

# Epidemiological trends of COVID-19 in Tertiary Care Hospitals of Rawalpindi, Pakistan



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## Abstract

**Background:** The goal of the study was to describe patient characteristics of a group of Pakistani population affected by COVID-19. Efforts have been made to identify the patient characteristics which increase the risk of infection. Many of these are useful in predicting the severity and prognosis of the disease.

**Methods:** A descriptive study was carried out at COVID-19 medical facility at the onset of lockdown in Rawalpindi in Pakistan from March to June 2020. Individuals who tested positive for COVID-19 using the reverse transcriptase polymerase chain reaction test were primarily enrolled in the study. A link was shared of an online google form for collecting data. Data was compiled on Google forms which was transferred into SPSS version 24 for descriptive data analysis.

**Results:** The study included 566 subjects; 469 (82.9%) recovered while 97 (17.1%) died. Majority of them were male, belonged to the age group of 31 – 45 years. The most common comorbid condition in the study population was hypertension 222 (39.2%). The most common symptoms patients presented with were dry cough (64%) followed by difficulty in breathing (48.2%).

**Conclusion:** The study has highlighted age, gender and comorbidities as the characteristics which affected the outcome. This would be helpful in planning treatment for future.

**Keywords:** COVID-19, epidemiology, mortality, co-morbidities, Pakistan.

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## Introduction

The 21st century continues to introduce the world to newer levels of immediate, rapid, and uncontrollable spread of infectious diseases. From education to healthcare to technology to development and virtually in every field, everyone has experienced and continues to experience exponential growth and spread. While all this has been championed for, the December of 2019 completely revolutionized the world leaving people aghast at the potential of 'spread'.

COVID-19, coronavirus disease 2019, started off as pneumonia of unknown etiology affecting a cluster of people. While there have been numerous epidemics in this relatively young century, SARS (1), swine flu (2), MERS (3) Ebola (4) in addition to the wave of post-antibiotic era problems (5), this is the first of them to be declared a pandemic and a global health emergency (6). To date, the global number of cases has crossed 420 million with more than five million deaths while the international community grapples to counter it. In the face of such a calamity, the initial approach was to cater for the more severely affected population as is the case with any other disease.

However, before long, some of the hospitals and medical centers were forced to triage patients with a better prognosis over those who required greater care due to the huge burden of the disease (7), leaving the more vulnerable population to deal with the disease without hospital support.

Efforts have been made and continue to identify the patient characteristics which increase the risk of infection (8, 9). Many of these are useful in predicting the severity and prognosis of the disease. Different populations have made attempts in the hope of formulating an effective strategy. While the Pakistani medical community continues to lament the COVID-19 situation (10) and the increasing number of cases, quality data reporting and analysis are scarce.

The study aims to describe the patient characteristics of a group of Pakistani population affected by COVID-19 which in turn can be helpful to prevent the transmission of the virus in Pakistan.

## Methodology

A descriptive cross-sectional study was conducted during the initial 3 months of the COVID-19 lockdown in Pakistan; 22nd March to 30th June, 2020.

The research was carried out at two tertiary care hospitals which were converted into a COVID-19 medical facilities at the onset of this pandemic of Rawalpindi. The study was approved by the institutional review board (IRB) and ethics committee of District Headquarters Hospital and Rawalpindi Medical University (No. 2701/DHQ H/Rwp).

Individuals who tested positive for COVID-19 at these centers using the reverse transcriptase polymerase chain reaction (rt-PCR) test were admitted to these hospitals for isolation and thus were included in the study through purposive non probability sampling. Individuals who did not consent were excluded. Similarly, individuals who were hemodynamically unstable or were unable to understand the variables of data collection were excluded. Participants who had COVID-19 affected individuals in their family were used as avenues to recruit further participants through snow ball sampling. Out of a total of 750 COVID-19 patients tested positive at this facility, 566 were enrolled in the study. Participants submitted their responses through google forms. The questionnaire consisted of variables of demographic details along with co-morbidities, disease related information and its outcome.

