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EVALUATION OF SERUM TROPONIN I LEVEL IN SEVERE ACUTE RESPIRATORY SYNDROME CORONA VIRUS 2 (SARS COV2) INFECTED PATIENTS ADMITTED IN CORONA VIRUS (COVID) WARD AND INTENSIVE CARE UNIT IN SILCHAR MEDICAL COLLEGE AND HOSPITAL, ASSAM: A RETROSPECTIVE STUDY.

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ABSTRACT.

Background:
The pandemic of COVID-19 led to the mortality of a large number of people worldwide. In several studies carried out in different parts of the world, it was seen that cardiac troponin I is a prognosticating biochemical marker of SARS-CoV2-infected patients. This present study aimed to evaluate the serum troponin I level in severe acute respiratory syndrome coronavirus 2 infected patients admitted to covid ward and COVID ICU and to find out any relationship between cardiac Troponin I and disease prognosis. This will aid in early diagnosis.

Methodology:
102 patients participated in this study. Among the 102 patients of SARS COV 2 infection, 49 patients were taken from the Covid ward suffering from mild or moderate form of the disease. The remaining 53 patients were taken from the ICU who were critically ill. Serum cardiac Troponin I value was collected from the Laboratory Information System of the hospital and all the data was analyzed statistically.

Results:
Cardiac Troponin I level is higher in covid positive critically ill patients admitted to ICU with COVID-19. The median (IQR) value of serum cardiac Troponin I is significantly higher (0.0190 ng/ml) in COVID-19 ICU patients than in the COVID patients of the General ward (0.0120 ng/ml). The difference was found to be significant with a p-value of 0.00. A p-value of <0.05 was considered statistically significant.

Conclusion:
Serum Troponin I can be used as a prognosticating marker in COVID-19 infection and a marker of ICU admission in COVID-19-positive patients.

Recommendation:
More studies will be required with a large number of study samples to establish the findings of the present study.

Keywords: *Cardiac Troponin I, Corona Virus, Prognostic marker, Severe Acute Respiratory Syndrome Corona Virus 2*
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INTRODUCTION.

SARS-COV2 struck first in Yuhan, China in December 2019, and after that engulfed all over the world with a total disease burden of 37.1 million with causalities of 1.07 million [1]. India is not an exception with a total no of 70,70,347 cases with a death toll of 1,08,500. Assam has

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1,93,387 COVID-19 patients with 811 deaths. (All data as of 11th October 2020) [2].

As the disease is comparatively new, extensive studies are going on in every aspect of the disease which includes studies of different serum parameters that may be affected by the SARS-COV2 virus, which will help to recognize the probable worst course of the disease also will help to pick up the susceptible patients who have a chance to be affected by the virus badly [3-6].

Serum troponin I is a parameter that is usually used as a marker for myocardial infarction. However, several studies show that cardiac troponin I can be used to define myocardial injury in SARS-COV2 virus-affected patients which is directly related to the prognosis of the patients [3]. The probable mechanism behind this is that the SARS-CoV-2 virus enters the cell through the binding between the protein of the virus and the Angiotensin Converting Enzyme II (ACE II) protein which is present mostly in the lung alveolar cell and also in myocardium. This may explain the direct myocardial injury by the virus. Apart from this, there may be type 2 myocardial infarction due to oxidative stress and hypoxia which may occur in previously normal patients also. Acute respiratory infection and sepsis can commonly be associated with an increase in troponin I level which is proportionate to the ICU admission and poor prognosis in COVID patients [4, 5].

Keeping in mind the above fact, serum level of troponin I can be evaluated in patients admitted in both ICU and ward infected with SARS COV2 virus. This study aims to determine the difference in the level of cardiac troponin I in patients infected with covid 19 admitted in the ICU and general ward, and to determine its correlation with other factors such as age and gender.

METHODS.

Study design.

A retrospective observational study.

Study setting.

The study was carried out at Silchar Medical College and Hospital, Assam, Northeast India.

Study population.

It consisted of 102 covid positive patients (Confidence level 95%, margin of error 5%, total average covid positive patient admitted that period 140) diagnosed either by rapid antigen test (RAT) positive done by ICMR approved kit or RTPCR positive for SARS COV2 virus. Among the 102 patients, 49 were taken from the Covid ward suffering from mild or moderate forms of the disease, and the rest 53 were taken from Covid Intensive Care Unit (Covid ICU) suffering the severe form of the disease. Following were the criteria for inclusion and exclusion of the study.

