

Correlation of Curb-65 and Pneumonia Severity Index in Severe Covid-19 Patients

N Anuradha¹, Viknesh Prabu Anbalagan², Harshvardhan Anilbhai Patel²

¹Associate Professor, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India, ²Junior Resident, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India

Abstract

Background: In community-acquired pneumonia, the CURB-65 and the pneumonia severity index (PSI) are commonly used to predict 30-day death. In hospital-acquired pneumonia, CURB-65 has also been proven to be beneficial in predicting 14-day mortality.

Objective: The objective of the study was to analyze the correlation of PSI and CURB-65 score to predict mortality among patients with severe coronavirus disease 2019 (COVID-19) pneumonia.

Methods: We have done a retrospective study in Sree Balaji Medical College and Hospital, Chennai which includes 60 reverse transcription polymerase chain reaction positive COVID-19 pneumonia patients. We collected data such as vital signs, characteristics, and laboratory parameters from hospital records.

Results: Our study shows that compare to the CURB65 score system, PSI performed significantly better in predicting mortality. Patients who come under the High-risk group of PSI have 81.7% in predicting mortality while the CURB65 High-risk group shows only 26.7% in predicting mortality.

Conclusion: In severe COVID-19 pneumonia patients, we found that PSI is better than CURB65 in terms of prediction of mortality.

Key words: Coronavirus disease 2019, CURB-65, Pneumonia severity index, Pneumonia

INTRODUCTION

The novel encased RNA betacoronavirus that causes coronavirus disease 2019 (COVID-19) is a novel enveloped RNA betacoronavirus.^[1] COVID-19 symptoms increase quickly, and a significant fatality rate has been documented worldwide. The World Health Organization (WHO) has declared a public health emergency of international concern in response to the worldwide COVID-19 epidemic.^[2] Ischemic heart disease, chronic renal or liver disease, and multi-organ failure are among the other complications causing death. Other prognostic factors such as older age, male, comorbidities, and smoking habits are associated with severe disease or death. It is critical to assess the severity

of COVID-19 since the results of non-severe individuals were better than those of severe patients.^[3]

Early detection and management are the most effective approaches to increase therapeutic efficacy, which is a difficult undertaking for clinicians. At the moment, a favorable result from high-throughput sequencing or reverse transcription-polymerase chain reaction in real-time (RT-PCR).^[4] The use of nasal and pharyngeal swab specimens is thought to be the best method. COVID-19 standard The term “computerized tomography” (CT) for the chest refers to a type of imaging that uses a computer to COVID-19 is frequently used as an essential diagnostic tool, and some CT symptoms may be linked to COVID-19 development and prognosis, but their clinical use is limited.^[5]

Many factors, such as limited medical resources and high examination prices, contribute to this. Thus, accessible and cost-effective indicators are urgently required to streamline the diagnosis procedure and evaluate the severity of the disease.^[6] It is critical to assess the severity of COVID-19

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Corresponding Author: Dr. N Anuradha, Department of General Medicine, Sree Balaji Medical College and Hospital, Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

since the results of non-severe individuals were better than those of severe patients. An accurate technique for determining the severity of pneumonia can assist doctors in better evaluating their patients' prognoses, allowing them to choose a more appropriate treatment plan.^[7] To assess the severity of community and hospital-acquired pneumonia, the pneumonia severity index (PSI) and the CURB-65 are routinely employed.

The CURB-65 and the PSI are commonly used to predict 30-day mortality in community-acquired pneumonia (Shah *et al.*, 2010). CURB-65 has also been shown to be effective in predicting 14-day mortality in patients with hospital-acquired pneumonia (Oktariani *et al.*, 2019). These technologies, however, have not been tested in COVID-19 patients. A simple prediction technique for assessing the probability of 30-day death and stratifying COVID-19 patients as high or low risk for poor outcome at the time of hospitalization would be beneficial.

The purpose of this study was to determine if CURB-65 or the PSI is a helpful tool for predicting 30-day death and to uncover other characteristics associated with increased mortality in COVID-19 patients.

