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ORIGINAL ARTICLE

Factors Linked With an Increased Risk of Death in Patients with Covid-19

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ABSTRACT

Objective: The purpose of this study was to determine the factors that increase a patient's chances of death from COVID-19.
Study Design: Retrospective study
Place and Duration: Medicine department of Benazir Bhutto Hospital (BBH) and Holy Family Hospital (HFH), Rawalpindi during the period from November 2021 to April 2022.
Methods: Total 142 patients of both genders of confirmed coronavirus disease were included. After receiving informed written consent from each participant, detailed demographic information was obtained. This information included the participant's age, gender, body mass index, and list of co-morbidities. Frequency of mortality and factors that increase a patient's chances of death were recorded. SPSS 24.0 was used to analyze all data.
Results: We found that 87 (61.3%) cases were males and 55 (38.7%) patients were females. Majority of the patients 53 (37.3%) had age >45 years. 65 (45.8%) patients were smokers. Severity of disease was found in 76 (53.5%) cases. There were 95 (66.9%) patients had hypertension, diabetes mellitus found in 75 (52.8%) cases, cardiovascular disease in 48 (33.8%) cases, pulmonary disease in 40 (28.2%) cases and chronic kidney disease in 34 (23.9%) cases. Among 142 patients, 27 (19.01%) patients were died. Among non-survivals, kidney dysfunction was the most common reason found in 17 cases, followed by cardiovascular and diabetes mellitus.
Conclusion: We came to the conclusion that clinical risk factors for a fatal consequences associated with coronavirus include chronic chronic conditions, complications, and demographic variables. These risk factors include acute renal injury, diabetes, hypertension, heart disease, male sex, older age, current smoker, and obesity. The findings might be used to future study on the disease as well as its control and prevention.
Keywords: Coronavirus, Comorbidities, Mortality, Severity

INTRODUCTION

The 2019 new coronavirus (2019-nCoV) illness (COVID-19), also known as Acute Respiratory Syndrome (SARS-CoV-2), is an extremely infectious viral infection [1]. More than 340 million people have been infected, and 5 million have died as a result [2]. In particular, nearly a million people died prematurely in 2020 [3] in more than a hundred different nations. To add insult to injury, a subsequent research indicated that COVID-19 was responsible for an additional 375,235 fatalities [4]. As a result, even those who manage to avoid succumbing to COVID-19's immediate dangers may experience serious, long-term clinical implications, such as heart and lung problems and even death in the future [5].

This evolving epidemic has necessitated the immediate extension of public health measures to better comprehend its epidemiology and determine its consequences [6]. Determining the effects of COVID-19 necessitates elucidating the range of its clinical severity, which includes the identification of possible risk factors of severe illness or mortality [6]. Since its discovery, various epidemiological studies have been carried out, with results demonstrating a correlation between demographic parameters, previous conditions, and the severity of COVID-19 and subsequent mortality [7].

Since COVID-19 is so difficult to spread and there is no effective therapy, it poses a significant threat all over the world [8]. Because of factors such as widespread illiteracy, a very inadequate health care system, and a lack of intensive care units, it will have an even more devastating effect on medium and low-income nations. Clinical features of COVID-19 patients with critical illness [9] or severe sickness [10] have been documented in a number of investigations. The goal of analysing clinical characteristics and risk factors is to pinpoint those that are most strongly linked to catastrophic outcomes. Unfortunately, our knowledge of the risk factors for mortality in patients with COVID-19 is still limited despite the efforts of scientists to understand better the diagnostic and clinical aspects of the illness. As a result, it's conceivable that not all potential risk variables would be investigated thoroughly. Variation in the quantity and kind of potential risk variables is present among studies. Hypertension, diabetes, COPD, dyspnea, drug abuse, gender, age, smoking, albumin, and D-dimer were among the most frequently cited risk variables that we investigated [11].

Risk factors for death due to COVID-19 have been studied extensively [12]. Patients with elderly, male sex, tachypnea, hypoxia, poor renal function, increased troponin, and raised D-dimer values were more likely to die from COVID-19, according to a retrospective cohort research done in New York City, USA. Studying 1,096 patients admitted to a single facility, a comparable retrospective cohort research in Kuwait found that patients older than 50, smokers, those with asthma, those with a high rapid Sequential Organ Failure Assessment score, and those with increased levels of inflammatory markers [13].

While most people infected with COVID-19 only have mild flu-like symptoms, a sizable minority develop pneumonia that can progress to acute respiratory distress (ARDS), requiring hospitalisation in critical care units. Mortality among hospitalised patients can approach 50%, and it can be considerably greater in the elderly, those with several medical conditions, and those with a low oxygen saturation (SaO2) upon admission [14]. C-reactive proteins (CRP), creatine kinase, lactate dehydrogenase (LDH), and platelets are only few of the laboratory indicators that may indicate a substantial clinical worsening in these individuals [15]. But mortality indicators vary greatly from one nation to the next. The most widely utilised medications during the first year of the pandemic were ivermectin, azithromycin, and hydroxychloroquine, all of which need to be addressed in relation to the results of many repurposed therapies for COVID administered in hospitals.

