

Demographic Characteristics of Patients with COVID-19: A Preliminary Report from Northern India

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ABSTRACT

Aim and objective: Coronavirus disease-2019 (COVID-19) has emerged as a serious global health problem in the 21st century. Due to its rapid spread across the nations, the World Health Organization declared it as a Public Health Emergency of International Concern (PHEIC), and efforts are being made worldwide to find a permanent solution. This disease outbreak has also shown certain gender-based impacts and has shown gender differences in vulnerability and mortality toward COVID-19.

Materials and methods: A 3-month cross-sectional study aimed to study the gender differentiation among COVID-19-positive patients was conducted in one of the premier tertiary-care multispecialty hospital of North India. The data pertaining to all the screened, tested, and reported positive for COVID-19 patients admitted in the "COVID hospital" of the institute was taken into analysis.

Results: A total of 1,566 of suspected patients were screened, and 271 were tested for COVID-19. Of the total of 271 tested, 104 patients were reported as COVID-19 positive; 63 (60.6%) were male and 40 (39%) were female. It was also attributed that male patients were having associated comorbidities, such as diabetes mellitus, hypertension, and smoking. Similarly, of 104 COVID-19-positive patients, death rate was also more towards male patients, 04 (3.84%), than female patients, 03 (2.88%).

Conclusion: The study has provided insight into the differences in disease severity in males, and more workup is needed to generalize our findings on gender effects of the COVID-19 outbreak.

Keywords: Comorbidity, COVID-19, Gender, Mortality.

Journal of Postgraduate Medicine, Education and Research (2020): 10.5005/jp-journals-10028-1398

INTRODUCTION

Coronavirus-2019 (CoV-19), a causative factor for coronavirus disease-2019 (COVID-19), has become a serious global health problem. Due to its rapid spread, the World Health Organization has declared COVID-19 a Public Health Emergency of International Concern (PHEIC), and efforts are being made worldwide to find a permanent solution for this threat. This disease outbreak is also showing certain gender-based impacts, and sex-disaggregated data have shown that there are gender differences in vulnerability and mortality toward COVID-19.^{1,2} The emerging evidences are stating that more mortality rate among males potentially might be due to sex-based immunological differences or associated with comorbidities such as hypertension, cardiovascular disease, and lung disease or may be linked to behaviors such as smoking and drinking alcohol.³⁻⁵ These gender-based skewness had been reported in SARS-CoV infection of 2003 also. In the study of Karlberg et al.,⁶ it was reported that of 1,755 SARS cases, males were reported having higher mortality than females (21.9% vs 13.2%, p value < 0.0001). The study of Leung et al. states that male gender was reported with a greater risk of adverse events in SARS patients.⁷

The reasons for these gender-based differences are not well understood. But females are stated to be less susceptible to such infections in comparison to male due to having different innate immunity, steroidal hormones, or features attributed to sex chromosomes. It has been reported in the studies of Karlberg et al. and Wang et al. that these gender-based differences could be due to estrogen levels that would have been protective for females toward worse outcomes of SARS-CoV infection.^{6,8} It has been reported that immune response to CoV-19 infection is different among females and males. The immune-regulatory genes encoded by X-chromosome causes lower viral load levels and less inflammation

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How to cite this article: Sharma R, Rana A, Kumar A, et al. Demographic Characteristics of Patients with COVID-19: A Preliminary Report from Northern India. *J Postgrad Med Edu Res* 2020;54(3):82-85.

Source of support: Nil

Conflict of interest: None

in females when compared to males, and CD4+ T-cell counts are higher leading to better immune response. Also, antibodies produced in females are in higher levels and remain longer in circulation. The levels of activation of the immune cells are higher in females, and it is correlated with the trigger of TLR7 and the production of interferon (IFN). Higher levels of TLR7 leads to higher immune responses and better resistance to viral infections. TLR7 recognizes single-strand RNA virus and stimulates the production of antibodies against the virus and proinflammatory cytokines, including IL-6 and IL-1 family members.⁹

Therefore, past outbreaks have shown the importance of incorporating a gender analysis into preparedness, and it raises an apprehension: Are men more prone to get infected and susceptible to worse outcomes of COVID-19 infection? So, the present analysis was conceived with an objective to compare the severity and mortality in male and female patients with COVID-19, a prognostic factor for individualized assessment.

