ORIGINAL ARTICLE

The Outcome of COVID-19 Patients with Moderate to Severe Disease: A Single Institution Study

Iffat Rafeeq[1*], Anees Ahmed Gardezi[1], Nuzhat Rafeeq[3], Shagufta Parveen[4], Abeera Ahmad[5]

ABSTRACT

Objective: To determine the outcome of COVID-19 positive patients with moderate to severe disease.

Study Design: A cross-sectional study.

Place and Duration of Study: This study was conducted at the Department of Medicine of Combined Military Hospital, Malir Karachi, Pakistan, from 1st Jun 2020 to 31st Jul 2020.

Materials and Methods: Total 67 SARS-CoV-2 positive cases, including males and females, were studied. All patients were admitted with presenting complaints such as fever, cough, arthralgia, or shortness of breath. Investigations including complete blood count, serum ferritin, quantitative CRP, liver function tests, renal function tests, blood sugar fasting, and random chest radiographs and ECG were performed. Critical patients were admitted to COVID ITC and managed with high-flow oxygen and assisted ventilation. Patients with moderate disease were admitted to a high-dependency unit and managed with oxygen, intravenous dexamethasone, intravenous antibiotics, anticoagulants, and antiviral therapy patients accordingly. Supportive treatments, including zinc, vitamin C and vitamin D, were given to all patients.

Results: Out of total 67 patients, 56 were suffering from comorbidities. Eighteen patients have died. Forty-nine patients have recovered with uneventful recovery.

Conclusion: All over the world advanced age and comorbidities such as hypertension, diabetes, asthma, chronic obstructive pulmonary disorder, and chronic kidney disease remain a major health hazard for an increased likelihood of adverse clinical outcomes in patients with COVID-19 infections outcomes. Early diagnosis and prompt treatment of moderate to severe COVID-19 cases could only be possible with good clinical acumen to prevent a catastrophic outcome.

Keywords: *COVID-19, Co-morbidities, Disease, Outcome*.

How to cite this: *Rafeeq I, Gardezi AA, Rafeeq N, Parveen S, Ahmad A. The Outcome of COVID-19 Patients with Moderate to Severe Disease: A Single Institution Study. 2023; 4(2): 116-120. doi: http://doi.org/10.37185/LnS.1.1.261*

Introduction

COVID-19, the worst ever encountered outbreak on the planet, first emerged at the end of December 2019 in Wuhan City, Hubei Province of Central China. WHO (World Health Organization) declared the COVID-19 outbreak a global pandemic on January 30th, 2020.[1] In the past the world faced pandemics but not on this big of a scale. Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) was first reported in China in 2002 with a mortality of 11%. In 2012, the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) emerged in Saudi Arabia with a fatality of 37%.[2] The viruses likely originated from bats and infected humans through other intermediate animal hosts, e.g. the civet (Paguma larvata) for SARS-CoV and the camel for MERS-CoV.[3] To date, COVID-19 has spread rapidly worldwide across 220 countries. United States of America rates at top of the list, followed by India, Brazil and France. Globally, approximately 678,652,119 cases have been reported from novel Coronavirus, and 6,790, 827 deaths have been reported, approximately

[1]*Department of Medicine/Gynecology and Obstetrics*[4]
Combined Military Hospital (CMH), Kharian, Pakistan
[3]*Department of Radiology/Pathology*[5]
Combined Military Hospital (CMH), Malir, Pakistan
Correspondence:
Lt Col Dr. Iffat Rafeeq
Assistant Professor, Medicine
Combined Military Hospital (CMH), Kharian, Pakistan
E-mail: iffatrafeeq@yahoo.com
Funding Source: NIL; Conflict of Interest: NIL
Received: Jun 16, 2022; Revised: Dec 22, 2022
Accepted: Jan 14, 2023

651,257 162 cases have been recovered.[4] Approximately 135,139,203 (73.3%) individuals have received 1st dose of vaccine worldwide, and 123,279 040 (66.9%) received 2nd dose of vaccine. In Pakistan, 1576688 cases were confirmed, and the death rate was 30 641; about 1,538,689 cases were recovered successfully.

