

Original Research Article

Confusion, blood urea, respiration and blood pressure 65, pneumonia severity index and shock index and hypoxemia scores in community acquired pneumonia and outcome prediction: a descriptive study from Dr B R Ambedkar Memorial Hospital Raipur, India

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Received: 01 February 2020

Accepted: 10 February 2020

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ABSTRACT

Background: According to WHO, pneumonia is the third important cause of death worldwide despite various advances in medical science. Incidence of Community acquired pneumonia is about 20% to 30% in developing countries compared to 3% to 4% in developed countries. Incidence of CAP is much higher in the very young and the elderly individuals. Objectives of the study was to compare CURB 65, PSI (Pneumonia severity index) and SIPP (shock index and hypoxemia) scores with respect to outcome prediction in community acquired pneumonia (CAP).

Methods: The present hospital based descriptive observational study was conducted in the Dept of medicine, Pt. J.N.M. Medical College and Dr B. R. A. M. Hospital, Raipur, during 2016-2018 involving a total of 98 patients of community acquired pneumonia.

Results: Majority of them i.e. 22 (22.4%) subjects belonged to age group 41-50 years. 34 (34.7%) subjects were found to have CURB65 score 1. 28(28.6%) subjects PSI score was noted to be class I. 89 (90.8%) subjects were discharged while, there was death of 9 (9.2%) subjects. The difference in the mean score was statistically significant ($p < 0.001$). PSI score was found to have diagnostic sensitivity of 94.4% and specificity of 100% while CURB 65 score having 83.1% sensitivity and 100% specificity. SIPP score had least AUC 0.88.

Conclusions: Maximum diagnostic ability was noted with PSI score followed by CURB 65 and SIPP score.

Keywords: Community acquired pneumonia, CURB 65, Pneumonia severity index, Shock index and hypoxemia scores

INTRODUCTION

Community-acquired pneumonia (CAP) is defined as pneumonia not acquired in a hospital or a long-term care facility.¹ It is an evolving inflammatory disease and clinical deterioration can result due to reasons like circulatory failure, respiratory failure or hospital acquired

illnesses.² According to WHO, pneumonia is the third important cause of death worldwide in spite of various advances in medical science.³ Incidence of Community acquired pneumonia is about 20% to 30% in developing countries compared to 3% to 4% in developed countries. Incidence of CAP is much higher in the very young and the elderly individuals.⁴

CURB-65 has been adopted as a guideline for management of CAP by British Thoracic Society (BTS) since 2004. It is a six-point scoring system (0-5) based on clinical as well as laboratory parameters (confusion, serum urea, respiratory rate, blood pressure and age >65 years) for assessing patients.⁵

The Pneumonia Severity Index (PSI) gives us a means of stratifying groups of patients considering the risk of mortality. This scoring system is based on 20 variables including three demographic characteristics, five comorbid illnesses, five physical examination findings and seven laboratory and radiographic findings from the time of presentation and hence may not be used in overcrowded hospital emergency departments.⁶ It is best validated for assessing patients having low risk of mortality who might be suitable for outpatient care than those with severe CAP at the time of hospital admission.⁷ CURB-65 is a simplified scoring system compared with PSI but has poor sensitivity.⁸

Physiological score Shock index and hypoxemia (SIPF) score is the combination of shock index (heart rate/systolic blood pressure) >0.7 (1 point) plus $\text{PaO}_2/\text{FiO}_2 < 250$ (1 point), scoring 0-2 points.⁹ If shock index is >0.7, it is considered as risk for severe sepsis on initial presentation. Also, alteration of $\text{PaO}_2/\text{FiO}_2$ ratio <250 represents hypoxemia.²

So, the present study was carried out in order to compare CURB 65, PSI (pneumonia severity index) and SIPF (shock index and hypoxemia) scores in predicting severity and outcome of community acquired pneumonia.

Objectives of the study was to compare CURB 65, PSI (Pneumonia severity index) and SIPF (shock index and hypoxemia) scores with outcome in community acquired pneumonia (CAP).

