Original Research Paper

A study on clinical and biochemical profile of covid-19 patients receiving oxygen therapy requiring ventilatory support in a tertiary care centre

Author Details
[1]Dr. K. Suresh, [2]Dr. P. Nedunchezhian, [3]Dr. A. Ponnambalam, [4]Dr E. Pradeep Edwin Paul.
1Professor and Head, 2 PG Resident, 3Cardiologist and Associate Professor, 4PG Resident, Dept of General Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Ariyur, Puducherry, Pondicherry University.
Corresponding Author: Dr. P. Nedunchezhian, PG Resident, Dept of General Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Ariyur, Puducherry, Pondicherry University

ABSTRACT:
Aim: This study was conducted to document different clinical and biochemical profiles of covid-19 patients admitted with oxygen support who later become ventilator dependent in Sri Venkateshwaraa medical college and Research institute, Ariyur. **Objectives:** To study the clinical and biochemical profile of covid-19 patients receiving oxygen therapy who requires ventilator support. To assess various parameters in terms of CRP, FERRITIN, D-DIMER levels on Admission and on ventilatory support. Association between SPO2 with CRP, FERRITIN, D-DIMER and mode of ventilation. **Materials and Method**: This is a retrospective study of all patients admitted to Sri Venkateshwaraa Medical college hospital between March 01, 2021 and June 30, 2021, with the diagnosis of COVID-19 receiving oxygen on admission who later becomes ventilator dependent. From a common database prepared for COVID-19, we retrieved the relevant data and compared the clinical findings, biochemical parameters and outcomes of covid ward and covid ICU patients. **Results:** A total of 50 COVID -19 patients, aged 18 years and above, data were documented. There is a significant difference in biochemical values of the same patients while on Admission and on ventilator. Clinical parameters were associated with the risk covid -19 severity, but there was no statistically significant difference.

Key words: COVID 19, CRP, D-Dimer , Sr.Ferritin.

INTRODUCTION:

COVID-19 caused by the novel coronavirus SARS-CoV-2, has spread rapidly to become a worldwide pandemic resulting in an enormous strain on healthcare systems globally. The United States of America and India are the two most affected countries as of September 17, 2020, with a death toll of 199,746 in the USA and 83,198 in India.[1,2] The first case of COVID-19 infection reported in Kerala, India. On January 27, 2020, a 20 year old female presented to the Emergency Department in General Hospital, Thrissur, Kerala. As of September 17, 2020, the number of cases confirmed in the different regions of our country was 92,016, including 1,686 deaths, the majority of which were diagnosed after the deconfinement in June 2020. This rapid viral spread has prompted the publication of numerous studies to identify clinical, biological, radiological and genetic predictors for the progression of the disease to severe and fatal form. [3] The majority of cases who had severe acute respiratory syndrome – Corona Virus 2 (SARS-CoV-2) infection are asymptomatic or self-limiting flu-like manifestations. The risk of developing severe novel Corona Virus Disease 2019 (COVID-19) is known to be combined with several characterized individual conditions, although additional still undisclosed factors are likely to play a role in severe infections are also seen when no comorbidities are present. In order to properly manage patients presenting with a newly discovered positive swab, several prognostic scores are under evaluation to predict in-hospital death and to discriminate between patients requiring hospital admission for oxygen support, dependency for ventilator.[4,5] According to the WHO interim guide, the primary and preferred method for diagnosis is collection of upper respiratory samples via nasopharyngeal and oropharyngeal swabs, and detection of SARSCoV-2 RNA by RT-PCR (World Health Organization, 2020). [6] A triphasic progressive pattern has been described in infected patients evolving toward severe clinical pictures, and an early assessment might not rule out the subsequent worsening of the disease. Consequently, reliance upon indicators providing better prognostic predictions would be critical in order to properly select patients requiring hospital admission, especially when exponentially increasing numbers of infections occur in a short time interval and hospitals become

crowded.[7] In fact, the proposed disease pathogenesis of COVID-19 indicates two overlapping disease states: an initial viraemic phase where signs and symptoms are attributable to viral replication and a subsequent inflammatory phase where the severity and critical illness is attributable to a cytokine storm.[6] While these two phases have different management implications from a treatment choice perspective – antiviral/antibody therapy versus anti-inflammatory therapy – a clear prognostic approach is still missing. The ability to predict prognosis and infectiousness of patients during the viraemic phase could fundamentally impact triage and management of patients and potentially of their contacts. Early in the COVID-19 pandemic it was suggested that evidence from the 2002 SARS-CoV epidemic indicated that higher viral loads were associated with increased need for intensive care and overall worse outcomes. This study was conducted to document the clinical and biochemical profile of covid-19 patients receiving oxygen therapy requiring ventilator support at Sri Venkateshwara medical college and Research institute, Ariyur.