SARS-CoV-2 results from variable symptoms depending on individual genetics, race, age, gender and geographic location. In critical cases, it has been observed that there is damage to lung epithelial cells, thrombosis, hypercoagulation, and increased vascular permeability leading to sepsis. This may lead to acute respiratory distress syndrome (ARDS) and eventually pulmonary fibrosis.[5] With advancing age, the immune mechanism losses its resiliency; therefore, susceptibility to infection increases.[6]

It has been observed that >75% of critically ill elderly patients were suffering from 1-2 chronic medical conditions.[7] Congestive heart failure and conduction disturbances have been shown to involve 25-35 % of the ICU patients.[8] Data from China and other countries have indicated adults, particularly those with underlying comorbidities, are at greater risk of acquiring bilateral pneumonia complicated by type II respiratory failure, multi-organ dysfunction even death appears to be the most serious manifestation.[9] Internationally, mortality was noted to be highest among individuals >65 years of age who acquired moderate to severe disease. Among that, 80% were suffering from co-morbidities such as diabetes mellitus, hypertension, chronic obstructive airway disease, malignancies, chronic kidney disease, cardiovascular disease and epilepsy.[10] This has led to the importance of evaluating the frequency of comorbidities in debilitated patients, as we have enclosed here.

Materials and Methods

This study was carried out at the Department of Medicine, Combined Military Hospital, Malir Karachi, from 1st June 2020 to 31st July 2020. Data collection was done with the permission of the Hospital Ethical Committee (file no 51/2021/ Trg / ERC). We included 67 patients, both males and females; all patients were declared positive for SARS-COV 2 by nasopharyngeal polymerase chain reaction (PCR) (figure 1). 56 patients were suffering from co-morbidities such as diabetes mellitus, hypertension, chronic kidney disease, malignancy, chronic obstructive pulmonary disease, cardiovascular disease and epilepsy. Asymptomatic patients or patients with mild symptoms were excluded from the study.

Patients were divided into two groups irrespective of age (Figure 1). Group A - moderate disease, including tachypneic patients, maintaining oxygen saturation >92% with nasal prongs or face mask, chest radiograph revealed bilateral infiltrates <50%, inflammatory markers including serum ferritin, quantitative (CRP) C-reactive proteins, D dimers and lactate dehydrogenase were moderately deranged. They were managed in a high-dependency isolation unit.

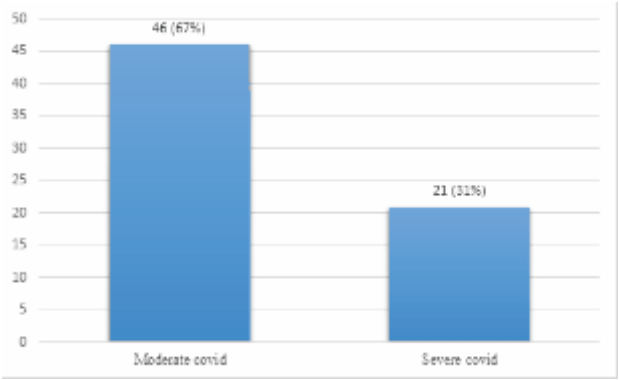

Fig 1: Distribution of Comorbidities as moderate and severe cases (n = 67)

Group B - Severe disease, including patients who were severely tachypneic and unable to maintain oxygen saturation >92% without high flow oxygen via rebreathing mask and therefore placed on assisted mechanical ventilation. They were managed in the COVID Intensive Care Unit, with well-equipped mechanical ventilators and trained staff. Laboratory parameters, including complete blood picture, liver function tests, renal function tests, and arterial blood gases were taken into account. Inflammatory markers were severely deranged, including serum ferritin, quantitative (CRP) C-reactive proteins, D dimers, and lactate dehydrogenase. Chest radiograph revealed bilateral infiltrates >50%, HRCT chest score > 32/40.

Data was entered in SPSS version 24 and analyzed. Descriptive analysis with mean+/- standard deviation was calculated for gender and biochemical markers serum ferritin, C reactive protein and complete blood count. Frequencies were noticed for

co-morbidities in both groups.

