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Frequency of COVID-19 Complications and Their Outcomes in Patients Admitted to a Tertiary Care Hospital in Karachi

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Abstract: The end of 2019 was marked by the emergence of a new coronavirus. Now it is named severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2), which was declared a pandemic by the World Health Organization in March 2020. This study aims to highlight the variety of complications due to COVID-19 infection and their outcomes in hospitalized patients infected with this deadly virus. An observational cohort descriptive study was conducted from April 2020 till July 2020 at Dr. Ziauddin University Hospital, Karachi. All patients with confirmed features of COVID-19 pneumonia and age above 18 years were included. Pulmonary and extrapulmonary complications were labeled as primary outcomes. The association of these complications with the need for mechanical ventilation, length of hospital stays, and mortality was labeled as the secondary outcomes. Out of 244 patients enrolled for this study, 199 (81.5%) were COVID-19 PCR positive while 45 (18.5%) were negative. The mean age of patients was 58.1 (± 2.14) years with male predominance (68.4%). Acute respiratory distress syndrome (ARDS) was the most common complication in our study (51.6%), followed by acute liver injury [N=202 (58.9%)], and acute kidney injury [N=233 (24.4%)]. The outcomes were observed only in 219 patients, as 25 patients left against medical advice. Mortality was significantly higher in the ARDS group (41.9%, $p<0.05$) than in the non-ARDS group (0.01%). Mechanical ventilation requirement was also higher in the ARDS group than in the non-ARDS group (65.8% vs. 0.8%). As a whole, 69.67% of patients recovered and were successfully discharged, while 20.08% of patients died. The complications like ARDS, cardiomyopathy, renal impairment, and shock had a poor outcome in terms of morbidity and mortality.

Keywords: COVID-19, complications, acute respiratory distress syndrome, outcome, pandemic, ventilatory support.

卡拉奇三级医院住院患者中 新冠肺炎并发症的频率及其结果

摘要：2019年年底，出现了一种新的冠状病毒。现在它被命名为严重急性呼吸系统综合症冠状病毒2(非典——冠状病毒-2)，它于2020年3月被世界卫生组织宣布为大流行病。本研究旨在突出新冠肺炎感染引起的各种并发症及其结果在感染这种致命病毒的住院患者中。2020 年 4 月至 2020 年 7 月在卡拉奇齐奥丁大学医院进行了一项观察性队列描述性研究。包括所有具有新冠肺炎肺炎特征且年龄在18岁以上的患者。肺部和肺外并发症被标记为主要结局。这些并发症与机械通气需求、住院时间和死亡率之间的关联被标记为次要结局。在参加本研究的244名患者中，1

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99名（81.5%）为新冠肺炎聚合酶链反应 阳性，45 名（18.5%）为阴性。患者的平均年龄为58.1(±2.14)岁，男性居多(68.4%)。急性呼吸窘迫综合征(ARDS)是我们研究中最常见的并发症 (51.6%)，其次是急性肝损伤 [N=202 (58.9%)] 和急性肾损伤 [N=233 (24.4%)]。结果仅在219名患者中观察到，因为25名患者不接受医疗建议。ARDS组的死亡率（41.9%，p<0.05）显着高于非 ARDS 组（0.01%）。ARDS 组的机械通气需求也高于非 ARDS 组（65.8% 对 0.8%）。总体来看，69.67%的患者康复出院，20.08%的患者死亡。ARDS、心肌病、肾功能损害和休克等并发症在发病率和死亡率方面的结果较差。

关键词: 新冠肺炎, 并发症, 急性呼吸窘迫综合征, 结果, 大流行, 通气支持.

1. Introduction

In December 2019, a new strain of the coronavirus, the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), was discovered in Wuhan, China [1]. Due to increasing globalization allowing for trans-border transmission, the virus has been spreading rapidly worldwide, resulting in the World Health Organization declaring it a global epidemic [2]. The current global count of COVID-19 cases has been estimated to be around 131 million. The first case reported in Pakistan was on February 26, 2020. Since then, Pakistan has seen more than 688,000 cases with over 14,000 deaths [3]. Pakistan's largest metropolitan city, Karachi, is located in Sindh; as of now, there are more than 266,000 cases.