METHODS

This retrospective study was done in the department of general medicine at Sree Balaji Medical College and Hospital, Chennai. We have collected data from 60 severe Covid-19 pneumonia patients' case-sheets from January 2021 to June 2021 and for each patient, we calculated the CURB65 score and PSI score. Based on the CURB65 score and PSI score two groups are divided into low risk and high-risk groups. To get PSI in severe COVID-19 pneumonia patients, we collected data such as patients age, sex, and comorbidities such as malignancy, chronic liver disease, congestive cardiac failure, cerebrovascular accidents, chronic renal disease, and vitals such as respiratory rate, systolic and diastolic blood pressure, body temperature, heart rate, laboratory investigations such as arterial blood pH, blood urea nitrogen (BUN), S.Na+, capillary blood glucose, hematocrit, oxygen saturation, and pleural effusion. According to the PSI score system, we gave scores to each characteristic and after that counted PSI scores for individual severe COVID-19 pneumonia patients and divided patients into PSI groups 1–5. Group 1–3 is the low-risk group while groups 4 and 5 are the high-risk group. Same way to get CURB65 in severe COVID-19 pneumonia patients, we collected data such as patient's mental status, BUN, respiratory rate, blood pressure, and patient's age. According to the CURB65 score system, we gave scores to each characteristic after that counted CURB65 score

for individual severe COVID-19 pneumonia patients and divided patients in CURB65 low risk and high-risk group. Scores 0 and 1 are under the low-risk group while scores 2–4 are under the high-risk group. Then, we have calculated the percentage of low risk and high-risk groups of both CURB65 and PSI to predict mortality in severe COVID-19 pneumonia patients.

The PSI and CURB-65 scores were calculated as shown in Tables 1 and 2. CURB-65 scores range from 0 to 4. A low-risk group score of 0–1 for mortality, whereas scores of 2 or higher are associated with higher mortality [Table 1]. PSI scores are classified as I, II, III, IV, and V low risk (Groups I–III) and high risk (Groups IV–V) [Table 2].

Statistical analysis

We have collected data from 60 severe COVID-19 pneumonia patients case-sheets and for each patient, we

Table 1: CURB65 score

Characteristics	Score
Confusion	1
Urea >30 mg/dL	1
Respiratory rate >30/min	1
Systolic blood pressure <90 mmHg or diastolic blood pressure <60 mmHg	1
Age >65 years	1
CURB-65 score	Risk
0–1	Low risk group
>2	Moderate and high-risk group

Table 2: Pneumonia severity index score system

Characteristics	Scores
Male	Age
Female	Age-10
Resident health worker	10
Comorbidities	
Malignancy	30
Chronic liver failure	20
Cardiac failure	10
Cerebrovascular accidents	10
Chronic kidney failure	10
Symptoms	
Altered mental status	20
RR >30/min	20
SBP <90mmhg	20
Body temperature <35 C or >40 C	15
Heart rate >125 bpm	10
Laboratory investigations	
Arterial blood gas pH <7.35	30
BUN >30 mg/dL	20
Serum Na+ <130 meq/L	20
Serum glucose >250 mg/dL	10
Hematocrit value <30%	10
Oxygen saturation <90%	10
Pleural effusion	10

RR: Respiratory rate, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, BUN: Blood urea nitrogen

calculated the CURB65 score and PSI score. Based on the CURB65 score and PSI score, two groups are divided into low risk and high-risk groups.

RESULTS

Our study has done on 60 patients. 35 patients (58.33%) had one comorbidity. Among that hypertension was the most common comorbidity than Type 2 diabetes mellitus, chronic asthma, chronic obstructive pulmonary disease, ischemic heart injury, hyperlipidemia, chronic kidney disease, and congestive cardiac failure. The most common symptoms were fever (42.5%) and lower respiratory tract symptoms such as cough (76.2%) and difficulty in breathing (37.3%). The high-risk group's laboratory parameters had higher neutrophil counts, higher levels of BUN, serum ferritin, C-reactive protein, and a low level of saturation.

4 patients (6.67%) in Group I, 3 patients (5%) in Group II, 4 patients (6.67%) in Group III, 23 patients (38.33%) in Group IV, and 26 patients (43.33%) in Group V. So among 60 severe COVID pneumonia patients for 49 patients, we can predict a high risk of mortality with PSI score system.

PSI

PSI	Frequency	Percent
High-Risk	49	81.7
Low-Risk	11	18.3
Total	60	100

44 (73.33%) patients have a CURB-65 score of 0 and 1 which is divided into the low-risk group. 16 (36.36%) patients have a CURB-65 score of 2–4 which is divided into the high-risk group. So among 60 severe COVID pneumonia patients only for 16 patients, we can predict a high risk of mortality with the CURB-65 score system.

