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RESEARCH ARTICLE
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CAUSES OF MORTALITY IN HOSPITALIZED PCR POSITIVE PATIENTS OF COVID 19 IN TERTIARY CARE HOSPITAL

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Abstract:
Objectives: To evaluate the causes of mortality in hospitalized PCR positive patients of Covid 19 in tertiary care hospital.
Materials and Methods: This retrospective observational study was conducted at Peshawar Medical College, Pakistan in the duration from November, 2023 to April, 2024. with ethical committee approval. We reviewed hospital records of 106 patients to collect demographic data, comorbidities, COVID-19 severity, treatment protocols, and causes of death. SPSS Version 25 was used for statistical analysis.
Results: We enrolled 106 patients with a mean age of 60.94 years. Among them, 43.4% were male and 56.6% were female. The majority were over 60 years old. Of the total, 77.4% survived while 22.6% died. ARDS and pneumonia were the most common causes of death, each accounting for 23.6% of cases. Sepsis caused 12.3% of deaths, cardiac arrest 4.7%, chronic pulmonary disease 6.6%, hypertension 17.9%, and diabetes mellitus 11.3%. The differences in ARDS, sepsis, cardiac arrest, pneumonia, chronic pulmonary disease, hypertension, and diabetes between deceased and surviving patients were not statistically significant.
Conclusion: It was concluded that ARDS and pneumonia were the main causes of mortality, each significantly affecting the death rate. Sepsis, cardiac arrest, and comorbidities like chronic pulmonary disease, hypertension, and diabetes also critically influenced patient outcomes. These findings underscore the need for effective management of respiratory complications and sepsis to improve survival. They also highlight the importance of monitoring and treating comorbidities to mitigate their impact on COVID-19 severity and mortality.

Key words: Covid 19, ARDS, mortality.

INTRODUCTION:

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) originated in Wuhan, China, at the end of 2019 and has since spread rapidly across the globe, resulting in the COVID-19 pandemic. To date, the virus has impacted over 450 million people and resulted in more than 6 million deaths

globally. It has caused substantial morbidity, mortality, and economic disruptions worldwide.(1) This infectious disease has led to widespread illness and death, particularly among hospitalized patients with severe cases. Understanding the specific causes of mortality in these patients is crucial for improving clinical outcomes and guiding effective treatment strategies. Hospitalized patients with COVID-19 often present with a range of complications that can contribute to mortality. Among these, respiratory distress, sepsis, and cardiovascular complications are frequently observed. Identifying the predominant causes of death can help in developing targeted interventions and refining treatment protocols to enhance patient survival. Studies have indicated that hospitalized COVID-19 patients with acute illness often have higher rates of hypertension, diabetes, and ischemic heart disease, with increased mortality observed in those with pre-existing cardiovascular conditions.(2) Various case reports and small studies have documented heart failure, myocarditis, acute myocardial injury, and atrial fibrillation linked to COVID-19; however, their prevalence in the broader COVID-19 population remains unclear.(3-5) A small study from a single center found a 19% incidence of cardiac injury among COVID-19 patients, which was associated with higher mortality, though the study did not specify the exact nature of the cardiac complications.(6)

Global research has thoroughly explored the causes of mortality in COVID-19 patients, localized studies are essential for understanding how these factors affect different regions. Pakistan has faced significant challenges from the COVID-19 pandemic, and this study seeks to offer insights specific to the Pakistani population, addressing the unique issues encountered by its healthcare system. By identifying the main causes of death among hospitalized COVID-19 patients, this research can guide resource allocation and enhance the management of critically ill patients, helping prioritize medical resources like ventilatory support in a context of limited healthcare resources.

Objective:

To evaluate the causes of mortality in hospitalized PCR positive patients of Covid 19 in tertiary care hospital.

MATERIALS AND METHODS:

Study Design: Retrospective observational study.

Study setting: at Peshawar Medical College, Pakistan in the duration from November, 2023 to April, 2024.

Inclusion Criteria:

- Patients who tested positive for COVID-19 via PCR.
- Patients admitted to the hospital during the study period.
- Patients of both gender of age ranging from 20 years to 70 years.

Exclusion Criteria:

- Patients with incomplete medical records.

