

Original research article

Comparison of Demographical, Clinical, Comorbid Condition and Laboratory Findings among Covid 19 Patients who Received Mechanical Ventilation in a Tertiary Care Center.

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Abstract

Background Covid-19 are an enormous group of infections that are known to cause ailment going from the normal virus to more extreme illnesses like Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS). In mid-2020, after a December 2019 episode in China, the World Health Organization distinguished SARS-CoV-2 as another sort of Covid.

Aim: Study compare demographics, clinical characteristics, comorbidities, baseline lab parameters between survivors and non survivors of Covid 19 who received mechanical ventilation in a tertiary care center.

Method : A comparative cross-sectional study conducted on patients admitted in Covid ICU at the Vedantaa Institute of Medical Sciences, Palghar from June 2020 to March 202. Patients with age more than 18 years with covid positive status requiring either invasive or non invasive mechanical ventilation included in the study.

Results : Out of 150 patients, 119(79.3) were male and 31(20.7) were female, with a mean age of 54.005 years (SD \pm 15.33). The patients were elderly (n = 31) and adults (n = 119). There were 19 (12.66) patients who not survived and 131(87.64) patients were there who survived from the disease. Median oxygen saturation of the patients who not survived was 88(84-97) and those who survived was 91 (78-96) but it was not statistically significant. Among the patients not survived found with comorbidity condition like Hypertension (91.17%) followed by Diabetes Mellitus, CKD, CAD. Metabolic parameters showed significantly higher in non-survival group compared to survival group. Increased in Neutrophile was observed in both the group but it was increased more in non-survival group compared survival

Conclusion : From these all overall information and data analysis of Demographic variable, Laboratorial parameters, comorbidity condition it was observed that these parameter were very helpful in management of severely ill patient, also in priority treatment for patients to decrease morbidity and mortality in population.

Keyword : COVID-19, SARS, MERS, Diabetes Mellitus, CKD, CAD.

Introduction

Covid-19 are an enormous group of infections that are known to cause ailment going from the normal virus to more extreme illnesses like Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome (SARS). In mid-2020, after a December 2019 episode in China, the World Health Organization distinguished SARS-CoV-2 as another sort of Covid. The episode immediately spread all throughout the planet. WHO (World health organization) declared covid 19 as a global pandemic on 11th march 2020.[1,2]

An early Chinese investigation of 103 COVID-19 cases discovered two strains, which they named L and S. The S type is more established; however, the L kind was more normal in beginning phases of the episode. It is additionally not unexpected for an infection to change, or transform, as it taints individuals and this infection has done as such. There are a few variations which have been named for the locales they were first found, yet they have now spread to different regions and nations, some ending up being more contagious just as more lethal.

Considerable mortality and morbidity was observed because of Coronavirus disease 2019 (COVID-19), more than 1,270,000 have died since December 2019 worldwide. [3]

COVID-19 has diverse clinical features it ranges from asymptomatic to critical illness and death.[4] From laboratorial confirmed COVID-19 cases represented 14% were severe cases and 5% were critical cases. This increased burden of this disease consumed most of medical resources of healthcare system also it contributed for the mortality.

In differentiating patients who are at high risk and for getting systemic treatment to prevent disease and its progression, good understanding of possible risk factors in combination to disease immunopathology associated with severity of COVID-19 is helpful for preventive team.[5]

Here's no real way to tell how long the pandemic will proceed. There are many variables, including the public's endeavors to slow the spread, analysts' work to study the infection, their quest for a treatment, and the accomplishment of the immunizations.

Due to the demographic features, comorbidities and immune system responses, clinical and laboratory features of the diseases are parameter between population noted by some previous Studies [6, 7]. Thus in order to determine high-risk group, mapping the disease and for systematic management of this disease testing the epidemiological, clinical and laboratorial parameter with the disease is the first priority.

Keeping this in mind for appropriate management and prioritized Tremont to the diseased, we aimed this study compare demographics, clinical characteristics, comorbidities, baseline lab parameters between survivors and non survivors of Covid 19 who received mechanical ventilation in a tertiary care center.

Material and Methods

Study Design: A comparative cross-sectional study

Study setting: The study was performed from the data of patients admitted in Covid ICU at the Vedantaa Institute of Medical Sciences, Palghar

Sample size: All the patients who were admitted in Covid ICU on mechanical ventilation from June 2020 to March 2021 were included in the study.

Study population: The patients who were admitted and given mechanical ventilation in Covid ICU, Vedantaa Institute of Medical Sciences, Palghar from June 2020 to March 2021 has been enrolled for the study.

