. was recorded. Inclusion criteria were patients above 12 years of age of either gender. Exclusion criteria were acute inflammatory condition other than pneumonia, coronary artery disease, chronic kidney disease and patients with autoimmune disorders.

A complete case history and thorough clinical examination was performed. Patients were subjected to hematology, biochemistry, sputum, blood culture and chest x- ray. CURB 65 and PSI score was determined within 48 hours of admission. hSCRP level was assessed with ELISA which was repeated on 5$^{th}$ and 7$^{th}$ day. hSCRP level was correlated with score, clinical features and outcome of patients. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS

**Table I Age distribution of patients**

| Age group (Years) | Number |
|---|---|
| <20 | 12 |
| 21-30 | 13 |
| 31-40 | 16 |
| 41-50 | 12 |
| 51-60 | 18 |
| >60 | 24 |

Table I shows that age group <20 years had 12, 21-30 years had 13, 31-40 had 16, 41-50 had 12, 51-60 had 18 and >60 years had 24 patients.

**Table II Gender wise distribution of patients**

| Total | Males | Females |
|---|---|---|
| 100 | 64 | 36 |

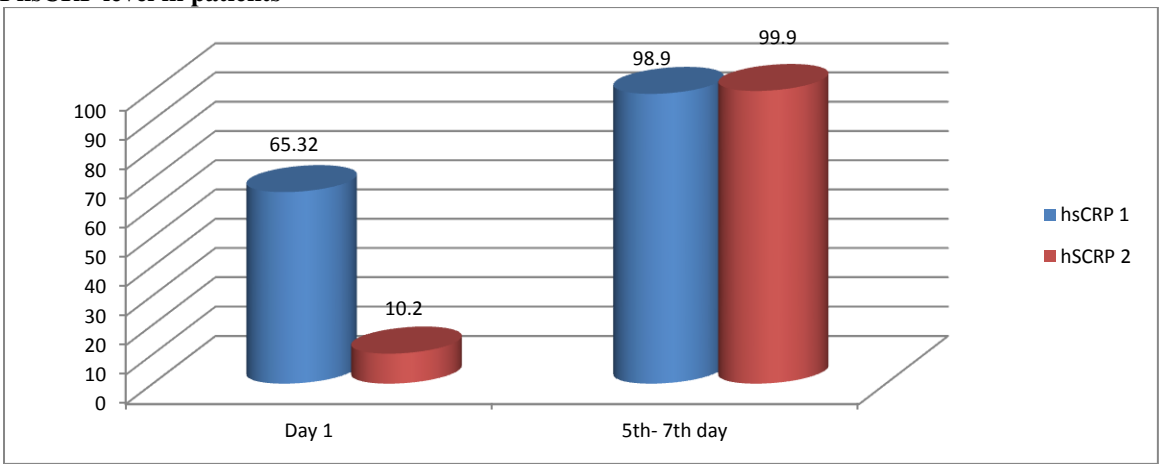
Table II shows that out of 100 patients, males were 64 and females were 36.

**Table III Mental state of patients**

| Mental state | Number | P value |
|---|---|---|
| Conscious | 88 | 0.05 |
| Confused | 12 | |

Table III shows that 88 patients were conscious while 12 were confused. The difference was significant (P< 0.05).

**Graph I hsCRP level in patients**




Graph I shows that on day 1, minimum hsCRP 1 level was 65.32 which increased to 98.9 on 5$^{th}$- 7$^{th}$ day. hsCRP 2 was 10.2 on day 1 which increased to 99.9 on 5$^{th}$ – 7$^{th}$ day.

**Table IV Mortality in different PSI classes**

| PSI class | Number | Deaths | P value |
|---|---|---|---|
| I | 16 | 0 | 0.01 |
| II | 13 | 0 | |
| III | 21 | 0 | |
| IV | 30 | 2 | |
| V | 20 | 1 | |
| Total | 100 | 3 | |

Table IV shows that out of all PSI class, IV exhibited 2 deaths and V had 1 death. The difference was significant (P< 0.05).

**Table V Mortality in different CURB-65 risk classes**

| PSI class | Number | Deaths | P value |
|---|---|---|---|
| 0 | 15 | 0 | |
| I | 22 | 0 | 0.01 |
| II | 18 | 0 | |
| III | 15 | 1 | |
| IV | 20 | 1 | |
| V | 10 | 1 | |
| Total | 100 | 3 | |

Table V showed that CURB class III had 1, IV had 1 and V had 1 death. The difference was significant (P< 0.05).