Methods:

This prospective observational study took place at Peshawar Medical College, Pakistan in the duration from November, 2023 to April, 2024, with the following approval of the hospital's ethical committee. Data of 106 patients were collected from the hospital records. The electronic health records were examined to gather information on patient demographics, such as age and sex, as well as comorbidities including conditions like diabetes and hypertension. The severity of COVID-19 for each patient was assessed and categorized into mild, moderate, severe, or critical. Treatment protocols administered, including medications and Ventilatory support, were reviewed. Additionally, the cause of death was documented as recorded in the medical records. For statistical analysis we used SPSS Version 25.

RESULTS:

We have enrolled a total of 106 patients with mean age of 60.94± 9.69 years (Table 1). Out of the total, 46(43.4%) individuals were male, while 60(56.6%) were female. When examining age groups, it was found that only 3((2.8%) individuals were under 40 years old. A larger portion, 43(40.6%) individuals, fell within the 41-60 age range, and the majority, 60(56.6%) individuals were over 60 years old. Regarding mortality, 82 individuals (77.4%) were reported as alive, whereas 24 individuals (22.6%) had passed away (Table 2). The data on mortality causes shows that Acute Respiratory Distress Syndrome (ARDS) and pneumonia were the most common, each accounting for 25 cases (23.6%). Sepsis was linked to 13 deaths (12.3%), while cardiac arrest was responsible for 5 cases (4.7%). Chronic pulmonary disease was observed in 7 cases (6.6%), and hypertension was a contributing factor in 19 cases (17.9%). Additionally, diabetes mellitus (DM) was identified as a cause in 12 cases (11.3%) (Table 3). For Acute Respiratory Distress Syndrome (ARDS), 4 out of 24 patients who died (16.7%) and 21 out of 82 patients who survived (25.6%) were affected, with a p-value of 0.48, indicating no significant difference between the two groups. Sepsis was present in 5 deceased patients (20.8%) and 8 surviving patients (9.8%). Cardiac arrest occurred in 2 deceased patients (8.3%) and 3 survivors (3.7%). Pneumonia was found in 6 deceased patients (25.0%) and 19 survivors (23.2%). Chronic pulmonary disease was not observed in any of the deceased patients (0.0%), but it was present in 7 surviving patients (8.5%). Hypertension affected 4 deceased patients (16.7%) and 15 survivors (18.3%). Lastly, diabetes mellitus (DM) was noted in 3 deceased patients (12.5%) and 9 surviving patients (11.0%). The total number of patients in each group was 24 (100.0%) for those who died and 82 (100.0%) for those who survived (Table 4).

Table 1: Mean age of all enrolled Patient *(n=106)*

Variables	**Mean±SD**
Age (Years)	60.94± 9.69

Table 2: Distribution of patients on the basis of gender and Age groups *(n=106)*

Gender	Frequency	Percentage
Male	46	43.4
Female	60	56.6
Age groups		
<40 years	3	2.8
41-60 years	43	40.6
>60 years	60	56.6
Mortality		
Live	82	77.4
Death	24	22.6

Table 3: Distribution of infants on the basis of gender and departments (*n=313)*

Causes	**Frequency**	**Percentage**
ARDS	25	23.6
Sepsis	13	12.3
Cardiac Arrest	5	4.7
Pneumonia	25	23.6
Chronic pulmonary disease	7	6.6
Hypertension	19	17.9
DM	12	11.3

Table 4: Distribution of patients according to causes of mortality *(n=106)*

Causes	Patients		P-value
	Death	Live	
ARDS	4(16.7%)	21(25.6%)	
Sepsis	5(20.8%)	8(9.8%)	
Cardiac Arrest	2(8.3%)	3(3.7%)	
Pneumonia	6(25.0%)	19(23.2%)	0.48
Chronic pulmonary disease	0(0.0%)	7(8.5%)	
Hypertension	4(16.7%)	15(18.3%)	
DM	3(12.5%)	9(11.0%)	
Total	24(100.0%)	82(100.0%)	