METHODS

The present hospital based descriptive observational study was conducted in the Dept of medicine, Pt. J.N.M. Medical College and Dr B. R. A. M. Hospital, Raipur, Chhattisgarh with prior approval of Institutional Ethics committee Pt. J.N.M. Medical College, Raipur. It was conducted during 2017-2018. A total of 98 patients of community acquired pneumonia who full filled inclusion criteria were included in the study.

Community - acquired pneumonia (CAP) is defined as pneumonia not acquired in a hospital or a long-term care facility. CAP is commonly defined as an acute infection of parenchyma of the lung which is associated with symptoms of acute infection and also accompanied by presence of an acute infiltrate on a chest X-ray or auscultatory finding of pneumonia (such as altered breath sounds or localized rales) in a patient not hospitalized or residing in a long-term healthcare facility for more than 14 days before onset of symptoms.

Inclusion criteria

Following categories of patients were included in the study. Age above 18 years with following signs or symptoms

- Cough, sputum production, dyspnea.
- Core body temperature exceeding 38°C.
- Auscultatory findings of abnormal breath sounds i.e. bronchial breath sounds or rales.
- Leukocyte count greater than 10000 or less than 4000 /microliter.
- Infiltrates on chest radiograph.

Exclusion criteria

- Active pulmonary tuberculosis.
- Immunocompromised patients.

Informed consent was obtained from study participants are from their attendant. Detailed clinical examination was performed age, gender, history, personal history was acquired by interviewing the patient attendant. Each of the three scoring namely CURB 65, PSI and SIPF were done when the patient came to hospital.

Statistical analysis

The data thus collected was analyzed by using SPSS 17.0 version. Qualitative data was presented as percentages and quantitative data was presented as mean and standard deviation. Unpaired t test was applied to compare the mean and SD between two groups.

RESULTS

Distribution of age groups in study subjects was assessed. 22 (22.4%) subjects belonged to age group 41-50 years. This was followed by 19 (19.4%) subjects in group 51-60 years and 17 (17.3%) subjects in 31-40 years age group. ≤ 30 group and 61-70 years age group comprised of 16(16.3%) subjects each. Whereas, 8 (8.2%) subjects belonged to >70 years age (Table 1).

Table 1: Distribution according to age group.

	Frequency	Percent
Age group in years	≤ 30	16.3
	31-40	17.3
	41-50	22.4
	51-60	19.4
	61-70	16.3
	>70	8.2
	Total	98

Out of 98 subjects in total 55 (56.1%) were females and 43 (43.9%) subjects were males (Figure 1).

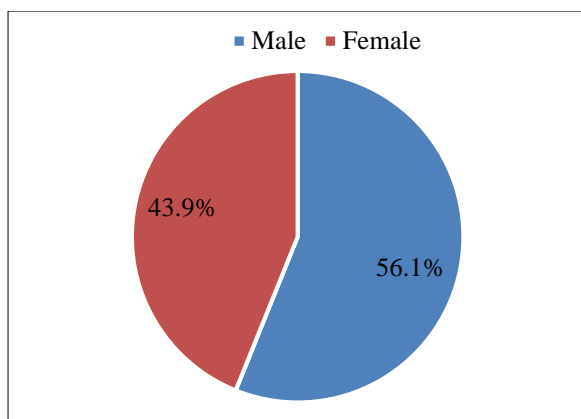


Figure 1: Distribution according to gender.

CURB65 score in study subjects states that 34 (34.7%) subjects were found to have CURB65 score 1. This was followed by score 0 in 25(25.5%), score 2 in 15(15.3%) and score 3 in 11(11.2%) subjects. 9(9.2%) and 4(4.1%) subjects were found to have CURB65 score 4 and 5 respectively (Table 2).

Table 2: Distribution according to CURB 65 score.

	Frequency	Percent	
CURB 65 score	0	25	25.5
	1	34	34.7
	2	15	15.3
	3	11	11.2
	4	9	9.2
	5	4	4.1
	Total	98	100

PSI score in study subjects revealed that in 28(28.6%) subjects PSI score was noted to be I. This was followed by score II with 25 (25%) subjects. Score IV and V comprised of 16 (16.3%) subjects in each. While,

13(13.3%) subjects were observed with score III (Table 3).