This was then transferred into IBM SPSS version 24. After confirming the correctness of data entry, patient identifiers were removed in order to ensure confidentiality. Descriptive analysis was done to analyze the age, gender, occupation, symptoms, travel history, vaccination history for influenza and BCG, and eventual outcome. Case fatality rates were calculated for all demographic variables. Logistic regression was applied to determine the association of different factors with the outcome of disease, keeping p value <0.05.

## Results

A total of 566 people diagnosed with COVID-19 were included; out of these 469 (82.9%) recovered while 97 (17.1%) died. The number of individuals put on ventilator were 88 (15.5%) with the average number of days spent on ventilator  $7.7 \pm 5.1$  days. The mean age was  $49.1 \pm 18.3$  years and the median age was 49 years (6 – 95). Majority of the individuals belonged to the age group of 31 – 45 years. Figure 1 illustrates different age groups along with their outcome while figure 2 illustrates gender related outcome.

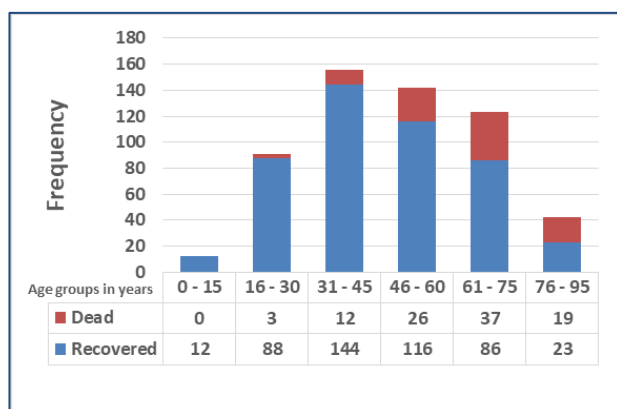


Figure 1. Frequency distribution of age groups in years in relation to the outcome in COVID-19 Infection.

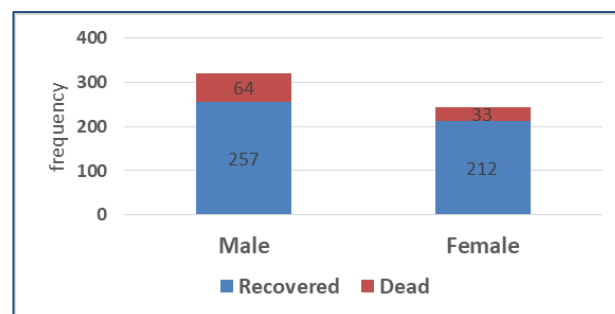


Figure 2: Frequency distribution of gender in relation to the outcome in COVID-19 Infection.

The majority of patients were male. One fifth of them were healthcare workers. An overwhelming 87.8 % of the patients had not traveled in the last four weeks before the onset of symptoms. Table 1 details the demographic characteristics of these patients.

Table 1: Demographic Characteristics of patients infected with COVID-19 (n=566) in relation to their outcome.

| Variables                    | Sub-groups | All cases   | Recovered   | Dead       | Case Fatality Rate (%) |
|------------------------------|------------|-------------|-------------|------------|------------------------|
| Overall                      | 566        |             | 469 (82.9%) | 97 (17.1%) | 17.1                   |
| Age Groups (Completed years) | 0 – 15     | 12 (2.1%)   | 12 (2.1%)   | 0          | -                      |
|                              | 16 – 30    | 91 (16.1%)  | 88 (15.5%)  | 3 (0.5%)   | 3.29                   |
|                              | 31 – 45    | 156 (27.6%) | 144 (25.4%) | 12 (2.1%)  | 7.69                   |
|                              | 46 – 60    | 142 (25.1%) | 116 (20.5%) | 26 (4.6%)  | 18.3                   |
|                              | 61 – 75    | 123 (21.7%) | 86 (15.2%)  | 37 (6.5%)  | 30.0                   |
|                              | 76 – 95    | 42 (7.4%)   | 23 (4.1%)   | 19 (3.4%)  | 45.2                   |
| Gender                       | Male       | 321 (56.7%) | 257 (54.7%) | 64 (65.9%) | 19.93                  |
|                              | Female     | 245 (43.3%) | 212 (45.2%) | 33 (34.0%) | 13.4                   |
| History of Traveling         | Yes        | 69 (12.2%)  | 65 (11.5%)  | 4 (0.7%)   | 0.05                   |
|                              | No         | 497 (87.8%) | 404 (71.4%) | 93 (16.4%) | 19.31                  |
| Contact with case of nCoV    | Yes        | 282 (49.8%) | 234 (41.3%) | 48 (8.5%)  | 17.02                  |
|                              | No         | 284 (50.2%) | 235 (41.5%) | 49 (8.7%)  | 17.25                  |
| Flu Vaccine                  | Yes        | 31 (5.5%)   | 29 (5.1%)   | 2 (0.4%)   | 6.45                   |
|                              | No         | 535 (94.5%) | 440 (77.7%) | 95 (16.7%) | 17.7                   |