Inclusion criteria.

- Patients belonging to the age of above 18.
- Patients underwent rapid antigen test (RAT) and showed positive results either done by ICMR-approved kit or reverse transcription polymerase chain reaction (RT-PCR) and were admitted either in the covid ward or covid ICU.

Exclusion criteria.

- Patients who were below 18 years of age.

Bias.

There was a chance that bias would arise when the study first started, but it was avoided by giving all participants identical information and hiding the group allocation from the nurses who collected the data.

Collection of data.

Detailed demographic data like age and sex were collected from hospital records. Biochemical data (Troponin I value) were collected from the Laboratory Information System (LIS) of the institute.

Statistical analysis.

The data collected and tabulated as frequency, mean, median percentage, etc. The Mann-Whitney U test was done to compare the Troponin I value of COVID-19 patients admitted in the Covid ward and Covid ICU. Spearman's rho was calculated to find out the correlation between Troponin I value and age of the COVID-19-positive patients admitted in ICU and General ward respectively. Microsoft Excel and other online statistical calculators were used for this purpose.

Ethical consideration.

The institutional ethics committee approved this study.

RESULTS.

The frequency distribution of study subjects shows that 51.96% (53) belonged to the ICU and 48.04% (49) were taken from the general ward. So, study subjects from the ICU and General Ward are quite comparable (Table 1).

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Table 1: Frequency of patients in ICU and General ward.

Admission	Frequency	Percentage
ICU	53	51.96%
General ward	49	48.04%

Frequency and percentage distribution show that out of 102 subjects 39.22% were female and 60.78% were male (Table no 2).

Table 2: Gender-wise frequency of patients.

Sex	Frequency	Percentage
Women	40	39.22%
Men	62	60.78%

Table 3 shows that the mean age of study subjects is 55.99 years with an SD value of 15.31. The median value of the Troponin I parameter is 0.0125 ng/ml with the IQR 0.120 - 0.360. It shows that the mean age of study subjects is 55.99 years with the SD value 15.31. The median value of the Troponin I parameter is 0.0125 ng/ml with the IQR 0.120 - 0.360.

Table no 3: Age distribution.

Age Mean ± SD	Troponin I Median (IQR)
55.99 ± 15.31	0.0125 (0.0120 – 0.0360)

Table 4 shows that in ICU patients the median (IQR) value of the Troponin I parameter is significantly higher (0.0190 ng/ml) than the COVID patients of the General ward (0.0120 ng/ml). The difference is statistically significant with a p-value of 0.00 as a p-value <0.05 is considered statistically significant.

Table no 4: Descriptive statistics of Blood parameter (Troponin I).

Variable	ICU Median (IQR)	General ward Median (IQR)	p-value
Troponin 1	0.0190 (0.0120 – 0.0570)	0.0120 (0.0120 – 0.0150)	0.00

The gender-wise difference in Troponin I value is significant in COVID patients admitted to ICU as the p-value is 0.04. Troponin I is higher in female patients than males in COVID ICU. However, there is no statistically significant difference in Troponin I value in male and female COVID-19-positive patients admitted in the General ward as the p-value is 0.712.

Table 5: Gender-wise significance of Troponin I value.

	ICU		P value
	Male Median (IQR)	Female Median (IQR)	
Troponin I	0.013 (0.012 – 0.046)	0.048 (0.016 – 0.062)	0.04
	General Ward		
	Male Median (IQR)	Female Median (IQR)	
	0.012 (0.012 – 0.014)	0.012 (0.012 – 0.016)	0.712

Table 6 shows that the Troponin I value in COVID-19-positive patients admitted to ICU is positively correlated to the age of the patients as the p-value is 0.007 and Spearman's rho is 0.365. This positive correlation is statistically significant. On the other hand, there is a positive correlation (Spearman's rho 0.275) between the Troponin I value and the age of the covid positive patients admitted in the general ward, but that correlation is not significant, the p-value is 0.

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Table no 6: Age-wise significance of Troponin I value.

	ICU (Age)	P value
Troponin I	0.365	0.007
	General ward (Age)	
Troponin I	0.275	0.056

DISCUSSION.

