RESEARCH ARTICLE

A gender-based study of symptoms and risk factors associated with mortality in COVID-19 patients in a tertiary care hospital, Lahore

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Abstract

Objective: To determine the symptoms and risk factors associated with gender-specific mortality among coronavirus disease-2019 patients.

Method: The retrospective, descriptive, cross-sectional study was conducted at the coronavirus disease-2019 ward of the Jinnah Hospital, Lahore, Pakistan, and comprised record of confirmed cases of coronavirus disease-2019 diagnosed on the basis of characteristic clinical symptoms, radiological findings and polymerase chain reaction positivity from May 1 to August 31, 2020. Clinical symptoms, comorbidities and outcomes were extracted from the medical records. Data was analysed using SPSS 23.

Results: Of 337 cases, 132(39.2%) died. Among the deceased, 84(64%) were males with median age 61.5 (interquartile range: 22) and 48(36%) were females with median age 54.5 (interquartile range: 25).There were more female non-survivors who suffered from kidney disease 10(66.7%) than male non-survivors 5(33.3%) (p<0.05). Ischaemic heart disease was more common among males than females (p=1.62).

Conclusion: The mortality rate in males was higher compared to females. The symptoms and risk factors associated with mortality varied between the genders.

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Introduction

Globally, as of September 1, 2021, there have been 217,558,771 confirmed cases of coronavirus disease-2019 (COVID-19) and 4,517,240 deaths reported by the World Health Organisation (WHO).[1] The emergence of this infection in December 2019 in Wuhan, China, resulted in a global pandemic. Since its emergence, more than 213 countries and regions have reported outbreaks of this infection and millions of people have been affected.[2]

Person-to-person transmission through respiratory droplets and faeces was one of the main factors contributing to its rapid spread, with new cases emerging every day and there are predictions of this disease lasting for a very long time in the world population.[3] The most common symptoms reported were fever, cough and fatigue. Critically ill patients usually present with dyspnoea, along with being older and having previously identified underlying disease. In this way, crude identification of disease can be done and severity can be assessed quickly.[4,5] However, accurate analysis of predictors of mortality is important as mortality is a major concern in this pandemic. Major clinical predictors include age, comorbidity, secondary infection and increased levels of blood inflammatory markers.[6]

Gender-disaggregated data is important in helping understand which population is more at risk. Very few countries are taking gender identity into account while reporting the cases and deaths by COVID-19.[7] The data that has been reported suggests a greater level of severity and mortality among males, leading to the conclusion that gender is an important risk factor irrespective of age and susceptibility.[8]

The current study was planned to compare some of the clinical predictors in male and female subjects who died of COVID-19.

Patients and Methods

The retrospective, descriptive, cross-sectional study was conducted at the COVID-19 ward of the Jinnah Hospital, Lahore, Pakistan, and comprised record of confirmed COVID-19 cases from May 1 to August 31, 2020. After approval from the institutional ethics review committee, the sample size was calculated using the WHO calculator with a 2% prevalence rate of deaths due to COVID-19 and 95% confidence interval.[9] The sample size was then inflated to include all cases who died in the specified time period.

Data included related to patients who had tested positive for COVID-19 based on characteristic clinical symptoms along with radiological findings of ground glass opacities (GGOs) and consolidation with bilateral and peripheral distribution on chest computed tomography (CT) scan and a positive polymerase chain reaction (PCR) test. Paediatric age group, patients who left against medical advice (LAMA) and cases with missing data were excluded.

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Clinical symptoms, comorbidity and prognosis were extracted from the medical records for which written consent had already been obtained at the time of admission.

Data was analysed using SPSS 23 and Excel. Categorical variables were outlined as frequencies and percentages, and continuous variables were expressed as median and interquartile range (IQR) as the data had non-normal distribution. Chi-square test was used for categorical data. P<0.05 was taken as statistically significant.

Results

Of 337 cases, 132(39.2%) died. Among the deceased, 84(64%) were males with median age 61.5 (IQR: 22), and 48(36%) were females with median age 54.5 (IQR: 25).

The difference between symptoms experienced by males and females was not significant (p>0.05), with the exception of body aches that were experienced largely by female non-survivors (p=0.03) (Table 1). There were more female non-survivors who suffered from kidney disease 10(66.7%) than male non-survivors 5(33.3%) (p<0.05). Ischaemic heart disease (IHD) was more common among males than females (p=1.62) (Table 2).

Table-1: Frequency of symptoms among male and female non-survivors.

