e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(1); 1751-1755

Original Research Article

Gender Wise Comparison of Hospitalized SARS Coronavirus 2 Positive Patients and Correlation with PCR Positivity in a Superspeciality Hospital: A Preliminary Report

Anupriya Wadhwa[1], Abha Sharma[2], Anuradha Sharma[3], Nupur Gupta[4], Neeraj Wadhwa[5]

[1]Professor, Department of Microbiology, Faculty of Dentistry, Jamia Millia Islamia, New Delhi, India
[2]Professor, Department of Microbiology, Govind Ballabh Pant Institute of Post Graduate Medical Education and Research, New Delhi, India
[3]Professor, Department of Microbiology, Faculty of Dentistry, Jamia Millia Islamia, India
[4]Professor, Department of Microbiology, Faculty of Dentistry, Jamia Millia Islamia, India
[5]Director and Head, Foresight Eye Clinic, New Delhi, India

Received: 10-11-2025 / Revised: 15-12-2025 / Accepted: 02-01-2026
Corresponding Author: Dr. Nupur Gupta
Conflict of interest: Nil

Abstract:

Introduction: Coronavirus Disease (COVID-19) pandemic that originated from Wuhan, China have affected more than 250 countries and regions worldwide. Various studies worldwide have observed sex differences in progression of COVID-19 disease. Men are more likely to be admitted to intensive care units compared to women. Sex difference has been observed in previous coronavirus outbreaks too as in Severe Acute Respiratory Syndrome Coronavirus 1 (SARS-CoV-1) 2003 epidemic. Therefore, we conducted a study on gender wise comparison of clinical profile among hospitalized SARS Coronavirus 2 positive patients and correlation with PCR positivity.

Methodology: Hospitalized adult patients were tested for SARS COV 2 by real time PCR (closed system, TRUENAT) according to the advisories issued by ICMR. Retrospectively gender analysis of clinical data of all COVID-19 positive patients was done. The PCR positivity and CT values were also correlated with gender of the COVID-19 positive patients. Statistical analysis of data was done using the GraphPad software and p value was calculated by Fischer's exact test.

Results: Total 1123 admitted patients were tested for COVID-19 by TRUENAT PCR, out of which 38(3.3%) patients were diagnosed as confirmed SARS COV 2 cases. The prevalence of COVID-19infection among males was 2.4% and 0.97% among females. No significant difference among males and females were noted with regards to clinical symptoms). The time from onset of symptoms to diagnosis was less than 5 days for both male and female patients. On correlating ct values with PCR positivity, it was observed that very low positive have CT values between 31-40 , low and medium positive, both had CT values between 21-30 and high positive CT values were between 11-20.

Conclusion: Interpretation of the gender differences among covid patients must be made with great caution. Knowledge on gender wise comparison of hospitalized SARS Coronavirus 2 positive patients may improve our understanding of COVID-19 and help the healthcare systems to be ready for future coronavirus epidemics or pandemics.

Keywords: SARS CoV, Gender, TRUENAT, PCR.

DOI: 10.25258/ijcpr.18.1.297

Introduction

Coronavirus Disease (COVID-19) pandemic that originated from Wuhan, China have affected more than 250 countries and regions worldwide [1]. According to ICMR, total COVID-19 cases in India have reached 49,30,237 including 9,90,061 active cases, 38,59,400 cured/discharged/migrated and 80,776 deaths in till 15th September 2020 [2]. Various studies worldwide have observed sex differences in progression of covid-19 disease [3,4,5.6]. Men are more likely to be admitted to intensive care units compared to women. Sex difference have been observed in previous coronavirus outbreaks too as in Severe Acute Respiratory Syndrome Coronavirus 1 (SARS-CoV-1) 2003 epidemic. Studies from Hong Kong, Singapore and Saudi Arabia reported a higher case fatality rate in men in the previous coronavirus outbreaks [7,8,9].