Study design:
In this study we retrospectively collected information from all covid 19 patients aged 18 years and above admitted to Sri Venkateshwaraa Medical college hospital between March 01, 2021 and June 30, 2021, with a diagnosis of COVID-19 receiving oxygen support later becomes ventilator dependent. From a common database prepared for COVID-19, we retrieved the relevant data and compared the clinical findings, biochemical parameters and outcomes of covid ward and covid ICU patients.

METHODOLOGY:
This is a retrospective study of all infected patients admitted to Sri Venkateshwaraa Medical college hospital between March 01, 2021 and June 30, 2021, with a diagnosis of COVID-19 receiving oxygen support later becomes ventilator dependent. From a common database prepared for COVID-19, we retrieved the relevant data and compared the clinical

findings, biochemical parameters and outcomes of COVID ward and COVID-ICU patients.

Inclusion criteria:
All patients aged 18 and above admitted in COVID -19 ward, receiving oxygen therapy, All COVID-ICU patients.

Exclusion criteria:
Patients with positive COVID RT-PCR not receiving oxygen, All patients receiving oxygen therapy due to non-COVID cause.

Statistical analysis:
Data will be entered in excel and analyzed by using SPSS version 23.0 software Categorical variables will be reported as frequency and percentages and continuous variables as mean ± standard deviation (SD). Means for continuous variables will be compared using *t*-test for independent groups when the data were normally distributed; the chi-square test will be used for categorical variables. The value of P < .05 is considered statistically significant

RESULTS:
Restrospectively a total of 50 patients admitted in covid ward & covid ICU were included in this study.Table 1 shows the comparison of biochemical markers such as CRP , D-Dimer, Sr. Ferritin during the time of amission & later when patient becomes ventilator dependent. There was a significant difference in the biochemical markers. Hence, these biochemical markers were elevated during the course of amission , which significance on going inflamation in patients. When they progress to become ventilator dependent.Table 2 Compares biochemical markers of the patient, who are on verious modes of oxygen delivary at time of ventilatory support. There is no satistical significance among various modes of ventilation, as the increase in biochemical markers has no significant variation among the various modes of ventilatory support. Table 3 shows association between fever, cough and shortness of breath with duration of stay. There is no satistical significance in clinical parameters with duration of hospital stay.

Table 1: comparison of CRP, D-Dimer , Sr.Ferritin on admission and ventilator support

Comparison of CRP, D-Dimer, Sr.Ferritin on admission and ventilator support				
Biochemical Parameters	Admission	Ventilator	P-value	Paired t-test
CRP	76.92 ± 28.058	87.54 ± 22.493	.001	*
D-Dimer	8.28 ± 3.785	9.86 ± 3.747	.004	*
Sr. Ferritin	562.42 ± 323.18	719.84 ± 259.22	.000	*

Crp:C-reactive protein, serum ferritin *significance

FIG-1: Comparison of CRP, D-Dimer, Sr.Ferritin on admission and ventilator support
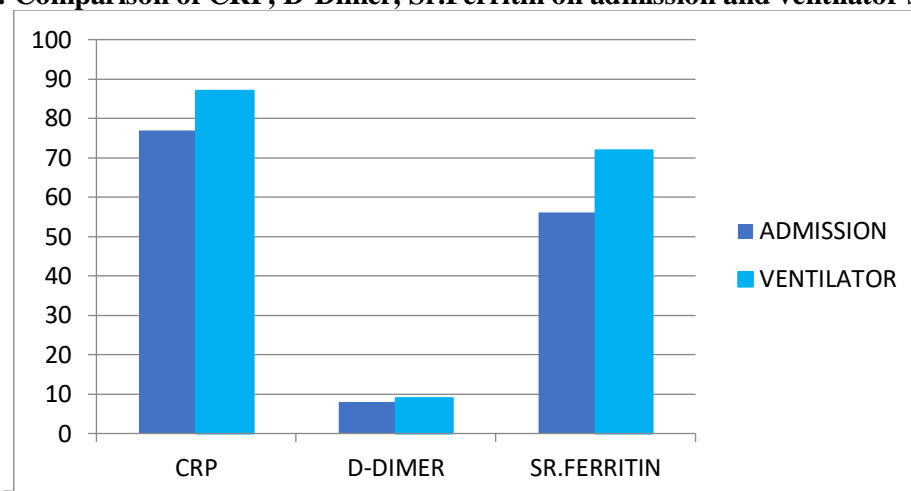