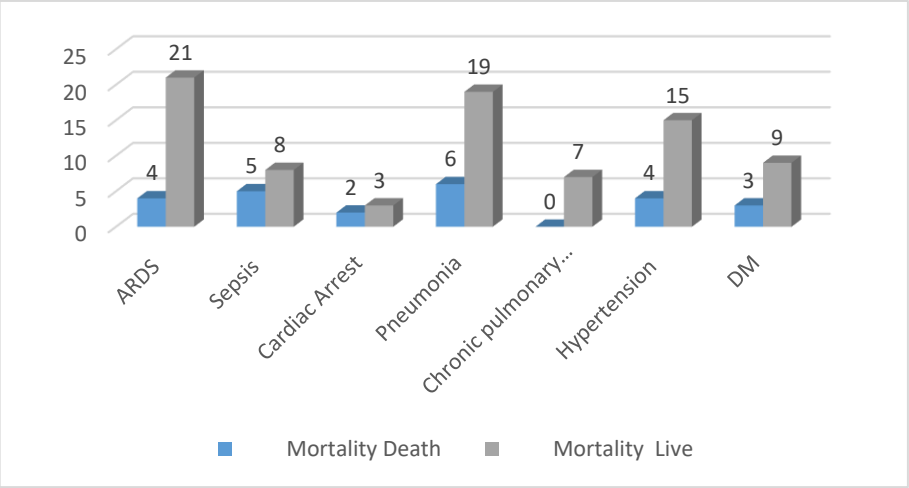

Fig 1:

Discussion: COVID-19 pandemic continues to challenge healthcare systems worldwide, understanding the underlying causes of mortality in hospitalized patients is essential for improving clinical outcomes and guiding treatment strategies. (7) This retrospective observational study included analysis of 106 patients hospitalized with COVID-19 infection to identify the causes associated with mortality. In the present study the overall mortality rate was 22.6%, with 24 out of 106 patients succumbing to the infection. Our study was supported by a cohort study reported a case fatality rate of 21%.(8) Another study, involving stated a higher case fatality rate of 29.7%.(9) In the present study, the causes of mortality among hospitalized COVID-19 patients indicate that Acute Respiratory Distress Syndrome (ARDS) and pneumonia were the most prevalent causes of death, each accounting for 25 cases (23.6%). This finding is consistent with existing literature, which highlights respiratory complications as major contributors to mortality in severe COVID-19 cases. ARDS was identified in 10.8% of all deaths related to COVID-19, with prevalence rates varying between 8.2% and 16.1%.(10) In 2020, COVID-19 was documented in 81.3% of deaths attributed to ARDS.(10) It is still estimated that ARDS occurs in 75% of ICU patients with COVID-19 and affects 90% of those who do not survive in the ICU.(7) In our study Sepsis, was responsible for 13 deaths (12.3%), also emerged as a notable cause of mortality. This finding is consistent with other studies highlighting sepsis as a severe complication in COVID-19 patients, often resulting from or exacerbated by the systemic inflammatory response triggered by the virus. The Instituto Latino Americano de Sepse (ILAS) defines sepsis as "a life-threatening organ dysfunction resulting from a dysregulated host response to infection".(11) According to the SPREAD study (12) conducted by ILAS, 30% of ICU beds in Brazil were occupied by patients with sepsis or septic shock, with a mortality rate of 55% among these

patients. Research has highlighted that multiple organ dysfunction, sepsis, and septic shock are major causes of death in COVID-19 patients.(13, 14) Cardiac arrest, which caused 5 deaths (4.7%), further reflects the impact of COVID-19 on cardiovascular health. The association between COVID-19 and increased risk of cardiac complications has been documented in various studies, indicating that the virus can significantly strain the cardiovascular system, leading to severe outcomes.(15) A study by J. Pillarisetti et al.(16) found that cardiac complications occurred in 9.3% of COVID-19 patients, with a mortality rate of 20% among those who experienced cardiac events. Interestingly, the study revealed that chronic pulmonary disease was more common among survivors, whereas it was not present in any of the deceased patients. This result may require further investigation to determine the protective factors or treatment differences that could account for this observation.

Conclusion: It was concluded that Acute Respiratory Distress Syndrome (ARDS) and pneumonia were the predominant causes of mortality, each significantly contributing to the overall death rate. Sepsis, cardiac arrest, and comorbid conditions such as chronic pulmonary disease, hypertension, and diabetes mellitus also had critical impacts on patient outcomes. The findings highlight the urgent need to address respiratory complications and manage sepsis effectively to enhance patient survival. Additionally, the study points to the importance of closely monitoring and treating patients with pre-existing comorbidities to reduce their influence on the severity and mortality of COVID-19. Notably, the fact that chronic pulmonary disease was more common among survivors and absent in deceased patients suggests possible protective factors or differences in treatment that merit further investigation.

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