Inclusion criteria: Patients with age more than 18 years with covid positive status requiring either invasive or non invasive mechanical ventilation

Exclusion criteria: age less than 18 years, not requiring mechanical ventilation, pregnant patients

Methodology: After institutional ethical committee approval, and written informed consent, patients satisfying the study criteria will be enrolled for the study. The demographic factors like age, gender, associated comorbidities, symptoms at presentation to hospital, baseline lab investigation like complete blood count, renal function test including electrolytes, biomarkers like CRP, Ferritin were recorded for all patients. Among all patients' survivors and non survivors will be sorted and all the baseline parameters will be compared between two groups.

Statistical analysis: Data will be entered in MS Excel 2010 and will be cross validated by a co-investigator. Statistical analysis will be performed using SPSS for Windows version 25.0 version for Windows (SPSS Inc, Chicago, IL). Data will be presented as the means + SD, for numerical variables, percentages and proportions for categorical variables. Student t test will be utilized to compare both groups and chi square technique will be utilized for assessing the significance of the difference in both groups.($p < 0.005$)

Results

Two hundred and 90 confirmed cases of COVID-19 were admitted to the Vedantaa Institute of Medical Sciences, Palghat during the period from June 2020 to March 2021. The average length of a hospital stay was 9 days (IQR, 7–17 days). Of the 150 patients, 131 (79.3%) were male and 27 (20.7%) were female, with a mean age of 57.33 ± 33.25 years. 119 (79.3%) of the patients were adults and 31 (20.7%) patients were elderly. The proportion of male was more than that of female in not survived group. Table no. 1 below showing the baseline characteristics of patients infected with COVID-19 transferred to ICU wards and compared the baseline characteristics on the basis of non-survivors and survivors. There were 19 (12.66) patients who not survived and 131 (87.64) patients were there who survived from the disease. Median oxygen saturation of the patients who not survived was 88 (84-97) and those who survived was 91 (78-96) but it was not statistically significant. Mean Respiratory rate and Heart Rate found statistically significant. Among the patients most of the patients from who not survived found with comorbidity condition like Hypertension (91.17%) followed by Diabetes Mellitus, CKD, CAD. Proportion of Hypertension was statistically significant between not survived and survived patients. Median hospital stay between the group was statistically significant.

Table 1: Baseline Characteristics of COVID- 19 Patients

Parameters	Non Survivor (n = 19)	Survivor (n = 131)	Total (n =150)	P-value
Age (Mean \pmSD)	54 \pm 16.59	54.01 \pm 14.07		0.997
< 45 Years	6(31.6)	30(22.9)	36(24.0)	0.717
45 - 65 Years	9(47.4)	74(56.5)	83(55.3)	
> 65 Years	4(21.1)	27(20.6)	31(20.7)	
Gender				

Male	15(78.9)	104(79.4)	119(79.3)	1.00
Female	4(21.1)	27(20.6)	31(20.7)	
Hospital Stay	11(8-15)	6(7-11)	9(7-17)	<0.01
BMI, Kg/m²				
18.5-24.9	5(25.80)	28(24)	33(22.2)	0.76
25-29.9	6(31.57)	40(33.86)	46(30.6)	
≥30	8(42.10)	50(42.43)	58(38.7)	
Oxygen Saturation (SPO ₂)median (IQR)	88(84-97)	91 (78-96)	90(84-97)	0.087
Respiratory Rate	21 (1.38)	17 (0.89)	17 (1.135)	<0.01
Heart Rate	87(2.36)	84(1.24)	86(1.8)	<0.01
Comorbidities				
Hypertension	17(91.17)	79(61.3)	97(64.85)	<0.001
Diabetes Mellitus	11(58.8)	62(47.7)	73(48.96)	<0.001
Hypothyroidism	2(8.8)	18(14.1)	20(13.44)	0.0003
CAD	5(26.5)	18(13.7)	23(15.17)	0.006
CKD	8(41.2)	34(26.6)	42(28.27)	<0.001
COPD	3(14.7)	10(7.8)	13(8.62)	0.052
Smoker	4(20.6)	27(20.7)	31(20.68)	<0.001

Table: 2 Distribution of Symptoms, Laboratorial parameters and other parameters among the survived and non-survived groups.

