

UTILITY OF QUICK COVID-19 SEVERITY INDEX IN PREDICTING EARLY CLINICAL DECOMPENSATION IN HOSPITALIZED PATIENTS WITH COVID-19

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Received : 09/03/2023
Received in revised form : 05/04/2023
Accepted : 17/04/2023

Keywords:
Quick covid-19 severity index;
Decompensation; covid-19; qCSI.

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DOI: 10.47009/jamp.2023.5.3.151

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2023; 5 (3); 735-738



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Abstract

Background: Patients with COVID-19 decompensate rapidly and need increasing respiratory support, including invasive mechanical ventilation. Hence, the present study used the quick covid-19 severity index to predict early clinical decompensation in hospitalized patients with covid-19. **Materials and Methods:** This prospective observational study was conducted from May 2021 to October 2021 on 200 patients. The patients were classified into four risk strata based on the following scores: 0 to 3 low risk, 4 to 6 low to intermediate risk, 7 to 9 high intermediate risk and ten or more than ten high risks. The patients were monitored for the next 24 hrs to see early clinical decompensation with oxygen requirement increased to 10 L or more. In addition to basic patient information, CT chest grading was collected from electronic records. **Result:** The maximum number of patients was reported in the age group of more than 60 years, 39.5%, and male predominance was reported with 69% male patients. Type 2 Diabetes, hypertension, and coronary artery disease were reported in 37%, 34% and 8.5%, respectively. Chronic kidney disease was observed in 1% of patients, and chest CT grading three was reported in most patients. The symptoms of all patients were also reported, and breathlessness was reported in a maximum of 67.5% of patients. Our study's maximum number of patients was reported with high-intermediate qCSI score points of 65%. **Conclusion:** The quick covid-19 severity index is a useful clinical tool that can predict early clinical decompensation of covid-19 patients with high specificity and positive predictive value.

INTRODUCTION

In December 2019, the first pneumonia cases of unknown origin were identified in Wuhan, the capital city of Hubei province. The pathogen was identified as a novel enveloped RNA beta coronavirus 2, later named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^[1,2] WHO declared covid-19 disease a public health emergency of international concern on January 30, 2020, and later declared it a global pandemic on 11 March 2020.^[3] Since then, covid has produced significant morbidity and mortality worldwide.

The first two waves of covid led to a public health crisis in both developing and developed countries, particularly in developing countries like India; the effect was too obvious. Because of considerable variations in the virus, which can lead to the next wave at any point, disaster preparedness is essential

because hospitals are not designed to handle this pandemic.^[4]

Proper triaging in an emergency department is essential for optimal patient care. Patients requiring high-flow oxygen and invasive and non-invasive ventilation will be admitted directly to ICU and intermediate ICU wards.^[5] At the same time, patients requiring less oxygen at admission will be admitted to non-ICU wards. In the previous two waves, a significant proportion of patients admitted in non-ICU wards deteriorated within 24 to 48 hrs of admission and had to shift to ICU wards.^[6] Hence a proper scoring system is needed to find those patients who deteriorate early and admit them to ICU or intermediate ICU and should be monitored carefully.

Various scores, including Pneumonia Severity Index (PSI), CURB-65, CRB 65, A- DROP, SMART-COP, NEWS2, qSOFA, Brescia covid respiratory severity scale, and quick covid severity index

(qCSI), were proposed to detect patients at high risk. Most of the scoring systems are designed to detect circulatory collapse rather than respiratory failure, which is seen in covid-19.^[7] Out of the quick covid severity index is particularly interesting as it is a simple bedside scoring test that uses three variables: respiratory rate, pulse-oximetry saturation and oxygen flow rate in L /min. It also showed good performance in predicting ICU admissions. The performance of this score in our population is not established. Being a simple bedside score that includes variables we regularly use in our wards, this study aims to know the usefulness of this score in predicting early clinical decompensation in patients admitted with covid-19.