There is limited availability of sex- and age-disaggregated data, thus hampering analysis of the gendered implications of COVID-19 and the development of appropriate responses [10].Therefore, we conducted a study on gender wise comparison of clinical profile among hospitalized SARS Coronavirus 2 positive patients and correlation with PCR positivity and to assess gender as a risk factor for covid disease.

Material and Method

With the approval of ethical committee of the institute (reference number IEC 2020/7/06-04), this study was conducted over a period of two months from July 2020 to August 2020.

After taking consent , all patients admitted to the hospital were tested for SARS COV 2 by real time PCR (closed system, TRUENAT) according to the advisories issued by ICMR. Retrospectively gender wise analysis of clinical data from the case records of all covid 19 positive patients tested in our hospital was done. The PCR positivity and ct values were also correlated with gender of the covid 19 positive patients. Statistical analysis of data was done using the GraphPad software and p value was calculated by Fischer's exact test.

Results

Table 1: Gender wise characteristics of hospitalized COVID -19 patients

Parameter	Male	Female	P vlaue
	N(%)	N(%)	
Sex	27(72.9)	11(29.7)	
Age			
0-14yrs	0	0	1.000(NS)
15-49yrs	12	6	0.724(NS)
50-64yrs	11	4	1.000(NS)
>65yrs	4	1	1.000(NS)
Symptoms			
Fever	6	3	1.000(NS)
Chest pain	10	3	0.714(NS)
Cough	14	5	1.000(NS)
Breathlessness	14	3	0.281(NS)
Sore throat	5	3	0.667(NS)
Asymptomatic	5	1	0.650(NS)
Time from onset of symptoms to diagnosis (median days)	-3.2	-3.8	
<5days	23	7	0.195(NS)
5-7days	3	4	0.160(NS)
>7days	1	0	1.000(NS)
Patient category			
Symptomatic influenza like illness in hospital	23	8	0.390(NS)
Hospitalized SARI patient	1	0	1.000(NS)
Symptomatic HCW	0	1	1.000(NS)
Others	3	2	0.615(NS)
Transmission source			
Unknown	27	10	0.289(NS)
Contact	0	0	1.000(NS)
Travel	0	0	1.000(NS)
HCW	0	1	1.000(NS)
RT PCR Cycle Threshold value E gene			
<10	0	0	1.000(NS)
20-Nov	6	4	0.431(NS)
21-30	13	4	0.721(NS)
31-40	8	3	1.000(NS)
RT PCR Cycle Threshold value Rdrp gene			
<10	0	0	1.000(NS)
20-Nov	6	3	1.000(NS)
21-30	11	4	1.000(NS)
31-40	10	4	1.000(NS)
RT PCR Positivity			
Very low	10	0	0.037(S)
Low	5	6	0.047(S)

Medium	7	1	0.394(NS)
High	5	4	0.400(NS)