MATERIALS AND METHODS

A cross-sectional study was conducted in one of the premier tertiary-care multispecialty hospital of North India providing healthcare services to the city of Chandigarh and neighboring states of Punjab, Haryana, Himachal Pradesh, and Uttarakhand. To manage this COVID-19 outbreak, screening areas were established in OPD as well as in emergency areas, with the objective that all patients who report to institute have to be “pre”-triaged before being triaged based on physiological parameters. Designated isolation wards were reserved for confirmed/suspected cases of COVID-19 in the institute, and its functioning was ensured under the jurisdiction of an institution level “COVID-19 apex committee”. Later, with the surge in number of cases, a designated 250-bedded ‘COVID-Hospital’ was developed in the institute for the management of COVID-19–positive cases.

It was a 3-month study aimed to study the gender differentiation among COVID-19–positive patients. The data pertaining to all the screened, tested, and reported positive for COVID-19 patients admitted in the “COVID hospital” of the institute was taken into analysis. All these reported positive patients were studied for positivity rate of the disease, associated comorbidities, and mortality pattern based upon gender preponderance of the disease.

RESULTS

COVID-19 put its first step in the institute and in the city Chandigarh in the month ending of January 2020 when the sample of first suspect case was sent for COVID-19 testing. The first positive case in the institute as well as of the city itself was reported on March 19, 2020. The city was also put under the tag of “hotspot” as the number of cases were reported to be more than 1 per lakh as per the definition of hotspot for COVID-19.

Over a period of 3 months from February to April 2020, a total of 1,566 number of suspected patients were screened, and 271 (17%) patients were admitted and tested for COVID-19 (Table 1).

Out of the total of 271 tested, 104 patients were reported COVID-19 positive, and 63 (60.6%) were male and 40 (39%) were female (Table 2) having more male preponderance to disease activity. Out of the total positive patients, 05 (M-04(4%) and F-01(1%) have to be admitted for intensive care management.

It was also attributed to the findings that male patients were reported to have associated comorbidities such as diabetes mellitus, hypertension, and smoking (Table 3). Similarly, out of 104 COVID-19–positive patients, death rate was also more toward male patients, 04 (3.84%), than female patients, 03 (2.88%). Most of the deceased were reported to having pulmonary pathologies of acute respiratory distress syndrome, respiratory pneumonia

leading to respiratory failure, whereas one patient was reported to have refractory shock with ventilator-associated pneumonia. All these patients were supported on high-flow oxygen concentrations, along with inotropes, high-end antibiotics, and other supportive management. Thirteen (12.5%) were discharged after having recovered from the illness.

DISCUSSION

In the present study, a total of 104 laboratory-confirmed COVID-19-positive patients were analyzed, where 60.0% of them were of male gender, stating more male preponderance to disease activity, which was found to be consistent with the recent research by Chen,⁴ Huang,¹⁰ and Xu.¹¹ In a similar report by Guan¹² of around 1,100 COVID-19 patients from 552 hospitals in China, about three-fifth of them were male patients, indicating gender predisposition to COVID-19, with males being more prone the infection than females. Another study on critically ill patients reported that around two-third of the males were affected than females, whereas a study by Zhang found having equal sex distribution.^{13,14} Another study by Gebhard reported that the disease incidence in men per 100,000 population in Switzerland in the age groups of 60–69 years, 70–79 years, and 80+ years was 267, 281, and 477, respectively, and these numbers exceeded in men by 74, 87, and 108 per 100,000 than ones reported in women.¹⁵