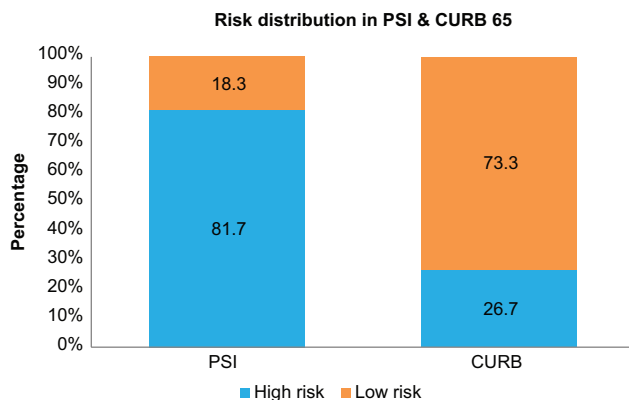
CURB 65	Frequency	Percent
High-Risk	16	26.7
Low-Risk	44	73.3
Total	60	100

PSI Group	Frequency	Percent
1	4	6.7
2	3	5
3	4	6.7
4	23	38.3
5	26	43.3
Total	60	100

Among the PSI group, 81.7% were at high risk and the rest 18.3% were at lower risk. In the CURB group, 26.7% were at high risk and the rest 73.3% were at lower risk.

CURB65 Group

CURB65	Frequency	Percent
Zero	23	38.3
1	21	35
2	11	18.3
3	4	6.7
4	1	1.7
Total	60	100



DISCUSSION

Several studies have looked at common intensive care severity ratings to determine the severity and mortality of COVID-19 pneumonia. PSI and CURB-65 performed better than fast Sequential Organ Failure Assessment (SOFA) in predicting death in COVID-19 pneumonia patients. The quick SOFA (qSOFA) score is straightforward, and qSOFA score 2 indicated the severity of COVID-19.^[8] There are no predictive techniques for predicting COVID-19 pneumonia severity and death. We wanted to see if CURB-65 and PS might predict the severity and mortality of COVID-19 pneumonia.

The evaluation of severity is a crucial early step in the therapy of patients with community-acquired pneumonia. Several pneumonia-specific ratings, general sepsis scores, and predictive biomarkers have been presented as tools to assist doctors in making critical treatment decisions.^[9] There is, however, no universal agreement on the best severity evaluation technique to adopt.

In this study, we looked at the ability of two prognostic scoring systems to predict 30-day death and looked at independent predictors of mortality in a large cohort of COVID-19 patients. The PSI is a better diagnostic tool in terms of early prediction of mortality in severe COVID-19 pneumonia patients compared to CURB65. Because in our study, PSI shows 81.7% high-risk group patients in predicting mortality while in compare to CURB65 which shows only 26.7% high-risk group in predicting mortality

Table 3: PSI score classification

PSI groups	PSI scores	Risk
1	Age <50 years no comorbidities, laboratory and clinical findings	Low risk
2	<70	Low risk
3	71–90	Low risk
4	91–130	High risk
5	>130	High risk

PSI: Pneumonia severity index

in same COVID patients. Several investigations have prospectively examined the operational properties of these two evaluation instruments,^[10,11] with the majority finding no significant difference in predicted accuracy, except one study, which indicated a modest but significant difference in favor of PSI, comparable to our work.^[12]

PSI scores were higher in the elderly compared with young severe COVID-19 pneumonia patients and showed that the PSI scale was a better discriminatory ability because the PSI scale includes several characteristics such as age, comorbidities, arterial blood pH, capillary blood glucose, respiratory rate, systolic and diastolic BP, BUN, and hypoxemia, that were found to be associated with increased risk of mortality in severe COVID-19 pneumonia patients [Table 3]. Liu *et al.*^[13] evaluated the clinical features and outcomes of old and young COVID-19 patients and found that PSI ratings were greater in the elderly compared to young patients.

CURB 65 predicted only 26.7% of patients to be at high risk of mortality while the PSI system predicted 81.7% of patients at risk. There are continuing efforts to establish a prognostic score system that can indicate a bad result for COVID-19 patients.^[14] CURB-65 scores were found to be considerably higher in deceased COVID-19 patients,^[15] which contradicted the findings of our study. We discovered that PSI scores alone predicted death much better than CURB-65 scores when we evaluated the prognostic scoring systems as continuous variables. The superior discriminating ability of the PSI scale was an expected outcome since the PSI scale takes into account various characteristics, such as age, comorbidities, and hypoxemia, which have been linked to an elevated risk of death in COVID-19 patients.^[16]

CONCLUSION

Our retrospective study includes severe COVID-19 pneumonia patients and the study shows that the PSI is a better prognostic index for mortality of severe COVID-19 pneumonia patients compared with CURB-65.

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