ORIGINAL ARTICLE

Outcome of Covid-19 Related ARDS Patients at a Tertiary Care Hospital

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ABSTRACT

Background: In covid-19 related ARDS patients, early approach to proper health care facility and non-invasive ventilation lead to better outcome.

Objective: To determine the outcome of covid-19 related ARDS patients at a tertiary care hospital, Rahim Yar Khan.

Methodology: This retrospective study was carried out at department of ICU & anesthesiology in collaboration with department of Pulmonology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. A total of 74 (confirmed positive PCR) covid-19 ARDS patients with age of 18-90 years of either sex were admitted in covid ICU from June – December 2020. Patients with negative PCR for covid-19 or who presented in gasping condition or received dead were excluded from the study. Outcomes were labelled as recovered (survivors) or died (non-survivors) and treatment outcome was observed in both groups those who were on non-invasive ventilation (NIV) and on invasive mechanical ventilation (IMV). Data was analyzed by using SPSS version 23.0

Results: Out of 74 patients, 60 (81.08%) were male and 14 (18.02%) were female. Middle and old age patients were more affected as compared to young age group (p-value 0.01) and more than half 41 (55.40%) patients went in to severe ARDS. Regarding treatment outcome 44 (59.5%) patients received NIV and 30 (40.5%) patients received IMV. Survival rate better (35.4%) among the patients on NIV as compared to those on IMV (6.7%) respectively.

Conclusion: Survival was better among the covid-19 ARDS patients who received NIV as compared to those on IMV. Keeping an eye on respiratory rate and SpO2 is the main factor for the early recognition of ARDS development and severity.

INTRODUCTION

Covid-19 is a viral infection caused by severe acute respiratory syndrome corona virus 2 (SARS – COV – 2). It started in china in December 2019 and within few months, it spread so quickly to involve a large part of the world[1-3]. The World Health Organization declared it a public health emergency of international concern on 30th January, 2020 and a global pandemic on 11th March, 2020[4]. The clinical spectrum of disease ranges from asymptomatic or mild, self-limiting respiratory tract illness to severe progressive pneumonia and acute respiratory distress syndrome (ARDS)[5-7]. About 20% of covid-19 patients experience a severe course, requiring hospitalization and 1/4th of the hospitalized patients need ICU admission[8]. ARDS is a life-threatening complication of covid-19[9].

It is classified as mild, moderate, and severe depending upon the degree of hypoxemia. In moderate to severe form of ARDS, patients require invasive mechanical ventilation (IMV) and have poor outcome[10]. Development of ARDS and need for invasive mechanical ventilation in covid-19 patients varies from 29-75% and mortality of ventilated patients ranging from 12-81% in different studies[11-13]. As there is wide variation in frequency of cases of covid-19 having ARDS, need of mechanical ventilation and mortality of ventilated patients in various studies, we decided to carry out a study in our ICU to see the pattern of above variation in patients presented to our ICU. Such local data is likely to help in decision making about management of these cases and best use of critical care resources.

MATERIAL AND METHODS

This study was conducted at Department of Intensive Care Unit and Anesthesiology in collaboration with Department of Pulmonology, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. Retrospective cohort of consecutive confirmed positive covid-19 patients admitted and treated in covid ICU from June to December 2020. A total of 170 patients with a suspicion of covid-19 infection were admitted in Covid ICU through flu filter clinic. Only 74 confirmed covid-19 PCR positive (throat or nasal swab) patients between the ages of 18-90 years of either sex were included. We divided age groups in 03 categories; young (18-39

years), middle age (40-59 years) and old age (60 years and above). The study was conducted with the approval obtained from institutional review board of Sheikh Zayed Medical College/Hospital, Rahim Yar Khan.

An informed consent was taken from patients or their attendants for inclusion in this study and required treatment in ICU. Patients with negative covid-19 PCR, or who presented in gasping condition or received dead were excluded from the study. All these 74 PCR positive patients had bilateral infiltrates on chest x-ray with severe hypoxia (oxygen saturation less than 90% on 10 liter of oxygen) and/or PaO2 less than 60mmHg on ABGs. Information regarding comorbidities like Diabetes Mellitus, Hypertension, Chronic Kidney Disease, Chronic Liver Disease, stroke, duration of ICU stays, patients' survival, discharged from ICU and death were obtained on a predesigned performa. Patients who did not maintain SpO2 on non-invasive ventilation [Continuous Positive Airway Pressure (CPAP), Bilevel Positive Airway Pressure (BiPAP) and High flow Nasal Cannula (HFNC) etc], were put on invasive mechanical ventilation. Outcomes were labeled as recovered (survivors) or died (non-survivors) and treatment outcome was observed in both groups those who were on NIV and invasive mechanical ventilation. Data was analyzed by using SPSS version 23.0. Mean ± SD were taken for quantitative variable like age and ICU stay. Qualitative variable like gender, comorbidities, and different outcomes were presented as frequencies and percentages. The outcome was compared in two genders, in different age groups and among the survivors and non survivors by using layered cross tab and applying chi-square test.

RESULTS

Sociodemographic and clinical characteristic of the patients is shown in table 01. Out of 74 patients, 60 (81.08%) were male and 14 (18.02%) were female. Regarding age distribution, no patient <18 years was admitted during the period of study. Middle and old age patients were more prone to develop severe hypoxia as compared to young age group (45.94% vs. 36.48% vs. 17.56%) respectively. More than two third patients had extensive radiological involvement i-e whole lung fields bilaterally 45 (60.81%), upto mid 19 (25.67%) and lower zone infiltrates 10

(13.51%). Regarding severity of ARDS in these covid-19 patients 17 (22.97%) had mild ARDS, 16 (21.62%) had moderate and 41 (55.40%) went into severe ARDS according to PaO2/FiO2 ratio.