In order to be ready for the COVID-19 pandemic, it is essential to have a firm grasp of hospital epidemiology, taking into account the unique features of the community and the healthcare system as a whole. Understanding mortality risk variables helps improve patient triage and care, making the most of public hospitals' limited resources.

The purpose of this research is to consolidate and improve our knowledge of the precise impact of risk variables on the COVID-19 mortality rate.

MATERIAL AND METHODS

This retrospective study was conducted at the department of Medicine, Benazir Bhutto Hospital (BBH) and Holy Family Hospital (HFH), Rawalpindi during the period from November 2021 to April 2022.

The study comprised of 142 patients. After receiving informed written consent from each participant, detailed demographic information was obtained. This information included the participant's age, gender, body mass index, and list of co-morbidities. Patients <18 years of age, pregnant females, accidentals cases and those did not provide any written consent were excluded.

Patients with a positive COVID-19 test ranged in age from 18 to 85 years old, and in the beginning of the pandemic, there were asymptomatic and moderate cases. Based on the positive findings of polymerase chain reaction (PCR) tests conducted on each referred patient at the hospital, a cohort of COVID-19 patients was isolated from the inpatients' electronic medical records and identified. The computerized hospital records were searched to discover the patients' structured clinical data, which included vital signs, radiological findings, comorbidities, and hospitalization course and outcomes. The data also included the subjects' ages, genders, whether or not they smoked, heights, weights, and the results of several laboratory tests. The body mass index (BMI) was determined using the formula BMI = weight (kg)/height2 (m2), and individuals were classified according to the criteria established by the World Health Organization (WHO). Patients were classified as being underweight if their body mass index (BMI) was less than 18.0 kg/m2, as being of normal weight if it was between 18.5 and 24.9 kg/m2, as being overweight if it was between 25.0 and 29.9 kg/m2, and as obese if it was equal to or greater than 30.0 kg/m2. Comorbidities were determined based on associated International Classification of Diseases (ICD) codes, and laboratory findings were interpreted based on the reference values of the hospital laboratory. The severity of the patient's condition as assessed upon admission was categorized in accordance with the Clinical Spectrum of SARS-CoV-2 Infection published by the National Institutes of Health (NIH). Patients who had a positive test result but no symptoms were categorized as "asymptomatic," whereas patients who had any of the signs and symptoms of COVID-19 but did not have shortness of breath, dyspnea, or abnormal chest imaging were categorized as having "moderate sickness." Individuals were considered to have "moderate sickness" if they displayed signs of lower respiratory disease during clinical evaluation or imaging and had an oxygen saturation (SpO2) of less than 94% when measured in room air at sea level. Patients were considered to have "severe illness" if they had a SpO2 that was lower than 94%, a ratio of arterial partial pressure of oxygen to fraction of inspired oxygen (PaO2/FiO2) that was lower than 300 mm Hg, a respiratory rate that was higher than 30 breaths per minute, or lung infiltrates that were higher than 50%. Patients were considered "critically sick" if they had respiratory failure, septic shock, or multiple organ dysfunction in addition to other symptoms.

A one-hot encoding method, which converts categorical variables into binary vectors, was applied to each and every one of the categorical data sets. The proportion of inpatients diagnosed with COVID-19 was broken down by age group, gender, and clinical features, and summary tables were generated to analyse the data. In order to examine the statistical significance of the variations in frequency between the categorical categories, the death rates associated with each attribute were subjected to a series of 2 tests. SPSS 24.0 was used to analyze all data.

RESULTS

We found that 87 (61.3%) cases were males and 55 (38.7%) patients were females.(figure 1)

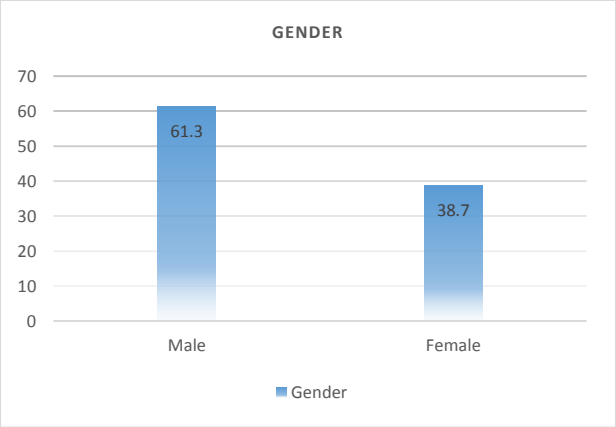

Figure-1: Presented patients with gender distribution

Majority of the patients 53 (37.3%) had age >45 years. 65 (45.8%) patients were smokers. Severity of disease was found in 76 (53.5%) cases. Fever, cough, flu and headache were the most common symptoms found among all cases.(table 1)