Research has shown that the virus causes a respiratory infection that can lead to severe pneumonia associated with cough and fever [4, 5]. Its transmission mode is reported to be through liquid droplets released through cough, sneezes, hand-to-mouth-to-eye contact, and contaminated hard surfaces, making this a highly contagious disease [6]. The COVID-19 primarily manifests itself in lung infection and causes mild symptoms of fever, cough, sore throat, and dyspnea. However, 5% of the population was found to experience a far severe spectrum of the disease ranging from acute respiratory distress syndrome to multi-organ failure, culminating in death. In the case of hospitalized patients, these numbers have escalated up to 16% of carriers experiencing severe forms of respiratory symptoms or systemic manifestations of the disease [7].

Extrapulmonary complications can range from thrombosis, disseminated intravascular coagulation, acute renal failure, encephalitis, myositis, pulmonary embolism, arrhythmias, septic shock, myocardial infarction, ischemic stroke, liver dysfunction, and secondary infections to rhabdomyolysis. Unfortunately, so far, there has been no conclusive explanation for the multi-organ manifestations of COVID-19, making it a challenge for physicians to deal with the panorama of effects caused by this deadly pathogen. The disease dynamics are still unknown. However, it is speculated that this multisystem involvement could be determined by the mechanisms of direct cellular and endothelial injury caused by the virus. The viral infection elicits pro-inflammatory cytokines, and thrombotic events result from systemic coagulopathy and hemodynamic alterations. All patients infected with COVID-19 exhibit systemic hyper-inflammation or cytokine storm mediated by interleukin-1 and interleukin-6, the presence of which has been associated with a poor prognosis for survival [8].

Acute Respiratory Distress Syndrome (ARDS) was the major complication of most COVID-19 patients, affecting about 41% of the hospitalized patients as depicted by a study in an intensive care unit in Wuhan, China [9]. A cohort study conducted in China demonstrated cardiac fatalities in 20% of hospitalized COVID-19 cases with 12% of patients without the prior known cardiovascular disease [10]. A study of 21 patients with severe COVID-19 pneumonia admitted to the ICU in Washington State reported that 33% had cardiomyopathy [11]. In a study of 5,449 patients hospitalized with COVID-19 in New York, 36.6% developed acute kidney injury, 14.3% of whom required renal replacement therapy [12]. The multi-organ failure in COVID-19 patients can be attributed to catastrophic microvascular injury caused by activation of complement pathways resulting in a pro-coagulant state. Due to varied clinical presentation of the disease and increased mortality rate associated with multi-organ involvement, patients are destined to require concurrent medical care resulting in overburdening the healthcare systems worldwide and imposing a serious nuisance for public health [13].

As the pandemic takes a toll on the world population and the future consequences of the disease remain vague, we aim to highlight the wide array of complications and their outcome in COVID-19 infected hospitalized patients via this study. The relevant data can aid in designing and implementing strategies and

countermeasures to stream the devastating effects that increase both morbidity and mortality. This study aims to determine the frequency of pulmonary and extrapulmonary complications and their outcome in patients with COVID-19 infection admitted in Dr. Ziauddin University Hospital, Clifton Campus, Karachi.

2. Methods

This study was conducted at Dr. Ziauddin Hospital Clifton, Karachi, Pakistan. It was an observational cohort descriptive study conducted from April to July 2020. Data was collected on a proforma from the records of patients admitted to the hospital during this period with a diagnosis of COVID-19 infection. Prior approval from the ethical review committee (ERC) of the institution was taken with reference code 2450820MAPUL dated September 10, 2020. The patients' informed and written consent was waived off as it was a retrospective study, but full confidentiality was maintained throughout the study. Inclusion criteria were all patients admitted in the hospital with age over 18 years and had tested positive for COVID-19 with confirmed features of pneumonia. Patients were labeled as having complications secondary to COVID pneumonia only after comparing their hospital's clinical course with their baseline status. The primary outcome was defined as the pulmonary and extrapulmonary complications encountered in COVID-19 infected patients, including ARDS, pulmonary embolism, pneumothorax, pneumomediastinum, arrhythmias, cardiomyopathy, myocardial infarction, stroke, shock, acute kidney injury, and acute liver injury. The secondary outcome was defined as the need for mechanical ventilation, length of hospitalization, and mortality.