MATERIALS AND METHODS

This prospective observational study was conducted in Rajiv Gandhi Government General Hospital for six months, from May 2021 to October 2021. Approval was obtained from the Institute Ethics committee, Madras Medical College. The study population consisted of 200 covid-19 positive patients admitted to Rajiv Gandhi Government General Hospital covid wards during the study period. After getting informed consent from the patient or the legal guardian, the study included these patients.

Inclusion Criteria

All hospitalized patients of both gender ageing above 18 yrs with confirmed Covid-19 by RT PCR. Patients requiring oxygen 6L or less than 6L at the time of admission were included.

Exclusion Criteria

Patients under 18 years requiring oxygen more than 6L, high flow oxygen, and non-invasive or invasive ventilation at admission. Patients who refused to participate in the study were excluded.

Methodology

In this study, during admission of covid RT PCR-positive patients, respiratory rate, pulse oximetry

saturation, and oxygen flow rate in L/min via face mask were entered. Quick covid-19 severity index score was calculated using these variables. The patients were then classified into four risk strata based on the following scores: 0 to 3 low risk, 4 to 6 low to intermediate risk, 7 to 9 high intermediate risk and ten or more than ten high risk. Then patients were monitored for the next 24 hrs to see early clinical decompensation, that is, oxygen requirement increased to 10 L or more, high flow oxygen, non-invasive or invasive ventilation or death. In addition to that, basic information such as complete blood count, serum biochemical tests such as LFT, RFT, inflammatory markers, and CT chest grading was collected from electronic records. The collected data were entered into a Microsoft Excel spreadsheet and analyzed statistically using EpiInfo software.

Statistical analysis was carried out to establish the performance of the quick Covid Severity Index in predicting early clinical decompensation (within 24 hours). The analysis was also done to determine if there is any correlation between the qCSI score and CT grading.

RESULTS

This prospective observational study was conducted in Rajiv Gandhi Government General Hospital for six months from May 2021 to October 2021 on 200 confirmed COVID patients by RT-PCR. The maximum number of patients was reported in the age group of more than 60 years, 79 (39.5%), and male predominance was reported with 138 (69%) male patients. Type 2 Diabetes, hypertension, and coronary artery disease were reported in 74 (37%), 68 (34%) and 17 (8.5%), respectively. Chronic kidney disease was observed in 2 (1%) patients. Chest CT grading reveals that the maximum number of patients, 74 (37%), had grade 3 in our study [Table 1].

Table 1: Demographic and other parameters of patients

Parameters		Frequency (%)
Gender	Female	62 (31.0)
	Male	138 (69.0)
Age Group (Years)	<30	12 (6.0)
	31-40	27 (13.5)
	41-50	39 (19.5)
	51-60	43 (21.5)
	>61	79 (39.5)
Hypertension	No	132 (66.0)
	Yes	68 (34.0)
Coronary artery disease	No	183 (91.5)
	Yes	17 (8.5)
Chronic kidney disease (CKD)	No	198 (99.0)
	Yes	2 (1.0)
CT chest grading (GRADE)	1	41 (20.5)
	2	62 (31.0)
	3	74 (37.0)
	4	23 (11.5)
QCSI score (Points)	Low	4 (2.0)
	Low-intermediate	34 (17.0)

	High-intermediate	130 (65.0)
	High	32 (16.0)

The symptoms of all patients were also reported. It was found that headache, fever, myalgia, fatigue, frequency of sore throat, running nose, cough, breathlessness and loss of smell were reported in 11(5.5), 150 (75%), 35 (17.5%), 8(4%), 21 (10.5%), 8(4%), 100(50%), 135 (67.5%), and 12(6%) patients [Table 2].