This is one of the first preliminary study reporting upon gender role in morbidity as well as mortality of CoV-2 infection. In the present study, males were found having more prior associated comorbidities such as diabetes mellitus, hypertension, smoking, COPD, and thereby receiving complicated treatments and experiencing worse in-hospital outcomes in comparison to females. The study by Liang et al.¹⁶ has reported that male patients have more associated comorbid conditions and thus have poorer outcomes from COVID-19. In the present study, male patients were reported to have more associated comorbidities such as diabetes mellitus, hypertension, and smoking than female patients. In the present study, deaths were also more skewed toward male gender, where death rate among males were 3.84% when compared to female patients 2.88%. These findings were similar to phenomenon reported in SARS-CoV infection of 2003, where males were reported to have a higher mortality rates (21.9%) than females (13.2%). Also, the study of Leung et al. reported that male gender was associated with higher risk of adverse events than females.^{6,7} The Global Health 50/50 research has reported an impressive overview stating sex-disaggregated data from different countries worldwide which clearly demonstrate similar numbers of cases with comorbidities among both gender but with an increased case fatality among

Table 1: Number of patients screened and admitted

S. no.	Age* (year)	Screened		Admitted	
		Gender		Gender	
		M (%)	F (%)	M (%)	F (%)
1	<6	26 (1.7)	18 (1.1)	01(0.4)	04 (2.5)
2	7–14	90 (5.7)	61 (4)	03 (1)	02 (0.7)
3	15–59	766 (49)	493 (31.5)	136 (50)	106 (39)
4	>60	68 (4.3)	44 (3)	14 (5)	05 (2)
		950 (61)	616 (39)	154 (57)	117 (43)
Total		1566		271	

*Age criteria as per http://censusindia.gov.in/Census_Data_2001/India_at_glance/broad.aspx

Table 2: Status of COVID-19 positive patients and outcome

S. no.	Age* (year)	Positive cases		(Expired-E; discharged-D; undergoing treatment-U)	
		Gender		Gender	
		M	F	M	F
1	<6	01	05	U-1	U-3, E-1, D-1
2	7-14	03	02	U-3	U-2
3	15-59	56	29	E-2; D-9; U-45	D-3; U-26, E-0
4	>60	03	05	E-2, U-1	U-3, E-02
	Total	63(60.6%)	41 (39.4%)	63 (60.6%)	41 (39.4%)
		104		104	

*Age criteria as per http://censusindia.gov.in/Census_Data_2001/India_at_glance/broad.aspx

Table 3: Details about COVID-19 positive deceased

	Age (years)	Gender	Co-morbid condition
Deceased-1	65 years	Male	No associated comorbidity
Deceased-2	67 years	Male	Coronary artery disease
Deceased-3	69 years	Female	Diabetes mellitus (II) with hypertension
Deceased-4	55 years	Male	Diabetes mellitus (II)
Deceased-5	58 years	Male	Diabetes mellitus (II)
Deceased-6	06 months	Female	Acyanotic congenital heart disease, patent ductus arteriosus and coarctation of aorta
Deceased-7	63 years	Female	Hypertension with chronic kidney disease

males.¹⁷ Similarly, in a study by Zhonghua, among the 1,023 deaths, majority have been ≥ 60 years of age, male gender, and have association with one or more preexisting comorbid conditions, such as hypertension, cardiovascular disease, and diabetes.¹⁸ Similarly, in the study by Jian-Min, proportion of male gender was higher in the mortality rate than female in SARS patients.¹⁹ Also, a study²⁰ conducted in Beijing in 2003, where data of a large population of 520 SARS patients (including 135 deaths), had summarized that male patients may be more prone to die from SARS-CoV-2.

Also, in the present study, most of the deceased were reported having pulmonary pathologies of ARDS and respiratory pneumonia leading to respiratory failure, which were similar to the findings in the study by Zhang where respiratory diseases such as ARDS were found to be more fatal.¹⁴ Similarly, Wang et al. have reported that most of the COVID-19 patients had bilateral patchy shadows or ground-glass opacities in their lungs and developed an atypical pneumonia and ARDS.²¹ This dysfunction of pneumocytes decreased the ability of the lungs to expand leading to increased risk of lung failure with raised mortality.^{22,23}

CONCLUSION

The study results highlight gender-specific differences in susceptibility to COVID-19 and provide insight into the differences in disease severity in males. More workup is needed to generalize our findings on gender effects of the COVID-19 outbreak.

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