Patients presented with dry cough most of the times (64%) followed by difficulty in breathing (48.2%). They were least likely to present with runny nose (8.3%) and diarrhea (9.4%). Forty-one (7.2%) patients were asymptomatic. Figure 3 describes the frequency of different symptoms.

A total of 343 (60.6%) of our patients had comorbid conditions; the most common were hypertension 222 (39.2%), diabetes mellitus 175 (30.9%), heart diseases 69 (12.2%), Asthma 26 (4.6%), Renal 21 (3.7%), Thyroid 12 (2.1%), Liver diseases 8 (1.4%), other diseases 84 (14.8%) respectively.

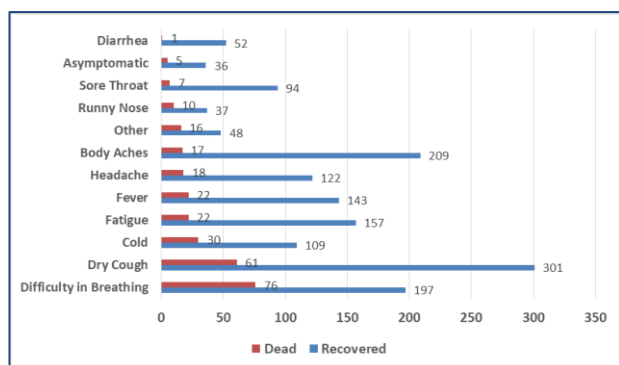


Figure 3: Frequency distribution of Symptoms in COVID-19 (n =566)

Logistic regression was applied to determine the association of different epidemiological factors related to mortality in COVID-19 patients with p value less than 0.05 considered as statistically significant. This showed male gender, presence of comorbidity (with particular emphasis on diabetes mellitus), belonging to a specific age group between 31 to 75 years significantly increased the odds of mortality as presented in Table 2. All these independent variables were statistically significant however the odds of association varied between 1.73 to 2.98.

Table 2: The effective epidemiological factors related to mortality in COVID-19 patients

| Variable                    | Odds ratio | Standard error | p-value | 95% Confidence Interval |
|-----------------------------|------------|----------------|---------|-------------------------|
| Male Gender                 | 1.73       | 0.271          | .041    | 1.023 – 2.956           |
| Comorbidity                 | 2.98       | 0.396          | .006    | 1.374 – 6.495           |
| Age groups (31 to 75 years) | 1.95       | 0.125          | .000    | 1.530 – 2.499           |

## Discussion

Global data shows consistent trends with regards to COVID-19 patients. Male gender, belonging to specific ethnic groups, increased age with particular emphasis on middle and later ages, and the presence of certain comorbidities, either in isolation or in combination, are all prominent factors implicated in the incidence of the COVID-19 infection and its mortality (11, 12). Other factors continue to be investigated, with some showing probable or little association while a few others continue to remain questionable.

In the current study the typical patients were men between the ages of 31 years and 60 years. They were unlikely to have travelled recently and were equally likely to have been exposed or not exposed to someone else diagnosed with COVID-19 infection. They were likely to complain of dry cough and shortness of breath. They had been administered the BCG vaccine but not the influenza vaccine. There was presence of at least one comorbid condition, with the likely condition being either hypertension, diabetes mellitus or a combination of both.