The exclusion criteria covered all patients in the pediatric age group or less than 18 years of age. Although the full spectrum of clinical manifestations of COVID-19 is diverse and non-specific, patients exhibiting signs of fever, cough, dyspnea, loss or change in the sense of smell and/or taste, sore throat, and flu-like symptoms were suspected of having contracted the virus. Two diagnostic tests were conducted to confirm positive cases; radiological and PCR tests. On a chest CT scan, the radiologically found airspace opacities, commonly known as ground glass opacifications, were considered highly suggestive of COVID infection with the distribution of the opacities mostly bilateral peripheral and predominant in the lower zone. Other radiographic changes with the highest discriminatory value include crazy paving appearance, broncho-vascular thickening, and traction bronchiectasis. The real-time reverse transcriptase-polymerase chain reaction was considered a standard gold test in diagnosing COVID infection. A total of 244 patients were enrolled for this study, and the sample size was calculated with an online calculator (calculator.net) with a confidence interval of 95% and an incidence of 20%.

All the data was entered in SPSS version 20, and Statistical tests were conducted. Quantitative variables of each complication were analyzed using their mean and standard deviations. Frequencies and percentages were expressed for qualitative variables of each complication, such as gender, ARDS, AKI, and primary diagnosis. Stratification was done regarding age, gender, and primary diagnosis to determine the effect of these modifiers on the outcome variables (COVID-19 complications). Continuous data were tested for normality using the Shapiro Wilk normality test; Age was normally distributed, and length of stay was not normally distributed. Unpaired Student t-test (The non-parametric Wilcoxon rank-sum test (Mann–Whitney U-test) test was used where necessary) and chi-square tests were used to compare continuous and nominal data, respectively. Statistical significance was set at a P-value of ≤ 0.05, and where necessary, Bonferroni's correction was used to adjust for multiple comparisons with a corrected P-value (P′) of <0.05. All statistical analyses were performed using STATA/IC for Mac v16.1 (StataCorp LP, Texas, USA).

3. Results

A total of 244 patients were included in this study, with 167 males (68.4%) and 77 females (31.6%) and a mean age of 58.1 (± 2.14) years. COVID-19 PCR test was positive in 199 (81.5%) and negative in 45 (18.5%) patients. Table 1 shows the patients' baseline characteristics, complications, and outcomes. Acute respiratory distress syndrome (ARDS) is the most common complication encountered in our study. Out of 244 patients, 126 (51.6%) had ARDS. 33 (13.5%) out of 244 patients needed invasive mechanical ventilatory support, whereas 51 (20.8%) needed NIV for hypoxemia. Acute liver injury was the second most common complication (119 patients or 58.9%), followed by acute kidney injury (57 patients or 24.4%).

Table 1 Baseline, clinical characteristics, complications, and patients' outcomes

Characteristics, N=244	**n (%)**
Baseline and clinical characteristics	
Age, mean (SD)	58.1(2,14)
Gender, male	167(68.44)
Comorbidities	
Hypertension	125(51.23)
Diabetic mellitus	108(44.26)
Ischemic heart disease	29(11.89)
Malignancy	5(2.05)
chronic liver disease	4(1.64)
Other	8(3.28)
None	67(27.46)
Ventilatory support, n=244	
BIPAP/CPAP	47(19.26)
HFNC	4(1.63)
Invasive mechanical ventilation	33(13.52)

No	160(65.57)
Tracheal cultures, n=30	
Positive	25(83.33)
Negative	5(16.67)
Urine cultures, n=55	
Positive	17(30.91)
Negative	38(69.09)
Blood cultures, n=59	
Positive	6(10.17)
Negative	53(89.83)
COVID-19 complications	
ARDS, n=244	
Mild	40(16.39)
Moderate	48(19.67)
Severe	38(15.57)
No	118(48.36)
Pulmonary Embolism, n=60	
Yes	11(18.33)
No	49(81.67)
Pneumothorax, n=231	
Yes	4(1.73)
No	227(98.27)
Arrhythmia, n=244	
A. fibrillation	5(2.04)
SVT	1(0.41)
No	238(97.54)
Cardiomyopathy/Myocardial Infarction, n=216	
Yes	20(9.26)
No	196(90.74)
Stroke, n=71	
Yes	5(7.04)
No	66(92.96)
Pneumomediastinum, n=231	
Yes	6(2.60)
No	225(97.4o)
Shock requiring inotropic/vasopressor support, n=244	26(10.66)
Yes	218(89.34)
No	
Renal Impairment, n=233	57(24.46)
Yes	176(75.53)
No	
Liver Injury, n=202	119(58.91)
Yes	83(41.09)
No	
Vitamin D, n=108	33(30.56)
Sufficient	53(49.07)
Insufficient	22(20.37)
Deficient	
Lymphopenia, n=244	117(47.95)
Yes	127(52.05)
No	
Patients' Outcome	
Length of hospital stay in days	
Median (Q3, Q1)	1(2,1)
Hospital outcome	
Discharged	170(69.67)
Death	49(20.08)
Not recorded	25(10.25)