Results

A total of 67 patients werje included in the study. There were 56 patients who were suffering from comorbidities, including 40 males and 29 females (figure 2).

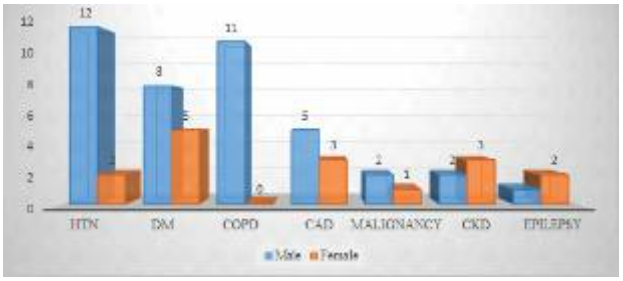

Fig 2: Gender distribution of Comorbidities (n = 56)

A total of 46 patients were suffering from moderate disease, and 21 were suffering from severe disease (table 3). The mean age of patients was 40.24 years with 16.25 +/- SD. Age range from 21 to 85 years. It has been shown in group B that comorbidities were directly related to higher mortality. There were 18 deaths, four females and 14 males (figure 3).

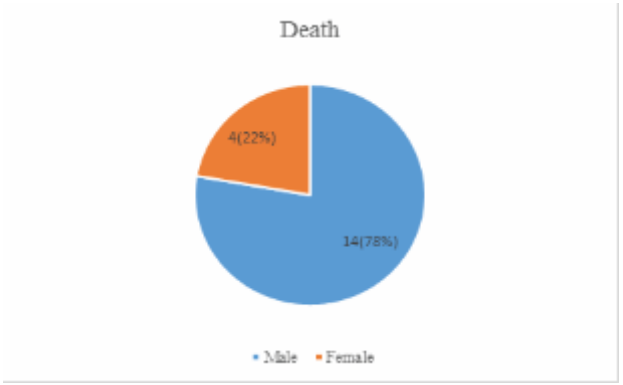

Fig 3: Death ratio of critically ill patients (n = 18)

One female patient from group A (moderate disease), aged 40 years, having no comorbidity died due to CRS (cytokine release syndrome), ARDS, and multi-organ dysfunction. Moderate disease was noticed in 46 patients, and severe disease in 21 patients (Figure 4).

Discussion

Coronaviruses (CoVs) belong to the subfamily Orthocoronavirinae family Coronaviridae, order Nidovirales. There are four genera within the subfamily, named as Alphacoronavirus (α-CoV), Betacoronavirus (β-CoV), Gammacoronavirus (γ-CoV) and Deltacoronavirus (δ-CoV). Genomic

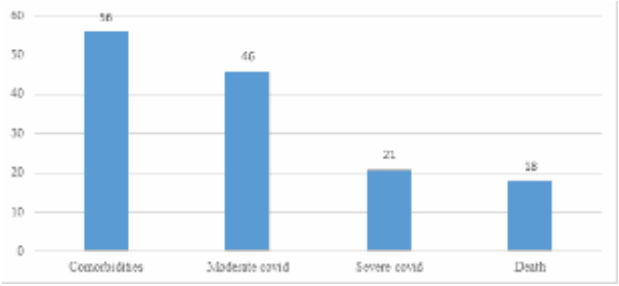

Fig 4: Graphical presentation of clinical outcome of the study (n = 67)

sequence demonstrated that coronavirus disease 2019 (COVID-19), is caused by a novel coronavirus, namely severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This deadly virus belongs to the B lineage of the betacoronavirus (b-CoV).[11]