Parameters		Non Survivor (n = 19)	Survivor (n = 131)	Total (n =150)	P-value
Symptoms	Fever	8(44.1)	84(64.5)	92(61.9)	<0.01
	Shrtness of Breath	12(61.8)	84(64.5)	96(64.1)	<0.01
	Cough	10(52.9)	89(67.6)	99(65.7)	<0.01
	Chest Pain	0(0.0)	16(12.0)	16(12.0)	<0.01
	Headache	7(35.3)	17(12.7)	24(15.6)	<0.01
	Diarrhea	6(29.4)	14(10.8)	20(13.2)	<0.01
	Vomiting	3(14.7)	17(12.7)	19(13.0)	<0.01
	Abdominal Pain	2(8.8)	14(10.8)	16(10.6)	<0.01
	Altered Sensorium	4(23.5)	18(13.5)	22(14.8)	<0.01

Laboratory Parameters	Hemoglobin	12.53±3.14	12.85±3.14	12.81±3.22	0.73
	Platelates	141.22±57.06	188.91±74.78	182.87±74.34	0.003
	Lymphocytes	20.85±25.28	16.64±10.44	17.17±13.20	0.481
	Monocytes	5.23±2.80	5.74±3.11	5.68±3.072	0.468
	Esinophils	0.36±0.50	0.90±1.38	0.83±1.32	0.002
	Besophills	0.74±1.10	0.48±0.88	0.52±0.91	0.352
	Neutrophile	79.22±6.57	76.17±10.30	76.55±9.94	0.092
Metabolic Parameters	Blood Urea	95.9±63.35	42.22±27.09	49.02±38.02	0.002
	Creatinine, mg/dl	5.13±3.22	2.184±12.76	2.58±12.018	0.021
	Alkaline Phosphate, IU/L	177.86±189.89	142.47±131.51	146.747±139.52	0.453
	AST, IU/L	84.73±60.18	65.80±42.05	68.10±44.83	0.212
Electrolytes	Sodium	137.1±8.51	137.06±13.07	137.06±12.54	0.986
	Potassium	4.67±1.09	4.23±0.592	4.29±0.69	0.1
	Calcium	6.52±3.09	8.27±8.57	8.02±8.07	0.099
Marker of Inflammation /tissue dammage	CRP	13.50±6.94	13.46±7.38	13.47±7.30	0.981
	Ferritin	1080.801±827.28	1417.347±1014.351	1374.71±996.49	0.12

**p-value<0.01 highly significant and , P-value<0.05 significant at 5% level of Significance.

Clinical Symptoms

On the admission of the patients to the hospital patients found common clinical symptom was shortness of breath which was 61.8% from non- survived patients and overall it was 64.1%, followed by cough in non-survival patients and overall patients also. Overall, 61.9% of the patients had fever and also it was third common most clinical symptoms in non-survival patients. Altered Sensorium and diarrhea were also showed common symptoms during the admission and after admission of the patients to the ICU.

Laboratory Parameters

Laboratorial parameters showed in table no.2, it was observed that there was significant difference observed in hemoglobin level between survived and non-survived patients. Platelet's count was found decreased in non-survived group compared to the survival group. Lymphocytes was not significant between both the groups. Increased in Neutrophile was observed in both the group but it was increased more in non-survival group compared survival and difference was statistically not significant

Metabolic Parameters

Metabolic parameters showed significantly higher in non-survival group compared to survival group. Increased in Serum creatinine, AST, and Blood urea was observed in the non-survival group shown in table no.2

Electrolytes and Marker of inflammation

CRP markers was balanced in both the groups but it was higher in non-survival group also, ferratin level was quite higher in the same group and that difference was statistically significant compared to survival group.

Electrolytes was observed balanced in both the groups, due to the diarrhea and gastrointestinal problem many studies show imbalance nature of electrolytes but in our study it showed balance nature. But there were some patients had there showing imbalance sodium level due to the diarrhea and vomiting.

Discussion

Two hundred and ninety confirmed cases of COVID-19 were admitted to the ICU of Vedantaa Institute of Medical Sciences, Palghar data collected from Covid ICU on mechanical ventilation. Out of the all the patients mortality rate was 12.66% , in that mortality maximum were severely ill males patients. Maximum non-survived patients were in the range of adult to elderly patients age were between >45 years. Patients in ICU had admitted with most common symptoms of shortness of breath, cough and fever. There were many studies published showed that risk factors like comorbidity conditions mainly responsible for the mortality of the patients.

Age: Most of the studies showed that age is also played key role as risk factor for the disease because adult and elderly patients, mostly elderly patients are low immune, so they are at high at high risk too exposed to the disease. In present study maximum exposed age group was >45 Years

Also it was found the disease was frequently infected the middle aged group >45 Years up to 65 Years. There were many studies showed that age group of 40 to 60 years was mostly exposed group to the disease. But it is fact that this virus is infecting irrespective of the age group [8-11]

Gender: In present study men were mostly infected than the women's, we also found that this more infection to the men because of frequently travelling to different places for different purposes, like social gatherings, business travels etc. A study conducted among 56 elderly patients found that more men than women were infected by COVID- 19 [12]. Previous studies have documented more men than women to be infected with other coronavirus infections, such as in SARS-CoV and MERS-CoV [14]. Many studies reported that less infection to the women because of their sex chromosomes and X-chromosome plays important role in adaptive immunity