## DISCUSSION

Acute respiratory infections, especially bacterial pneumonia, constitute the major cause of mortality and morbidity among children below 5 years of age in developing countries. World Health Organization (WHO) global burden of disease study estimated that lower respiratory tract
infections (LRTIs), which include CAP, were 429.2 million episodes of illness worldwide and accounts for 94.5 million disability adjusted life years (DALY's). In adults aged over 59 yrs, it causes 1.6 million deaths annually. Estimated death per 100,000 populations in 2004 due to LRTI in India was 89.5, while it was 62.0 in the United Kingdom (UK) and 21.3 in United States of America.[5]

Community-acquired pneumonia (CAP) remains as an infectious cause of mortality and morbidity globally. The common etiological agents of CAP are Klebsiella pneumoniae, Haemophilus influenzae, Streptococcus pneumoniae, and Pseudomonas aeruginosa.[6] Pneumonia is reported more in older patients and those with comorbidities, such as chronic liver, cardiac, lung and/or renal diseases, metabolic disorders such as diabetes mellitus, chronic alcoholism, malignancies, absence of spleen (asplenia), immune-compromising conditions or the use of immune-suppressing drugs, exposure to radiation or chemotherapy, and administration of antimicrobials, within the previous 3 months. In India, the incidence of CAP is 4 million cases/year with 20% requiring hospitalization.[7] The mortality rate of CAP patients in outpatient settings is 1%–5%, and in Intensive Care Unit, it is 25%. Pathogens may enter the lung by the aspiration of organisms that colonize the oropharynx, inhalation of infectious aerosols, haematogenous dissemination from an extra pulmonary site or direct inoculation and contiguous (adjoining) spread.[8]

The present study was conducted to determine CURB 65, CRP level and PSI score in patients of pneumonia.

We found that out of 100 patients, males were 64 and females were 36. We observed that 88 patients were conscious while 12 were confused. The difference was significant (P< 0.05).

Gonzalez et al[9] found that the overall and pneumonia-related 28-day mortality rates were 20.2% (n = 44) and 17.4% (n = 38), respectively. In predicting 28-day mortality, the CURB-65 score had sensitivity of 45% and specificity of 81%, and the PSI score had sensitivity of 82% and specificity of 34%. The CURB-65 and PSI discriminated poorly between fatal and nonfatal pneumonia cases (AUCs, 0.664 and 0.658, respectively; 95% confidence interval [CI], 0.57–0.75 for each). The addition of radiation therapy (RT) within 4 weeks and stem cell transplant (SCT) significantly improved the AUCs of the CURB-65 (0.75; 95% CI, 0.67–0.83) and PSI (0.73; 95% CI, 0.65- 0.82). Inadequate performances of CURB-65 and PSI demonstrate that a tool for predicting pneumonia-related mortality in cancer patients and other immunocompromised populations is needed. Pneumonia patients who have undergone recent RT or (SCT) are at a high risk of dying from pneumonia and require special consideration when assessing pneumonia-related mortality risk.

We found that on day 1, minimum hsCRP 1 level was 65.32 which increased to 98.9 on $5^{th}$- $7^{th}$ day. hsCRP 2 was 10.2 on day 1 which increased to 99.9 on $5^{th}$ – $7^{th}$ day. Out of all PSI class, IV exhibited 2 deaths and V had 1 death. CURB class III had 1, IV had 1 and V had 1 death. The difference was significant (P< 0.05).

Bashir et al[10] found that although both CURB-65 class III and PSI class IV were 100% sensitive in predicting death,

CURB-65 class III had a higher specificity (74.6%) than PSI class IV (52.2%) when used to predict death. In both PSI and CURB-65 risk scoring systems, mortality rate, need for intensive care unit (ICU) admission, prolonged need for intravenous (I.V.) antibiotics, prolonged duration of hospital stay and need for admission to ICU increased progressively with increasing scores. The PSI class ³IV was more sensitive in predicting ICU admission than CURB-65. The duration of hospital stay was found to have a weak but significant correlation with PSI and CURB-65 criteria. Defervescence time also had a very weak but significant correlation with PSI and CURB-65 criteria. Duration of I.V. antibiotics had a moderately strong correlation with CURB-65 criteria but a weak correlation with PSI criteria.

## CONCLUSION

High admission hsCRP > 70 mg/ml effectively predicts poor outcome in severe CAP and can be used as an adjunct for identifying high risk patients. CURB 65 is easiest to remember and apply although it is less accurate, it appears superior when quicker decisions are required. PSI is also accurate scoring system in predicting morbidity in terms of requirement of ICU admission.

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