Current research shows that the poor prognosis of patients with COVID-19 is related to multiple factors such as male gender, age >60 years, underlying comorbidities such as hypertension, diabetes mellitus, cardiovascular diseases, secondary ARDS, and others. Data from China and other countries indicated that older populations, particularly those with co-morbidities or chronic ill health, are at higher risk for severe illness and death than younger persons.[12] It has been observed in critical cases that there is damage to lung epithelial cells, predisposing to thrombosis and increased vascular permeability eventually leading to acute respiratory distress syndrome (ARDS), pulmonary fibrosis and unfortunately, death.[13] Patients with underlying chronic illnesses have upregulation of the angiotensin-converting enzyme-2 (ACE2) receptor, which has been misused by coronavirus as the source of infection. COVID-19 infection causes imbalances in ACE2 and induces an inflammatory immune response known as a cytokine storm, both amplifying comorbidities within the host.[13] In the United States, mortality was highest among older individuals, with 80 per cent of deaths occurring in those aged ≥65 years, and >75% were suffering from co-morbidities, including coronary artery disease, diabetes mellitus, hypertension, chronic obstructive airways disease, cancer (in particular hematologic malignancies, lung cancer, and metastatic disease), chronic kidney disease, immunosuppression, obesity and smoking.[14] In a report from the Chinese Centre for Disease Control and Prevention that included

approximately 44,500 confirmed infections, 87 per cent of patients were between 30 and 79 years old.[15] CDC (centre of disease control and prevention) generated a report regarding the Georgia Department of Public Health in March 2021, declaring all adults, regardless of underlying conditions or age, are at risk for serious illness from COVID-19.[16] In Washington State, the mortality rate was 12 times as high among patients with reported co-morbidities compared with none.[17] According to international statistics patients with hypertension, diabetes mellitus and ischemic heart disease are prone to develop a catastrophic outcome. We have observed in our study that hypertension was the most frequent comorbidity followed by diabetes mellitus and chronic obstructive airway disease. Around the globe 20-50% of COVID-19-affected patients were diabetics, and have proven to cause multi-organ dysfunction in moderate to severe disease.[18]

Chronic obstructive airway disease patients are more prone to developing severe disease, perhaps due to the downregulation of CD4 T, CD8 T, and B cells. A higher level of TNF, IL-2, IL-10, IL-8 and IL-6 receptors has been observed.[19] Cancer patients are regarded as a highly vulnerable group to acquire serious SARS-CoV-2 infection, possibly due to the systemic immunosuppressive state caused directly by tumor growth and indirectly by effects of anticancer treatment.[20] Epilepsy has been shown to increase fatality in hospitalization up to 1.2 % compared to 0.5% of population without epilepsy.[21] The link between chronic kidney disease and COVID 19 has been poorly established; however, the management of immunocompromised patients undergoing hemodialysis remains a dilemma.[22]

Conclusion

WHO has declared COVID-19 as a global public health emergency. Advanced age and comorbidities remain major health hazards for fatal outcomes. Early diagnosis and prompt treatment of moderate to severe COVID 19 cases could only be possible with good clinical acumen to prevent catastrophic outcomes. A few clinical trials recommend using melatonin in prophylactic and therapeutic doses without serious adverse effects to reduce the morbidity and mortality by COVID-19. However, further high-quality randomised clinical trials are required to further investigate the efficacy.