Table 2 shows the statistical association of the COVID-19 complications with the patients' outcomes. The outcome is only available for 219 patients as 25 people left the treatment course against medical advice. Patients who developed ARDS had a poor outcome as the mortality rate was 41.9% in the ARDS group compared to 0.01% in the non-ARDS group (p-value 0.001). Similarly, patients with developed cardiomyopathy, arrhythmias, shock, renal impairment, and lymphopenia also had poor outcomes (p-value 0.001). It also shows a significant statistical link with the ventilation support. Out of 126 (51.6%) patients who developed ARDS, 83 (65.8%) required invasive mechanical ventilation, and one patient (0.8%) had to undergo intubation and mechanical ventilator from the non-ARDS group. The need for mechanical ventilation was relatively higher in patients with developed cardiomyopathy, renal impairment, acute liver injury, and shock requiring vasopressor support (Table 2).

Table 2 Estimates of COVID-19 complications and statistical association with patients' outcome and ventilatory support

COVID-19 complications	**Hospital discharge n=219**		**P-value**	**Ventilation support n=244**		**P-value**
	Alive, n (%) n=170	Dead, n(%) n=49		Yes, n (%) n=84	No, n (%) n=160	
ARDS, n=244						0.001*
Yes	65(38.24)	47(95.92)	0.000*	83(98.81)	43(26.88)	
No	105(61.76)	2(4.08)		1(1.19)	117(73.12)	
Pulmonary Embolism, n=60						
Yes	5(13.51)	4(26.67)	1.000	8(27.59)	3(9.68)	1.000
No	32(86.49)	11(73.33)		21(72.41)	28(90.32)	
Pneumothorax, n=231						
Yes	1(0.63)	3(6.12)	0.420	4(5.00)	0(0.00)	
No	157(99.37)	46(93.88)		80(95.24)	147(100.0)	0.170
Arrhythmia, n=244						
Yes	1(0.59)	5(10.20)	0.020*	5(5.95)	1(0.63)	
No	169(99.41)	44(89.80)		79(94.05)	159(99.37)	0.190
Cardiomyopathy Myocardial Infarction, n=216						
Yes	2(1.37)	14(30.43)	0.000*	16(19.51)	4(2.99)	
No	144(98.63)	32(69.57)		66(80.49)	130(97.01)	
Stroke, n=71						
Yes	3(6.12)	2(14.29)	1.000	3(12.50)	2(4.26)	0.001*
No	46(93.88)	12(85.71)		21(87.50)	45(95.74)	
Pneumomediastinum, n=231						
Yes	2(1.27)	4(8.16)	0.290	5(5.95)	1(68.03)	

No	156(98.73)	45(91.84)		79(94.05)	146(99.32)	1.000
Shock requiring inotropic/vasopressor support, n=244						
Yes						
No	1(0.59)	24(48.98)	0.000*	26(30.95)	0(0.00)	0.250
Renal Impairment, n=233	169(99.41)	25(51.02)		58(69.05)	160(100.0)	
Yes						
No	15(9.38)	33(68.75)	0.000*	41(49.40)	16(10.67)	0.001*
Liver Injury, n=202	145(90.63)	15(31.25)		42(50.60)	134(89.33)	
Yes						
No	71(53.79)	36(75.00)	0.110	57(72.15)	62(50.41)	0.001*
Vitamin D, n=108	61()46.21	12(25.00)		22(27.85)	61(49.59)	
Sufficient						
Insufficient	23(28.75)	5(27.78)	0.941			0.020*
Deficient	39(48.75)	10(55.56)				
Lymphopenia, n=244	18(22.50)	3(16.67)				
Yes						
No	74(43.53)	29(56.18)	0.053			
	96(56.47)	20(40.82)				

* p' value = Bonferroni adjusted p value
Outcome is only available for 219 patients out of 244.