Table 3: Distribution according to PSI score.

	Frequency	Percent	
PSI Score class	I	28	28.6
	II	25	25.5
	III	13	13.3
	IV	16	16.3
	V	16	16.3
	Total	98	100

SIPF score in study subjects revealed that in 39 (39.8%) subjects were found to have SIPF score as 0. This was followed by score 1 and 2 with 36 (36.7%) subjects and 23 (23.5%) subjects respectively (Table 4).

Table 4: Distribution according to SIPF score.

	Frequency	Percent	
SIPF score	0	39	39.8
	1	36	36.7
	2	23	23.5
	Total	98	100

Outcome in study subjects was assessed, 89 (90.8%) subjects were discharged while, there was death of 9 (9.2%) subjects (Table 5).

Table 5: Distribution according to outcome.

	Frequency	Percent	
Outcome	Death	9	9.2
	Discharge	89	90.8
	Total	98	100

Table 6: Comparison of different scores with outcome.

Outcome		N	Mean	SD	t	p value
CURB65 score	Discharge	89	1.31	1.23	-8.47	0.0001
	Death	9	4	0.87		Highly significant
PSI score	Discharge	89	75.31	37.22	-11.24	0.0001
	Death	9	210.44	34.05		Highly significant
SIPF score	Discharge	89	0.73	0.73	-4.66	0.0001
	Death	9	1.89	0.33		Highly significant

Table 7: Comparison of different scores with outcome.

Variable(s)	sensitivity	Specificity	Area	S.E.	p value	95% C. I. 1		Cut off
						Low	High	
CURB65 score	83.1	100	0.942	0.025	0	0.893	0.991	2.5
PSI score	94.4	100	0.993	0.007	0	0.98	1.006	152.5
SIPF score	43.8	88.9	0.885	0.043	0	0.799	0.97	50

Mean CURB 65 score in discharged patients was 1.31 ± 1.23 and in deaths it was 4 ± 0.87 . The difference in the mean score was statistically significant ($p < 0.0001$). Mean CURB 65 score in discharged patients was 75.31 ± 37.22 and in deaths it was 210.44 ± 34.05 . The difference in the mean score was statistically significant ($p < 0.0001$). Mean CURB 65 score in discharged patients was 0.73 ± 0.73 and in deaths it was 1.89 ± 0.33 . The difference in the mean score was statistically significant ($p < 0.0001$). All the parameters were found to have significantly higher in subjects with death as outcome compared to those with discharge as outcome (Table 6).

ROC analysis in study subjects was plotted. Maximum diagnostic value was noted with PSI score (AUC=0.993) followed by CURB 65 and SIPP score. PSI score was found to have diagnostic sensitivity of 94.4% and specificity of 100% while CURB 65 score having 83.1% sensitivity and 100 % specificity. SIPP score had least AUC 0.88. CURB 65 showed diagnostic cut off of 2.5 with sensitivity of 83.1% and specificity of 100%. PSI score had diagnostic cut off of 152.5 with sensitivity of 94.4% and specificity of 100%. SIPP score had cut off of 0.50 with sensitivity of 43.8% and specificity of 88.9% (Table 7).

DISCUSSION

Age and gender

In present study, majority (22.4%) of the patients belonged to age group 41-50 years with mean age of 48.66 ± 15.92 years which correlates with the findings of Libermann et al, and Oberoi et al, the lower mean age in this study as compared to study by Bansal et al, and Shah et al, can be attributed to the fact that many young patients who were of lower severity but were admitted because of social circumstances thereby leading to a skewed distribution among the age groups.⁹⁻¹² In this study (8.2%) subjects belonged to >70 years age which was in accordance with the study by GC Mbata et al, and Madhu S. et al, in which (33.7%) and (29%) of patients were above 65 years of age respectively.^{3,13}