Table-1: Information specific to each and every instance

Variables	Frequency	Percentage
Age		
18-30 years	41	28.9
31-45 years	48	33.8
>45 years	53	37.3
Smokers		
Yes	65	45.8
No	77	54.2
Severity Of Covid-19		
Yes	76	53.5
No	66	46.5
Symptoms		
Fever	50	35.2
Cough	45	31.7
Flu	30	21.1
Headache	17	11.97

There were 95 (66.9%) patients had hypertension, diabetes mellitus found in 75 (52.8%) cases, cardiovascular disease in 48 (33.8%) cases, pulmonary disease in 40 (28.2%) cases and chronic kidney disease in 34 (23.9%) cases.(table 2)

Table-2: Prevalence of comorbidities among all cases

Comorbidities	Frequency	Percentage
Hypertension		
Yes	95	66.9
No	47	33.1
Diabetes Mellitus		
Yes	75	52.8
No	67	47.2
Cardiovascular disease		
Yes	48	33.8
No	94	66.2
Pulmonary disease		
Yes	40	28.2
No	102	71.8
Chronic kidney disease		
Yes	34	23.9
No	108	76.1

We found that 27 (19.01%) patients were died. Among non-survivals, kidney dysfunction was the most common reason found in 17 cases, followed by cardiovascular disease and diabetes mellitus.(table 3)

Table-3: Frequency of mortality and associated risk factors of increase in deaths

Variables	Frequency	Percentage
Mortality		
Yes	27	19.01
No	115	80.9
Associated Risk Factors of Mortality		
kidney dysfunction	17	11.97
cardiovascular disease	4	2.8
diabetes mellitus	4	2.8
Pulmonary Disease	2	1.4

Among 27 cases of mortality, 20 (74.1%) had age 41-85 years and 7 (35.9%) cases had age 25-40 years.(table 4)

Table-4: Age distribution among died cases

Variables	Frequency	Percentage
Age		
25-40 years	20	74.1
41-85 years	7	35.9

DISCUSSION

COVID-19 creates a one-of-a-kind challenge to health care systems throughout the world as a result of its convoluted patterns of transmission, our limited understanding of the risk factors that are related with mortality, and the absence of effective therapeutics. This study analyzed the demographic and clinical characteristics, treatment practices, and risk factors connected with death in patients with confirmed cases of COVID-19. The patients in this study were selected from throughout the country and represented a large sample size.

In current study 142 patients were presented. 87 (61.3%) cases were males and 55 (38.7%) patients were females. Majority of the patients 53 (37.3%) had age >45 years. 65 (45.8%) patients were smokers. Severity of disease was found in 76 (53.5%) cases. Fever, cough, flu and headache were the most common symptoms found among all cases. Results were comparable to the previous studies.[16,17] There is a correlation between increasing population densities and an increase in the number of contacts in social distance [18], which is associated with an increase in the risk of death due to COVID-19. On the other hand, a larger number of inhabitants living in rural regions in both counties with a low prevalence rate and counties with a medium prevalence rate may result in a lower death rate. In current study 19.01% patients were died which were in line with the previous study.[19]

There is an adjusted OR=2.57 between the presence of two or more comorbidities and admission to the intensive care unit (ICU) or death. As the Chinese national study shows, comorbidities are important to think about when determining a patient's risk level for COVID-19. [20] Despite the lack of an association between worse outcomes and first symptoms and vital signs, it is critical to not just depend on the initial clinical manifestations in forecasting outcomes for COVID-19 individuals. The illness may have an unexpected course. In our study, 95 (66.9%) patients had hypertension, diabetes mellitus found in 75 (52.8%) cases, cardiovascular disease in 48 (33.8%) cases, pulmonary disease in 40 (28.2%) cases and chronic kidney disease in 34 (23.9%) cases.[18-20] Among 27 cases of mortality, 20 (74.1%) had age 41-85 years and 7 (35.9%) cases had age 25-40 years.

One possible explanation for the rise in older mortality is the widespread presence of several health problems [21]. While the danger is reduced for healthy senior COVID-19 patients, a research using data from the UK Biobank found that they nevertheless face an elevated risk of mortality on their own [22]. This would imply that additional age-related variables, such as a reduced reserve capacity of essential organs or weakened immunological defences [23], have a role in COVID-19 mortality. Our findings did not accord with those of other research [24] that found a higher death rate among male COVID-19 patients. Most of these investigations, nevertheless, were conducted in the very early stages of COVID-19; they relied on records that, due to urgency, may have been incomplete; and they employed uncorrected risk estimates [25]. Conversely, COVID-19 cases and fatalities among women may have been underreported because to societal norms that dictate they have less access to healthcare [26]. Since men and women are equally at risk of dying from COVID-19 in severe instances [27], it is important to learn more about gender differences to eliminate any potential for discrimination in treatment.

CONCLUSION

We came to the conclusion that clinical risk factors for a fatal consequences associated with coronavirus include chronic chronic conditions, complications, and demographic variables. These risk factors include acute renal injury, diabetes, hypertension, heart disease, male sex, older age, current smoker, and obesity. The findings might be used to future study on the disease as well as its control and prevention.

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