Symptoms	Non-Survivors n (%)	Male non Survivors n (%)	Female non survivors n (%)	*p*-value
Fever	96 (72.7)	63 (65.6)	33 (34.4)	0.25
Cough	56 (42.4)	33 (58.9)	23 (41.1)	0.88
Dyspnoea	107 (81.1)	67 (62.6)	40 (37.4)	0.56
Anorexia	8 (6.1)	3 (37.5)	5 (62.5)	0.20
Body aches	13 (9.9)	4 (30.8)	9 (69.2)	0.03
Vomiting	14 (10.6)	9 (64.3)	5 (35.7)	0.74
Abdominal discomfort	12 (9.1)	6 (50.0)	6 (50.0)	0.49
Diarrhoea	4 (3.03)	0	4 (100)	0.07
Dysgeusia	3 (2.3)	2 (66.7)	1 (33.3)	0.81
Anosmia	4 (3.0)	1 (25.0)	3 (75.0)	0.16
Nausea	8 (6.1)	6 (75.0)	2 (25.0)	0.38
Sore Throat	3 (2.3)	1 (33.3)	2 (66.7)	0.35
Altered Sensorium	10 (7.6)	7 (70.0)	3 (30.0%)	0.51

Table-2: Frequency of comorbidities among male and female non-survivors.

Co-morbidities	Non-Survivors n (%)	Male non Survivors n (%)	Female non survivors n (%)	*p*-value
DM	62 (47.0)	35 (56.5)	27 (43.6)	0.76
HTN	74 (56.1)	38 (51.4)	36 (48.7)	0.58
IHD	25 (18.9)	16 (64.0)	9 (36.0)	1.62
Lung Disease	15 (11.4)	8 (53.3)	7 (46.7)	0.93
Kidney Disease	15 (11.4)	5 (33.3)	10 (66.7)	0.00
Liver Disease	10 (7.58)	5 (50.0)	5 (50.0)	0.06
Smoker	7 (5.30)	7 (100)	0 (0.00)	0.76

DM: Diabetes mellitus; HTN: Hypertension; IHD: Ischaemic heart disease.

Discussion

In 2019, a novel coronavirus emerged as a lethal and formidable disease which gradually engulfed the whole world. Belonging to the Severe acute respiratory syndrome coronavirus (SARS-CoV) family of ribonucleic acid (RNA) viruses, it has caused illness emerging from common cold to severe pneumonia.[10]

To our knowledge, the current study is the first in Pakistan to identify the risk factors associated with mortality in male and female genders. The male population was more susceptible to death as the number was 1.75 times that of females. This is in accordance with published research.[7,11] Females have a stronger innate and adaptive immunity compared to men for infectious viral diseases. This can be because the X chromosome has a high density of immune-related genes. But, on the other hand, females are more prone to developing autoimmune and inflammatory disorders compared to the males.[12]

In the current study, male non-survivors were older compared to the female non-survivors. Age and underlying comorbidities are the most important risk factors for death.[13] There was no significant difference in median age between the two groups. A study also reported no significant difference in median age between the genders.7 Males aged >60 years along with comorbidities were more prone to getting severe manifestations of COVID-19, including death.[14]

Symptoms reported were comparable between both male and female non-survivors, with dyspnoea being the most common symptom. However, there was significant number of females non-survivors (p=0.03) who experienced body aches, indicating that such a symptom might have an association with gender.

Fever, cough, and dyspnoea were the most common symptoms in the current study with majority experiencing fever or dyspnoea and one-half having cough. Similar results have been reported earlier.[15]

Comorbidities in the current study displayed a trend similar to published research in China and Italy.[11,16] In the current study, hypertension and diabetes were the most common comorbidities associated with death of COVID-19 patients, which is consistent with literature.[13]

In the current study the frequency of kidney disease was significantly higher in female non survivors. Similar results were found earlier.[17] A study showed increased prevalence of kidney disease in a tertiary care hospital in patients admitted with COVID-19. This could have led to an increased risk of death of the hospitalised patients.[18]

The difference in outcomes in males and females can be attributed to the fact that males have an increased expression of angiotensin converting enzyme-2 (ACE-2) in their lungs which is the primary binding site of SARS-CoV-2.19 Oestrogen may have a protective effect in females leading to reduced mortality.[19] A recent study showed that life-threatening systemic inflammatory response was less commonly observed in females along with the fact that there is a decreased percentage of female diabetics compared to males.[19] This is consistent with the current study, and it is well known that diabetics have higher rate of infections and comorbidity, which often lead to complications, thus being one of the factors for higher mortality.[17] A study in Wuhan on clinical characteristics and risk factors of mortality of COVID-19 patients with diabetes showed that diabetes, hypertension and old age were high risk factors of mortality in COVID-19 patients.[20] This might be due the high levels of circulating ACE-2 levels in males compared to females with diabetes and cardiovascular events.[21]

The current study has limitations. The efficacy of the guidelines of COVID-19 treatment have not yet been established. Thus the effect of treatment on outcome could not be analysed. Extra treatments, such as ivermectin, could have contributed to a negative prognosis of COVID-19 infection. Moreover, as the study was retrospective, records for day of arrival of patients could not be found which could have influenced the findings.

There is a need for further research on gender-specific analysis of COVID-19 on a larger sample to better understand disease progression and outcome.

Conclusion

Age and hypertension were important risk factors for mortality in both men and women. In addition, women who experienced body aches and who had preexisting kidney disease had adverse outcomes.

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