Table 1: Socio demographic and Clinical Characteristics of Covid-19 ARDS patients

Clinical Data		Total	Survivors	Non-Survivors	P-Value
Gender	Male	60 (81.08%)	15 (25%)	45 (75%)	0.70
	Female	14 (18.2%)	03 (21.5%)	11 (78.5%)	
Age	Young	13 (17.56%)	07 (53.8%)	06 (46.2%)	0.01
	Middle Aged	34 (45.94%)	08 (23.5%)	26 (76.5%)	
	Old Aged	27 (36.48%)	03 (11.1%)	24 (88.9%)	
Bilateral Chest Infiltrate	Lower zone	10 (13.51%)	05 (50%)	05 (50%)	0.08
	Upto middle	19 (25.67%)	10 (52.6%)	09 (47.4%)	
	Whole Lung fields	45 (60.81%)	03 (6.6%)	42 (93.4%)	
ARDS Severity	Mild	17 (22.97%)	10 (58.8%)	07 (41.2%)	0.02
	Moderate	16 (21.62%)	07 (43.8%)	09 (56.2%)	
	Severe	41 (55.40%)	01 (2.5%)	40 (97.5%)	

Treatment outcome (survivor/died) in both groups i.e. those on non-invasive and on invasive ventilation is shown in table 02.

Table 2: Treatment outcome in Covid-19 ARDS patients

Mode of Ventilation	Total	Survivors	Died	P-Value
Non-invasive Ventilation	44 (59.5%)	16 (35.4%)	28 (63.7%)	0.002
Invasive Mechanical Ventilation	30 (40.5%)	02 (06.7%)	28 (93.3%)	

DISCUSSION

In our study, majority of the patients (81%) admitted in ICU with ARDS were male and 18.2% were female, however overall survival was not statistically significant (p-value 0.70). This was also observed in other study like Grimaldi et al. in which 75% were male and 25% were females who suffered this pandemic[14].

Similarly another study done by P. Ramirez et al.[15] showed male predominance (72.7%) in their results as our's. This male predominance might be explained by high level of outside and social exposure of males as compared to females in our society. Other possible reason maybe that males are more likely to present for treatment purpose in the hospital as compared to female.

Middle & old aged patients were more susceptible for severe hypoxia as compared to young age group (46% vs. 36% vs. 18%) which is statistically significant (p-value 0.014) reflecting better survival in younger age group. This may be due to better immunity and absence of comorbidities in younger age group patients. Wan Xu et al.[16] showed a huge & significant involvement of middle aged (30-70 years) population 82.7% as compared to young (14-30 years) 10.6% & old age people (>70 years) 6.7%.

Another significant finding observed in our study was that more than 50% patients had severe ARDS as compared to 22.97% patients having mild ARDS and 21.62% patients with moderate ARDS (p-value 0.02) showing better outcome in mild and moderate ARDS than severe ARDS. This is explained by their late presentation to seek medical attention as there remained a lot of hipe and propaganda for covid-19 on social media. Most of the people in society (even educated communities) did not accept the pandemic and remained under the influence of fake news and material shared on social media day by day. Wu C et al.[17] in china studied 84 patients among which 44 patients suffered with severe ARDS having 52% mortality. Similarly Zhou F et al.[18] showed 50 patient with severe ARDS among 59 total patient with 85% mortality. Another study conducted in Italy by inciardi R et al.[19] showed 17 patients with severe ARDS out of 19 with 89% mortality rate.

Regarding mode of ventilation, it was found that survival of the patients was better on NIV (36.4%) as compared to invasive mechanical ventilation (6.7%) which is statistically significant (p-value 0.002). Mortality among the invasive ventilated patients was 93.3% as compared to NIV which was 63.7% which is explained by severity of the disease and more complications associated with invasive mechanical ventilation. Namendys – silva conducted a study in Wuhan China in which mortality rate was 86% in mechanically ventilated patients as compare to 79% among the patients of NIV group[20]. In another study conducted by Hua J et al showed a decrease in mortality rate among the patients of acute hypoxemic respiratory failure in covid-19 ARDS who were put on NIV versus invasively mechanically ventilated patients (40.8% vs. 92% respectively)[21]. They suggested to avoid IMV and to utilize NIV at the early stage of respiratory failure. Similar findings were shown in another study conducted by Wan S et al in which NIV was prioritized over IV in covid-19 ARDS patients which resulted in higher rate of patient discharge from ICU[22]. Burns GP et al found in their study that using CPAP, BiPAP and high flow nasal cannula (HFNC) reduced ICU stay among the hypoxemic respiratory failure in covid-19 patients as compared to those who received invasive mechanical ventilation[23].

Our study has certain limitations. As it was retrospective cohort, we could not initially randomized the patients in two groups i.e. NIV & invasive mechanical ventilation for appropriate comparison and results. We could not fulfil the entire criteria of ARDS as we were unable to get echocardiogram of all patients. However, we included confirmed covid-19 PCR positive patients with bilateral chest x-ray infiltrates and got the support of P/F ratio for making the diagnosis of ARDS. The sample size in our study was small, more studies on larger scale are needed further to strengthen the results.

CONCLUSION & RECOMMENDATIONS

Survival was better among the covid-19 patients with ARDS who received NIV as compared to those on invasive mechanical ventilation. Patients with all age groups can be benefitted with these non-invasive strategies (CPAP, BiPAP and HFNC) and mortality can be reduced. So early presentation to healthcare facility and keeping an eye on respiratory rate and oxygen saturation is the main factor in early recognition of ARDS development and its severity.

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