Comorbidities: Our study found that many of the elderly patients and patients more >45 years of age had some common comorbidity condition like hypertension, Diabetes mellitus, CKD CAD etc. these our observation was found nearly similar results to the many previous results of comorbidities. One research study showed that elderly patients are at higher risk for exposure of infectious diseases than the children whom show mild to asymptomatic infection. [15] Another study conducted by Li et al found that hypertension is an independent risk factor for severe COVID-19 also study conducted by Huang et al found that the Hypertension is also one for the risk factor for severity and mortality of disease.[16, 17] One Meta-analysis resulted that odds ratio of diabetes for ICU admission and mortality were 2.79(95%CI: 1.85–4.22)[18]

Clinical Symptoms: During the admission of the patients or after admission shortness of breathing, cough and fever were most common symptoms observed among the patients, in some patients diarrhoea and also vomiting observed as common symptoms. One study found that patients with fever had a higher risk of mechanical ventilation these results were similar to our results [19] Another study In which 52 critically ill COVID patients presented with fever [20]. Present study found shortness of breath was most common symptoms which similar to one study conducted found that some patients may progress to severe disease with dyspnea,

which may be accompanied by pneumonia in the second or third weeks of the disease [21-23]. Though the many studies found these some common clinical symptoms among the patients, but still it is unclear that viral load affects these clinical presentation or not.

Laboratorial Parameters: Laboratorial parameter like platelets count in our study showed that there was significant decrease in the platelets count of the patients who get not survived. Study conducted by Xu et al proposed that viral infection reduced platelets production and starts platelets destruction leads to thrombocytopenia, in critically ill patients of COVID-19 induced liver damage contributed to exacerbated thrombopenia indirectly. There was no statistical Significance found for the haemoglobin level in both the groups. Increased lymphocytes and neutrophil were observed in non-survived group. Some recent reports have also found increased neutrophil counts associated with COVID-19[24]. These elevated neutrophil counts showed that elderly patients are more susceptible to bacterial infection. Our study also observed lower eosinophil among non-survival patients, study conducted by Chen et al showed a reduction in eosinophil counts in most of the severe/ critical and fatal COVID-19 patients compared to mild/moderate and survived subjects on admission ($0.01 \times 10^9/L$ vs $0 \times 10^9/L$, $P < .001$).[25]

Metabolic Characteristics: Increased level of Serum creatinine and blood urea were observed among non-survived patients compared to survival patients A recent study found that the CRP level in elderly patients was significantly higher than that in young and middle-aged groups[26]. One recent study indicated that COVID-19 patients with severe conditions had high blood urea and creatinine levels.[27] Elevated AST was also associated with a high risk of mortality, as shown in a cohort of 10 131 US veterans, those with $AST > 89$ U/L had an aHR of 1.86 (95% CI: 1.35–2.57) when compared to those with $AST \leq 25$ U/L.[28]

Marker of inflammation: we found our study that, there was increase in CRP level but it was not statistically significant but marker ferritin was statistically highly significant among critically severe patients who get not survived. In a study of 989 patients in Wuhan, higher hs-CRP levels (reference 4 mg/L) were observed in COVID-19 patients, compared to the controls (27.4 [8.9–66.8] mg/L vs 3.1 [3.1–14.8] mg/L).[29] Laboratory analysis of patients admitted to the ICU showed an overall increase of CRP levels in the first seven days, peaking between days two and three.[29] Elevated levels of serum ferritin were associated with mortality and the development of severe outcomes in COVID-19. Another study found higher mean serum ferritin levels in moderate and severe patients than in mild patients (mild 327.27; moderate 1555; severe 2817.6; ng/ml).[30] A meta-analysis of 189 observational studies with data from 57 563 COVID-19 patients reported that a significant difference in mean ferritin levels of 606.37 ng/mL (95%CI: 461.86–750.88) was detected between survivors and non-survivors.[31]

In our study we found death rate of 11.7% majorly in adult to elderly patients having age more than 45 years all these patients were highly comorbid conditions and presented in the hospitals with shortness of breath and cough.

Limitation of Study: Our study underwent through many limitations, main limitation of our study was more detailed information from other laboratory tests and clinical outcomes were unavailable at the time of analysis. We studied only ICU patients who were severely ill, but we didn't go through the patients who were not critically ill in for similar parameter.

Conclusion : From these all overall information and data analysis of Demographic variable, Laboratorial parameters, comorbidity condition it was observed that these parameter were very helpful in management of severely ill patient, also in priority treatment for patients to decrease morbidity and mortality in population.

Conflict of Interest: None to declare

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