In present study, (56.1%) patients were females and (43.9%) were males. The gender distribution was in accordance with the study by GC Mbata et al, in which 48.8% patients were males and 51.2 % patients were females.¹³ The male to female ratio among the hospitalized patients of CAP was seen to vary among different studies but in general males had higher incidence of CAP as compared to females as seen in studies by Bansal et al, and Shah et al.^{11,12}

Outcome in study patients was assessed. In this study, (90.8%) patients were discharged while, (9.2%) patients were died. The mortality rate was 6.8%, 18%, 15% respectively in studies by Ewig S et al, Madhu S et al, and GC Mbata et al, respectively.^{3,13,14} In a study by Bansal S et al, mortality was (11%) and patients were

particularly elderly people.¹¹ However, study by Madhu S et al, reported mortality of (18%) showing the need of a good prognostic index.³

CURB65, SIPP, PSI Scores

(34.7%) patients were found to have CURB 65 score 1, followed by score 0 in (25.5%), score 2 in (15.3%) and score 3 in (11.2%) of patients. (9.2%) and (4.1%) patients were found to have CURB65 score 4 and 5 respectively. These findings were in accordance with study by G C Mbata et al, in which percentages of patients in CURB 65 risk groups 0 to 5 were 16.3%, 38.7%, 20%, 17.5%, 7.5% and 0% respectively.¹³

SIPP score parameters were assessed in study patients. Shock index i.e. HR/systolic BP > 0.7 (1 point) was noted in (51.0%) patients and $paO_2/Fio_2 < 250$ (1 point) was noted in (32.7%) patients. Sanz and co-workers modified shock index if heart rate/systolic BP more than 0.7 = 1 score. (39.8%) patients were found to have SIPP score as 0. This was followed by score 1 and 2 with (36.7%) patients and (23.5%) patients respectively. This finding correlates with study by Sanz et al, in CAP patients for assessing SIPP score, as a predictor of ICU admission and mortality in which 16.9% patients rated 2 points in SIPP score.⁸

CURB65, PSI and SIPP scores with outcomes were compared in study patients. All the parameters were found to be significantly higher in patients with death as outcome when compared to those with discharge as outcome. These findings correlate with study by Eldaboosy et al, in which PSI score was higher in dead patients (4.3 ± 0.7) than survived (2.5 ± 1.5).² According to study by Ewig et al, the rates of ICU admission and mortality according to the PSI score were 0% for risk class I, 10% and 2% for class II, 10% and 3% for class III, 21% and 8% for class IV, and 31% and 18% for class V of PSI respectively.¹⁴ According to Shah Bashir et al, mortality risk in the six separate groups of CURB 65 score was as follows: group 0 (0.7%); group 1 (3.2%); group 2 (3%); group 3 (7%); group 4 (42%); and group 5 (57%) that correlates with findings of this study.⁴ In contrast, study by Madhu S. et al reported that mortality was increased gradually with increase in PSI severity score but mortality was present even in PSI 1 and 2 class which was not there in this study.³

In present study, maximum diagnostic value was noted with PSI score followed by CURB 65 and SIPP score. PSI score had diagnostic cut off of 152.5 with sensitivity of 94.4% and specificity of 100% while CURB 65 showed diagnostic cut off of 2.5 with sensitivity of 83.1% and specificity of 100%. SIPP score had least AUC 0.88. SIPP score had cut off of 0.5 with sensitivity of 43.8% and specificity of 88.9%. Study by Alavi-Moghaddam et al, concluded that CURB-65 had a high sensitivity in predicting mortality and requirement of ICU admission, whereas PSI was shown to have a high specificity in this regard.¹⁵

CONCLUSION

CURB 65, SIPP and PSI were found to have significantly higher in subjects with death as outcome compared to those with discharge as outcome. Maximum diagnostic ability was noted with PSI score followed by CURB 65 and SIPP score.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Sharma CS, Sarode A, Patel RK, Mishra VN, Gupta S, Takalkar AA. Confusion, blood urea, respiration and blood pressure 65, pneumonia severity index and Shock index and hypoxemia scores in community acquired pneumonia and outcome prediction: a descriptive study from Dr B R Ambedkar Memorial Hospital Raipur, India. *Int J Adv Med* 2020;7:408-12.