Table 2: Observation of symptoms of patients

Parameters		Frequency (%)
Headache	No	189 (94.5)
	Yes	11 (5.5)
Fever	No	50 (25.0)
	Yes	150 (75.0)
Myalgia	No	165 (82.5)
	Yes	35 (17.5)
Fatigue	No	192 (96.0)
	Yes	8 (4.0)
Sore throat	No	179 (89.5)
	Yes	21 (10.5)
Running nose	No	192 (96.0)
	Yes	8 (4.0)
Cough	No	100 (50.0)
	Yes	100 (50.0)
Breathlessness	No	65 (32.5)
	Yes	135 (67.5)
Loss of smell/taste	No	188 (94.0)
	Yes	12 (6.0)

Our study's maximum number of patients was reported with high-intermediate qCSI score points 130 (65%). The ROC analysis showed 91.43% specificity and 91.4% positive prediction values [Table 3].

Table 3: Observation of qCSI score sensitivity and specificity

O2 flow rate (L/min)		QCSI SCORE (POINTS)	
		>9.5	<9.5
>10	Count	63	6
	% within O2 flow rate (L/min)	91.3%	8.7%
<10	Count	67	64
	% within O2 flow rate (L/min)	51.1%	48.9%
Cut-off value		9.5	
AUC		0.696	
p-value		<0.0001	
Sensitivity		48.46%	
Specificity		91.46%	
PPV		91.30%	
NPV		48.85%	

DISCUSSION

In our study, which included 200 patients, 69 % were males, and the remaining 31 % were females. These findings in our study follow earlier reported studies. In one study by Huang et al., nearly 73% of patients were male.² In another study by Guan et al., which includes 1099 patients, 58.1% were males.^[1] The median age was 56 years in our study. In Guan et al., the median age was 47 years.^[1] Most patients were in the > 61 age group, constituting 39.5 % of the total population. This is in contrast with studies 1 and 2. Both studies showed that the 15 – 49 age group is more involved. The major comorbidities encountered in this study were T2DM and SHT, constituting 37 % and 34%, respectively. A meta-analysis by Kumar et al. showed the prevalence of covid was 11%.^[8] Another study also reported a prevalence of around 10% in covid-19 patients.^[9] One study revealed that 29.5 %

of people admitted for covid-19 had a history of hypertension.^[10] In our population, the number of patients with hypertension and diabetes is quite high compared with other studies.

The majority of the patients had a fever as admitting symptom, which constitutes 75%, followed by breathlessness (67.5%), cough (50%), myalgia (17.5%), and the remaining others. The most common symptom was cough (67.8%) followed by fever (43%) in a study done by Guan et al.^[1] They reported percentage of people who were having breathlessness is only 18.7% which is not consistent with our finding that 67.5 % of people presented to the hospital with complaints of breathlessness. Breathlessness is the second most common symptom in our group.

Performance of quick covid-19 severity in predicting early clinical decompensation in the form of oxygen requirement increased to 10 L or more, high flow oxygen, non-invasive or invasive ventilation or death has sensitivity 48.46%;

specificity 91.43%; positive predictive value (PPV) 91.30%, negative predictive value (NPV) 48.85% with a significant p-value of < 0.0001. A similar study using the quick covid severity index by Rodriguez Nava et al. showed a sensitivity of 23.5-42.9%; specificity of 90.5-97.1%; PPV of 58.9-83.2%; NPV of 72.7-78%.⁶ None of the patients in this study group deteriorated severely enough to put them in invasive or non-invasive ventilation, and also no death in this study group during 24 hours of observation.

On CT chest grading, 37% of patients had grade 3 pneumonia, 31% had grade 2, 20.5 % had grade 1, and 11.5% had grade 4. On correlating CT chest grading and quick covid severity index, there was no significant correlation between them. Osman et al. also reported similar findings in their investigations.^[11]

CONCLUSION

The quick covid-19 severity index is a useful clinical tool that can predict early clinical decompensation of covid-19 patients with high specificity and positive predictive value, even though the score has low sensitivity and negative predictive value. The finding had statistical significance. However, the score did not correlate with the CT severity score.

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