REFRENCES

1. N Zhu, D Zhang, W Wang, X Li, B Yang, J Song. A novel coronavirus from patients with pneumonia in China, 2019. New England Journal of Medicine 2020; 382: 727. doi: 10.1056/NEJMoa2001017
2. S Bilgin, O Kurtkulagi, GB Kahveci, TT Duman. Millennium pandemic: a review of coronavirus disease (COVID-19). Experimental Biomedical Research 2020; 3: 117-25. doi: 10.30714/j-ebr.2020259176
3. P Zhou, XL Yang, XG Wang, B Hu, L Zhang, W Zhang, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 2020; 579: 270-73. doi: 10.1038/s41586-020-2012-7
4. National action plan for preparedness & response to Corona virus disease (Covid-19)Pakistanhttps//www.nih.org.pk/wp-content/uploads/ 2020/02/NAP-covid19_AL@version-3-date-12-2-2020-with-annexures.pdf Accessed 5th April 2020.
5. Pollard CA, Morran MP, Kalinoski ALN. The COVID-19 pandamic: a global health crisis. Physiology Genomics. 2020; 52: 549-57. doi: 10.1152/ physiolgenomics. 00089.2020
6. Guan WJ, Ni ZY, Hu Y, Liang WH, Ou CQ, He JX, et al. Clinical Characteristics of COVID-19 in China. New England Journal Medicine. 2020; 382: 1708-20. doi: 10.1056/ NEJMoa2002032
7. Tomasoni D, Italia L, Adamo M, Inciardi RM, Lombardi CM, Solomon SD, et al. Covid-19 and heart failure: from infection to inflammation and angiotensin II stimulation. Searching for evidence from a new disease. European Journal Heart Failure. 2020; 22: 957-66. doi: 10.1002/ejhf.1871
8. Wang LS, Wang YR, Ye DW, Liu QQ. A review of the 2019 Novel Coronavirus (COVID-19) based on current evidence. International Journal of Antimicrobial Agents. 2020; 56: 106137. doi: 10.1016/j.ijantimicag.2020.105948
9. Su S, Wong G, Liu Y, Gao GF, Li S, Bi Y. MERS in South Korea and China: a potential outbreak threat? Lancet. 2015; 385: 2349-50. doi: 10.1016/S0140-6736(15)60859-5
10. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. New England Journal Medicine. 2020; 382: 1199–1207. doi: 10.1056/ NEJMoa2001316
11. Xu X, Chen P, Wang J, Feng J, Zhou H, Li X. Evolution of the novel coronavirus from the ongoing Wuhan outbreak and modeling of its spike protein for risk of human transmission. China Life Science. 2020; 63: 457–60. doi: 10.1007/s11427-020-1637-5
12. Huilan Tu, Sheng Tu, Anwen S, Jifang S. Current epidemiological and clinical features of COVID-19; a global perspective from China. Journal of Clinical Virology. 2020; 81: 1–9. doi: 10.1016/j.jinf.2020.04.011
13. Cheng H, Wang Y, Wang GQ. Organ protective effect of angiotensin – converting enzyme 2 and its effect on the prognosis of COVID-19. Journal of Medical Virology. 2020; 92: 726-30. doi: 10.1002/jmv.25785

14. Wong JEL, Leo YS, Tan CC. COVID-19 in Singapore—current experience: critical global issues that require attention and action. Journal of American Medical Association. 2020; 323: 1243-4. doi: 10.1001/jama.2020.2467
15. Sahin AR, Erdogan R, Agaoglu PM, Diner Yi, Cakirci AY, Senel ME, et al. 2019 novel coronavirus (COVID-19) outbreak: a review of the current literature EJMO (Eurasian Journal of Medicine and Oncology) 2020; 4: 1-7. doi: 10.14744/ejmo.2020.12220
16. Lee N, Hui D, Wu A, Chan P, Cameron P, Joynt GM, et al. A major outbreak of severe acute respiratory syndrome in Hong Kong. New England Journal of Medicine. 2003; 348: 1986-94. doi: 10.1056/NEJMoa030685
17. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City. Journa of American Medical Association. 2020; 323: 2052-9.
18. Little P, Read RC, Amlôt R, Chadborn T, Rice C, Bostock J, et al. Reducing risks from coronavirus transmission in the home-the role of viral load. British Medical Journal 2020; 369: m1728. doi: 10.1136/bmj.m1728
19. Song J, Zeng M, Wang H, Qin C, Hou HY, Sun ZY, et al. Distinct effects of asthma and COPD comorbidity on disease expression and outcome in patients with COVID-19. Allergy. 2021; 76: 483-96. doi: 10.1111/all.14517
20. Liu C, Zhao Y, Duodu DO, Basho R, Cui X. COVID – 19 in cancer patients: risk, clinical features and management. Cancer Biology and Medicine. 2020; 17: 519-27. doi: 10.20892/j.issn.2095-3941.2020.0289
21. Cabezudo-García P, Ciano-Petersen NL, Mena-Vázquez N, Pons-Pons G, Castro-Sánchez MV, Serrano-Castro PJ. Incidence and case fatality rate of COVID-19 in patients with active epilepsy. Neurology. 2020; 95: e1417-25. doi: 10.1212/WNL.0000000000010033
22. Farouk SS, Fiaccadori E, Cravedi P, Campell KN. COVID-19 and the Kidney: What we think we know so far and what we don't. Journal of Nephrology. 2020; 33: 1213-8. doi: 10.1007/s40620-020-00789-y