Our study established that mean age was higher in patients with each complication (Table 3). This was especially significant for cardiomyopathy (secondary to viral myocarditis or acute coronary syndrome) and acute renal impairment. The mean age of patients who developed cardiomyopathy was 66.1 (± 8.61) years, while the mean age of patients who developed acute renal impairment was found to be 64.0 (± 13.2) years. None of the other pulmonary or extrapulmonary complications had any association with age. No association was established between COVID-related complications and the patients' gender.

Table 3 Statistical estimates of complications and association with age and gender

COVID-19 complications	**Age in years,**	**P-value**	**Gender**		**P-value**
	Mean (SD)		**Male, n (%)**	**Female, n (%)**	
ARDS, n=244					
Yes	58.76(11.58)	0.168	92(55.09)	34(44.16)	0.112
No	54.31(17.00)		75(44.91)	43(55.84)	
Pulmonary Embolism, n=60					
Yes	60.18(7.11)	1.000	8(17.39)	3(21.43)	0.732
No	58.41(13.84)		38(82.61)	11(78.57)	
Pneumothorax, n=231					
Yes	63.0(12.52)	1.000	4(2.44)	67(100.0)	0.326
No	57.71(13.94)		160(97.56)	0(0)	
Arrhythmia, n=244					
Yes	62.17(4.62)	1.000	6(3.59)	0(0)	0.181
No	56.47(14.74)		161(96.41)	77(100.0)	
Cardiomyopathy					
Myocardial Infarction, n=216					
Yes	66.1(8.61)	0.050	13(8.67)	7(10.61)	0.651
No	57.04(14.01)		137(91.33)	59(89.39)	
Stroke, n=71					
Yes	65.4(8.0)	1.000	5(10.87)	0(0.0)	0.154
No	57.53(13.90)		41(89.13)	25(100.0)	
Pneumomediastinum, n=231					
Yes	47.67(17.56)	0.703	4(2.44)	2(2.99)	
No	58.08(13.74)		160(97.56)	65(97.01)	0.813
Shock requiring inotropic/vasopressor support, n=244					
Yes					
No	59.85(11.36)	1.000	19(12.84)	7(9.09)	0.591
	56.22(14.91)		148(87.16)	70(90.91)	
Renal Impairment, n=233					
Yes					
No	64.09(13.20)	0.000*	42(25.61)	15(21.74)	0.530
	55.32(13.62)		122(74.39)	54(78.26)	
Liver Injury, n=202					
Yes					
No	57.92(13.21)	1.000	87(62.14)	32(51.61)	0.161
	58.48(15.21)		53(37.86)	30(49.18)	

* *p'* value = Bonferroni adjusted *p* value

Table 4 Statistical link between the LOS with the complications

Characteristics	LOS in days, median (Q3-Q1)	P-value
ARDS		
Yes	2(3-1)	0.000*
No	1(2-1)	
Vitamin D		
Sufficient	2(2-1)	
Insufficient	1(2-1)	0.867
Deficient	2(2-1)	
N/A		
Lymphopenia		
Yes	2(2-1)	0.1843
No	1(2-1)	

However, the length of hospitalization was more in patients who developed ARDS than in the non-ARDS group (Table 4).

4. Discussion

SARS-CoV-2 is an enveloped, non-segmented, single-stranded, positive-sense RNA virus [14]-[15]. Angiotensin-converting enzyme 2 (ACE2) is a protein found on the surface of lung alveolar epithelial cells and enterocytes of the small intestine, which has been proposed as the entry site for SARS-CoV-2 [16]. ACE2 breaks down angiotensin II, a pro-inflammatory factor in the lung. Inhibition of ACE2 may be another factor in lung injury and the cause of the systemic inflammation with cytokine release that can result in acute respiratory distress syndrome (ARDS) and multi-organ dysfunction [17,18]. Disruption in immune system regulation increased metabolic demand, and pro-coagulant activity likely accounts for some of the increased risk of adverse outcomes in those with COVID-19 related cardiovascular disease (CVD) [19]-[20]. Specifically, systemic inflammation can destabilize vascular plaques, while viral illness increases cytokine activity, increasing cardiac demand, similar to influenza. Recent research, however, has suggested that the virus may also cause direct damage to the heart utilizing ACE2 receptors located within cardiac tissue [21].