The present study aimed to evaluate the serum level of Troponin I in COVID-19-positive patients admitted to the hospital, and to find out any relationship between Troponin I level and ICU admission of COVID-19-positive patients.

In the present study, it was found that amongst the COVID patients, the serum Troponin I level is higher in critically ill admitted to the intensive care unit than those who were suffering from a milder form of the disease and were admitted in the general ward. The median of the Troponin I value was 0.0190 ng/ml with an interquartile range (IQR) 0.0120 - 0.0570 in Covid-19 positive patients admitted to ICU and the median of the Troponin I value was 0.0120 ng/ml and IQR 0.0120 – 0.0150 (Table4) in Covid 19 patients of general ward.

In an observational study conducted by Jiatian Cao et al., it was found that 11.1% (27 out of 244 patients) covid 19 positive patients had highly sensitive cardiac troponin I (hs-cTnI) levels (>40 ng/L) and among the critically ill patients 26.1% had elevated hs-cTnI levels, 13.1% among severe form of the disease had elevated hs-cTnI levels and only 1.1% had elevated hs-cTnI level in the moderate form of Covid 19 disease[5].

So, the critically ill group had the highest percentage (26.1%) of elevated hs-cTnI levels. Huang et al. found that 12% (5/41) of COVID-19 patients having an elevated level of cardiac troponin I developed myocardial injury and 4 of these patients shifted to ICU [6]. Lippi G et al. in a meta-analysis of 4 studies found that significantly higher cardiac troponin I difference in patients with a more severe (critically ill) form of covid 19 compared with a non-severe form of covid 19 disease [7].

In this study, it was also found that in ICU patients the level of Troponin I is higher in female patients than male patients, and the finding is statistically significant. The median of Troponin I was 0.048 ng/ml with IQR 0.016 - 0.062 in Covid 19 positive female patients of ICU and in the male patients the median was 0.013 ng/ml with IQR 0.012 - 0.046. In contrast to this present study, a cross-sectional study conducted by C Chen et al. found that covid 19 infected males are more prone to develop higher levels of Troponin I in critical care cases [8].

The present study also showed that in covid 19 patients the Troponin I level in ICU admitted patients increased with the advancing age with a p-value of 0.007 and Spearman's rho 0.365. So increasing age has a significant positive correlation to the Troponin I level in ICU-admitted critically ill Covid 19 patients. In the present study, the mean age of COVID-19-positive patients was 55.99 years (SD±15.31), and the level of Troponin I is significantly correlated to the age ($p<0.007$) of the patients admitted to COVID-19 ICU.

Giulio G. Stefanini et al. in their study found that 10.1% (40) patients had elevated levels of hs-cTnI and patients with elevated hs-cTnI belonged to the older age group ($p<0.001$) [9]. A cross-sectional study conducted by C Chen et al. found that increasing age and elevated Troponin I are significantly related to critical care cases (all $p<0.05$) than to mild cases [8].

GENERALIZABILITY.

The study's findings, based on a retrospective observational design in a specific hospital setting in Assam, India, offer insights into the relationship between serum Troponin I levels and the severity of COVID-19. While the results suggest Troponin I as a prognostic marker for ICU admission and severity, its generalizability may be limited by the study's regional context, the specific patient population, and the exclusion criteria. Further research with larger, more diverse populations and in different settings is recommended to validate these findings and enhance their applicability to broader contexts.

CONCLUSION.

From the present study, it is found that Troponin I can be used as a marker to assess the severity of covid 19 infected patients for ICU admission and it can also be used as a prognostic marker of covid 19 infection. Age can also be used as an important factor in disease severity and the requirement for ICU intervention.

LIMITATION.

The patients having chronic kidney disease; and muscular diseases were not excluded from the study hence the findings of the study can be biased.

RECOMMENDATION.

More studies will be required with a large number of study samples to establish the findings of the present study.

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LIST OF ABBREVIATIONS.

SARS COV2: Severe Acute Respiratory Syndrome Corona Virus 2
ICU: Intensive Care Unit
RTPCR: Reverse Transcriptase Polymerase Chain Reaction
RAT: Rapid Antigen Test

CONFLICT OF INTEREST.

There was no conflict of interest.

FUNDING.

No funding was received for this study.

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