Table 2: Comparison of ferritin, CRP, D-Dimer at ventilation with mode of oxygen delivery

Comparison of Ferritin, CRP, D-Dimer at ventilation with mode of oxygen delivery				
Mode of Oxygen	CRP	D-Dimer	Sr. Ferritin	P-value
CPAP	86.54 ± 27.44	9.61±2.897	646.25 ± 260.30	. 385(NS)
HFNO	80.25 ± 11.59	11.00±6.590	954.13 ± 137.32	.650(NS)
IMV	93.71 ± 13.94	9.71±3.338	733.14 ± 238.26	.009(NS)

CRP: C- Reactive Protein, Sr. ferritin : Serum ferritin, CPAP: Continuous positive Airway pressure, HFNO: High flow nasal oxygen, IMV: intermittent mechanical ventilation.

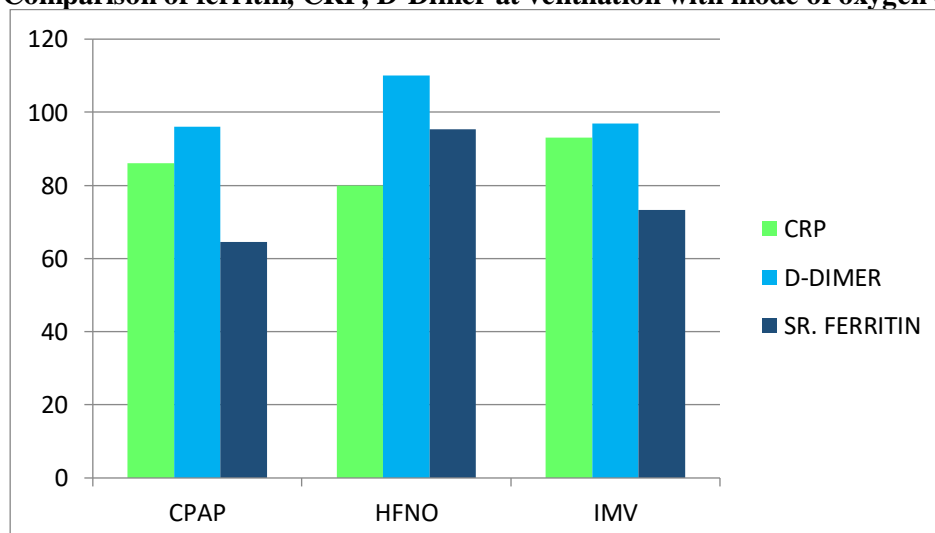**Fig 2: Comparison of ferritin, CRP, D-Dimer at ventilation with mode of oxygen delivery**

Table 3: Association between Fever, Cough & SOB with duration of stay

Duration of hospital stay		Mean	Std.Div	P-value
Fever	No n=18	10.17	4.033	.906(NS)
	Yes n=32	10.03	3.763	.908(NS)
Cough	No n=22	10.27	3.881	.756(NS)
	Yes n=28	9.93	3.839	.756(NS)
SOB	No n=21	10.62	3.413	.402(NS)
	Yes n=29	9.69	4.107	.388(NS)

Fig 3: Association between Fever, Cough & SOB with duration of stay
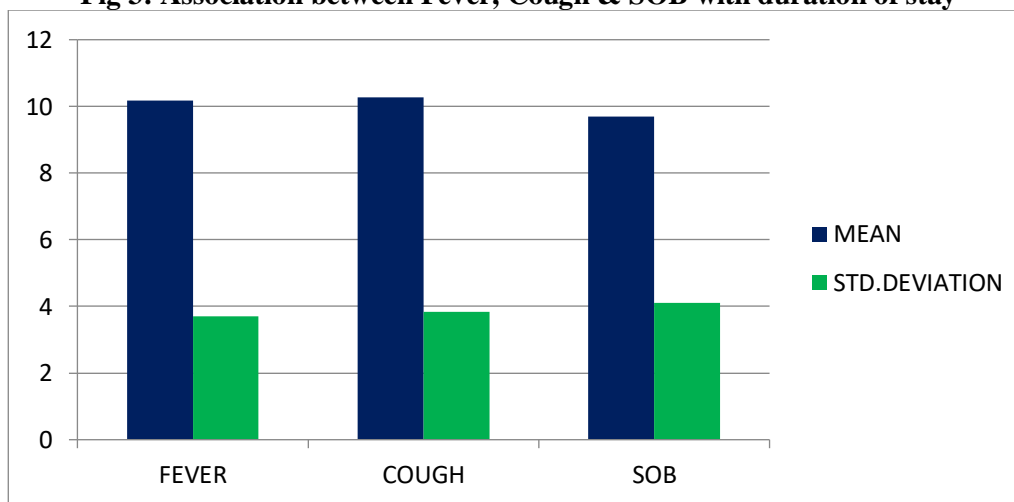
SOB: Shortness of breath