Lungs are one of the most frequently involved organs in COVID-19 infection. Symptomatic patients have much more lung involvement compared to asymptomatic ones. According to one study, symptomatic patients of COVID-19 showed lung opacities and airway abnormalities more frequently than asymptomatic ones. Abnormal CT scan findings were revealed in 79% of all symptomatic patients. Furthermore, only 54% of the asymptomatic patients had lung opacities on CT scans. The CT severity score was also higher in the symptomatic patients than their asymptomatic counterparts [22]. Acute respiratory distress syndrome, the most sinister complication, can occur in case of severe lung attack [23]. This is quite comparable to our study, where ARDS was found the most common pulmonary complication of SARS-Cov-2 infection. In fact, severe ARDS was also associated with increased mortality as out of 112 patients who developed ARDS in our study, 41.9% died, whereas the mortality in the non-ARDS group was only 1.8%.

It is a well-established fact that SARS-CoV-2 is associated with thrombotic complications and hematologic manifestations. Biopsy specimens from infected patients have shown multiple fibrin thrombi within the pulmonary vasculature [24]. The incidence of thrombotic complications is high in patients with severe disease. Mortality due to these complications is very high. Multiple factors could lead to these complications like immobilization, inflammation, and hypoxia. It is important to prevent thrombotic events: arterial thrombosis, venous thrombosis, ischemic stroke, pulmonary embolism, myocardial infarction, and, in severe cases, disseminated intravascular coagulopathy. Both morbidity and mortality increase with their development and are associated with poor prognosis. D-dimers are elevated as well. Therefore, they should be regularly monitored in moderate to severe pneumonia. Klok et al. studied the frequency of thrombotic complications in three Dutch hospitals where 184 patients admitted in the intensive care unit were observed for their clinical course. It was established that pulmonary embolism was the most common thrombotic complication; patients who developed these complications were at a higher risk of death, and anticoagulation worked miraculously to decrease the overall mortality in such patients [23]. As quite evident from our study, thrombotic events like pulmonary embolism, myocardial infarction, and stroke occurred in 18.3%, 9.2%, and 7.0% of the cases, respectively. Similar results were reported in [8], where 30% of the admitted patients had venous thromboembolism.

As reported in the study conducted in Wuhan, China, 7% of the patients admitted to the hospital with COVID-19 pneumonia developed myocardial injury [1]. The results are comparable to our study, where 9% of the patients had elevated troponin levels or significant EKG changes, suggestive of the acute coronary syndrome. This pathology can be attributed to the systemic inflammatory response, leading to plaque disruption and myocardial infarction. The treatment modality for such events remains controversial as a percutaneous coronary intervention may be the treatment of choice for opening up blocked coronary

vessels. However, the pro-thrombotic state induced by the SARS-CoV-2 virus may increase the risk of stent thrombosis post-procedure. The rate of arrhythmias was much higher in their setting compared to ours, i.e., 17% of hospitalized patients in Wuhan had dysrhythmias compared to 2.4% in our study. Myocarditis was another significant cardiac complication that may be attributed to the direct cellular injury caused by the virus. In fact, a study suggested that 7% of the death in COVID infection were secondary to myocarditis [25]. Diagnosing myocarditis and differentiating it from acute coronary syndrome has become quite challenging for physicians and intensivists globally as EKG changes and echocardiography findings overlap in both diseases.

Acute kidney injury is yet another significant complication of COVID pneumonia, especially in patients admitted to the intensive care unit. One of the studies conducted at 13 Northwell hospitals concluded that 36.6% of the patients developed AKI, out of which 14.3% required renal replacement therapy [12]. Not surprisingly, most patients who developed acute kidney injury had severe ARDS and required mechanical ventilatory support. Moreover, 89.7% of the patients on mechanical ventilators developed AKI as compared to 21.7% of patients in the non-ventilated group. Most patients who required dialytic support also fell in the category of severe ARDS, needing ventilator support. The frequency was almost similar in our setup – 23.3% of the admitted patients had deranged renal parameters during hospitalization. Patients who developed renal injury early in the course of the disease were more likely to develop multi-organ dysfunction, and hemodynamic instability, culminating in high mortality, as seen in the study by Jamie et al. where the mortality was 35.0% in the AKI group, thus establishing that development of renal injury has a poor prognosis for COVID-19 patients.