While different studies have indicated different rates of COVID-19 infection in multiple age groups, there is a general agreement that increasing age is associated with increased risk of severe infection (13). In the study, the infected population's age group distribution coincides with

the data published by the Chinese Center for Disease Control and Prevention (CDC).

The patients who were at a greater risk of dying were men greater than 60 years of age. They were more likely to be field workers, without a history of recent travel or a vaccination history for BCG or influenza. There is greater predisposition of men for both infection and mortality in previously published data (14). The current study results also show statistically significant differences between men and women with men being at a greater risk.

The majority of the population had comorbidities. Presence of high-risk comorbidities is associated with increased risk of infection and mortality. From the comorbidities it was noted in this study population, most of them belonged to the CDC category of established and probable risk factors. Asthma and hypertension have been a subject of debate due to conflicting results (15). However, considering the small number of patients for each comorbidity, it was difficult to accurately determine its statistical significance. Diabetes mellitus still stands out in this regard in our population where despite the limited data, we observed strong statistical significance; this is in line with it being an established risk factor for this disease in all populations investigated (15).

The overwhelming majority of patients did not have any travel history. The reason for that might be the fact that initially there were no restrictions on traveling. This lack of restriction was a major factor in importing the virus rapidly resulting in the disease becoming pandemic. Being in contact with patients did not play a significant role. A likely explanation for that might be exposure to asymptomatic individuals who were not screened. These people would have spread the disease without knowledge of the participants. Lau H et al. analyzed and described such findings of 'internationally lost COVID-19 cases' suggesting that this is a prominent feature in countries with lower medical standards (16).

The most commonly reported symptoms were cough, dyspnea and myalgias. This is similar to what has been reported to the CDC (17) as well as previous smaller studies in our population (18, 19). Less than 8% of our population was asymptomatic. This was much less than what has been reported (17). However, this may be attributed to sluggish attempts at screening individuals and tracing contacts, excluding a significant number of asymptomatic individuals and relatively late arrival of this virus in our country.

There has been quite a bit of debate with regards to the role of BCG vaccination (20) and that of influenza vaccination (21). While our population had a lower-case fatality rate for individuals who had these vaccinations, this difference in case fatality rate was not statistically significant. Considering the fact that greater than 80% of the population is given the BCG vaccination (22), analysis of a larger sample may provide clearer answers to the role of this vaccine in this pandemic.

The widely published case fatality rate is 2.3%. This case fatality rate is higher in people with increased age; 8% among people of ages between 70 and 79 years and 15% among people of ages greater than 80 years (11). In the study, the population had a greater case fatality rate with an overall rate of 17.1% because this was a hospital-based

study. Furthermore, the fatality was 3.29% in the ages from 16 years to 30 years of age. This increased to 10-folds in the age group of 61 to 75 years and 15-folds in the ages of 76 to 95 years. A similar case fatality rate has not been reported before, internationally or locally. The current explanation for this has been referred to earlier on: decreased screening of individuals and tracing of contacts, leaving out a huge proportion of mildly symptomatic and asymptomatic individuals from our analysis.

The small sample size is a significant limitation in this study. In addition, the study excluded some patients who were unstable and their relatives could not be accessed, further reducing the sample. Data published from other countries and populations are in the tens of thousands if not hundreds of thousands (8, 11, 23). It is unfortunate that a similar data set has not been published.

All the data collected was directly from the study participants. While the research tried to ensure that the participants understand the terms accurately, many objective measures were left to the discretion of participants resulting in measuring them subjectively instead. This can suspect a recall bias in the data as well. This was because a proportion of participants were asked to complete the questionnaires after they had ended their isolation despite efforts to keep such participants at a minimum.

## Conclusion

The study has highlighted some important patient characteristics of a segment of Pakistan population which affected the course of disease of COVID-19. Further large-scale studies are required to get a better idea of these patient characteristics. This may be done by using central databases, combining medical records from different hospitals or a combination of both.

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