DISCUSSION:

We conducted a retrospective study to assess clinical and biochemical profile of covid-19 patients receiving oxygen therapy, requiring ventilatory support. Amidst the increasing rate of COVID-19 transmission, it is vital to generate comprehensive information regarding the COVID -19 severity to measure the mortality risks. [8] In accordance with Adil R.et al several potential biochemical indexes that changed in patients with covid-19, whether certain co morbidity and clinical characteristics influence these markers. [9] Similarly, Avick Nag et al reported that fever is the most common presentation followed by dry cough and fatigability in covid patients. DM and HTN were most common co morbidities in COVID-19 patients affecting the severity. Biochemical parameters should be monitored to diffentiate between mild to severe cases.[10] In our findings, the analyzed biochemical parameters were found to increase on ventilator patients, when compared to patient initially on O2 support, such as CRP, D-Dimer and Sr.Ferritin. Hence there is a significant difference in biochemical values of patients on admission and later when they become ventilator dependent. Among various other modes (CPAP, HFNO, IMV) of oxygen delivery, biochemical

parameters were increased when eventually patient needs ventilator support, when compared to oxygen support at time of admission. However, the values of biochemical parameters were increased in all modes of Oxygen delivery. Therefore, these parameters were not statistically significant when comparing between the modes of oxygen delivery. We also evaluated the association between clinical symptoms like fever, cough, SOB (Shortness of breath) with duration of hospital stay. Clinical parameters were associated with the risk covid-19 severity, but there was no statistically significant difference. Based on the above discussion, we noticed that biochemical parameters are independent risk factor for the severity of covid -19. However, several studies reported the association between CRP, FERRITIN, D-DIMER levels and lung inflammation in severe stages of hospitalized COVID-19 patients.

CONCLUSION:

In a tertiary hospital of SVMCH&RI at Ariyur, A Total of 50 Covid -19 patient's clinical and biochemical profile were documented. This study infers that Clinical, biochemical parameters and comorbidity can help to measure COVID-19 severities. Therefore, we can assess patient's severity and mortality risks by easily monitoring these potential indicators. Early treatment should be initiated to prevent progression of the disease.

REFERENCES:

1. World Health Organization. Middle East respiratory syndrome coronavirus (MERS-CoV). Available from: https://www.who.int/news-room/fact-sheets/detail/middle-east-respiratorysyndrome- coronavirus-(MERS-cov), assessed on June 1, 2020.

2. World Health Organization. Summary of probable SARS cases with onset of illness from 1 November 2002 to 31 July 2003. Available from: https://www.who.int/csr/sars/country/ table2004_04_21/en/, accessed on assessed on June 1, 2020.

3. M.A. Andrews , Binu Areekal, K.R. Rajesh, Jijith Krishnan., et al. First confirmed case of COVID-19 infection in India: A case report. Indian J Med Res 151, May 2020, pp 490-492

4. COVID19 INDIA. Coronavirus in India: latest map and case count. Available from: https://www.covid19india.org, assessed on June 1, 2020.

5. A. Blakea, D. Collins a, E. O'Connora, C. Berginb, A.M. McLaughlinc, et al . Clinical and biochemical characteristics of patients admitted to ICU with SARS-CoV-2. Med Intensiva. 2020;44(9):589-590

6. Zhu, N. et al. A novel coronavirus from patients with pneumonia in China. N. Engl. J. Med. 2019; 382, 727–733.

7. Lu, H., Stratton, C. W. & Tang, Y. W. Outbreak of pneumonia of unknown etiology in Wuhan China: The mystery and the miracle. J. Med. Virol. 92(4), 401–402.

8. WHO. Coronavirus disease (COVID19) outbreak. 2020. https ://www.who.int/emerg encie s/disea ses/novel coron aviru s2019 . Accessed 15 Feb 2020.

9. sarhan AR, Hussein TA, Flaih MH, Husseien KR.A biochemical analysis of patients with covid-19 infection .Biochemical Res Int.2021.Oct 22;2021.

10. Kantri A, Ziati J, Khalis M, Haoudar A, El Aidaoui K, Daoudi Y, Chikhaoui I et al. Hematological and biochemical abnormalities associated with severe forms of COVID-19: A retrospective single-center study from Morocco. Plos one. 2021 Feb 4;16(2):e0246295.