The link between Vitamin D deficiency and the severity of COVID pneumonia still remains an enigma as several studies have studied the role of Vitamin D as an immunomodulatory hormone that has the potential to keep hyper-inflammatory responses at bay [26]. However, in our study, we could not establish a connection between vitamin D deficiency and poor outcome in COVID-19 patients as the outcome remained unaffected irrespective of the serum vitamin D levels.

Rod et al. conducted a review and assessed various studies to look for risk factors associated with poor prognosis in COVID-19 patients. It was found that increased age, high CRP and d-dimers, increasing values of sequential organ failure assessment (SOFA) score, diabetes mellitus, and low albumin were risk factors that highly contributed to the severity of the disease. Risk factors with medium consistency included high WBC count, procalcitonin, cardiac troponins, lactate dehydrogenase, serum ferritin, interleukin-6 levels, and CURB-65 score and lymphopenia [27]. In our study, 44.26% population had diabetes mellitus, and lymphopenia was present in 47.9% of the patients. However, we could not establish an association between lymphopenia and increased mortality. Therefore, more studies are needed to elucidate a clear-cut association of vitamin D and lymphopenia with the severity of the disease and its effect on morbidity and mortality.

5. Conclusion and Limitations

Although the COVID 19 virus was only discovered in December of this year, it has already spread across continents, posing a catastrophic threat to healthcare systems and global economies during the acute phase of the disease. Although some fundamental conclusions can be made based on clinical knowledge obtained from the residual long-term effects of the SARS and MERS outbreaks, the long-term ramifications of Covid19 infection on morbidity and death are still unknown. We can expect a significantly greater spike in cardio-pulmonary dysfunction and neuropsychiatric sequela in survivors of this extremely pathogenic new coronavirus since the extent of the Covid-19 pandemic is unprecedented. The knowledge gathered from the long-term effects of related HuCoV viruses in physical and psychological domains could be used as a checklist when planning COVID19 survivors' rehabilitation. Early signs of the pandemic imply that those with numerous metabolic co-morbidities, such as obesity, hypertension, and diabetes, are more likely to die. This emphasizes the necessity of adopting lifestyle changes such as frequent exercise and a healthier diet at the individual, family, and social levels to reduce the impact of pandemics in the future.

The pandemic that began in early 2020 with SARS-CoV-2 has taken a toll on people's mental and physical health globally, and it would not be wrong to label it as a menace of this decade. In an attempt to reduce the morbidity and mortality from this highly contagious disease, global healthcare resources came together to provide supportive care for the affected population. With this study, we were able to shed light on some of the most common complications encountered in COVID-19 patients and how they can affect the overall outcome and mortality. The long-term sequelae of this infection are greatly concerning, and anticipating them in advance may help provide better healthcare facilities and save lives down the road. The complications like ARDS, cardiomyopathy, renal impairment, and shock not only were the most encountered in our study, but they also showed poor outcomes in terms of morbidity and mortality. Considering the devastating global impact of this pandemic, it is important to know the multi-organ involvement this condition can have along with the debilitating outcome. Low income and limited

resources of countries' healthcare facilities can be upgraded to provide better care save lives.

The research drawbacks include the lack of information on the history of symptoms prior to acute COVID-19 disease and the lack of information on the severity of symptoms. Information regarding the symptoms and laboratory investigations was only obtained at the time of presentation in the hospital. In addition, this is a single-center study with a relatively small number of patients and, for other reasons, with no control group of patients discharged. Researchers have concentrated on the acute phase of COVID-19, but continued monitoring for long-lasting effects after discharge is important. Thus, follow-up studies are required to evaluate the series of signs, symptoms, laboratory investigations, and outcomes of the current pandemic.

Ethical Approval

IRB: Ethical approval was taken from the institutional approval from the Ethical review committee (Reference code: 2450820MAPUL, Dated: September 10, 2020).

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