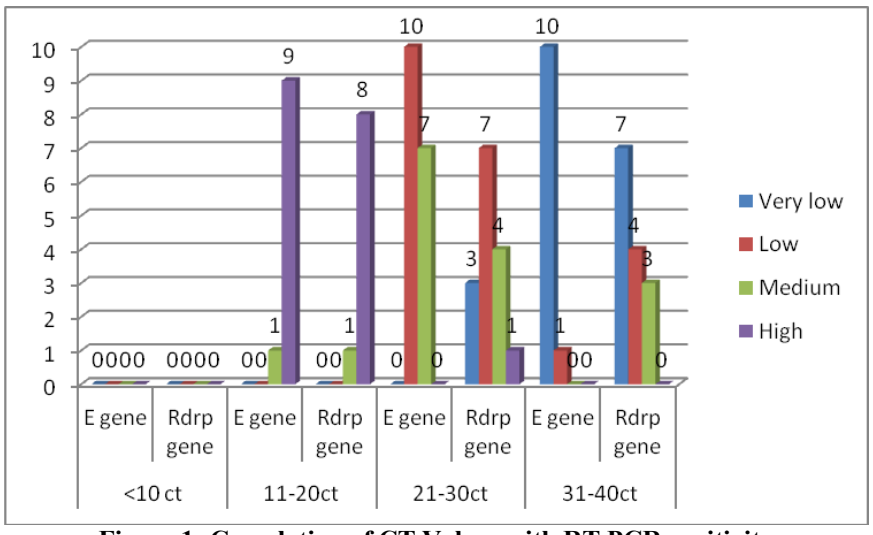

Figure 1: Correlation of CT Values with RT PCR positivity

Total 1123 admitted patients were tested for COVID 19 by TRUENAT PCR, out of which 38(3.3%) patients were diagnosed as confirmed SARS COV 2 cases. The prevalence of covid 19 infection among males was 2.4% and 0.97% among females. Out of 38 covid positive patients, 27(72.9%) were males and 11(29.7%) were females (table 1). The most common age group infected with covid 19 was 15 to 49 yrs in both males and females. No statistically significant difference was noticed between age groups in both genders. The most common symptoms among males were cough and breathlessness while in females cough was most common clinical symptom. Again, no significant difference among males and females were noted with regards to clinical symptoms. Time from onset of symptoms to diagnosis was also almost same in both sexes, median days (3.2 days males and 3.8 days females). In most of the patients whether male or female the time from onset of symptoms to diagnosis was less than 5 days. According to the patient category, most of the patients in both genders were admitted to the hospital because of influenza-like illness. Transmission source was unknown for all the patients. There was no significant difference between males and females with regards to ct value for both E gene and Rdrp gene, however the ct value was between 21-30 for both E gene and Rdrp gene in most of the male patients. According to the ct values, very low PCR positivity significantly correlated with male gender ($p = 0.037$) while low PCR positivity also significantly correlated with gender($p= 0.047$). On correlating ct values with PCR positivity, it was observed that very low positive have ct values between 31-40 , low and medium positive, both had ct values between 21-30 and high positive ct values were between 11-20.

Discussion

This preliminary study was done to investigate the role of gender in patients with Novel Coronavirus Disease (COVID-19). Men and women have different impacts of Pandemics and epidemics. The risk factors and susceptibility to infection may vary according to gender characteristics. Limited data is available on clinical analysis of covid 19 patients according to their sexes and thus implications of gender on COVID-19 need to be studied for the development of appropriate responses 10. In the present study, out of 38 positive patients, 72.9% were males. One study of 425 patients with COVID-19 indicated that 56% were males [11]. Another study of 140 patients found that 50.7% were males [12]. In another study by Tabata et al [13], out of 104 covid 19 positive patients 52% were males. The higher prevalence among men may be due to several reasons like more exposure as men are involved in more outdoor activities, their health is given more preference in terms of accessing medical care. In most developing countries and certain socioeconomic backgrounds women face lot of challenges in accessing medical facilities. More than half of the women surveyed in most countries were unable to see a doctor when they needed one [17]. Age was comparable in both males and females with 15-49 yrs age group being most infected in both groups. There is no significant difference in age between males and females and similar finding was seen in a study conducted by Jin et al [14]. Under the International Health Regulations (2005), only 40% globally reported confirmed cases of COVID-19 have been reported with age and sex disaggregation(till May 2020) to the WHO and preliminary analysis shows a relatively even distribution of infections between women and men (47% versus 51%, respectively) with more mortality seen in men.[15]. Geographical variations may also

be there in infection rates and deaths among women and men of different age groups however this analysis has not been done in the present study. Previous epidemics of SARS coronavirus outbreak in 2002−2003 showed that men and women have different susceptibilities to the virus and different vulnerabilities to the infection [16] which may not hold true for SARS COV 2 as observed in data analyzed in this study and others [13,14,15]. COVID-19 studies done in China suggest that old age, male sex, and presence of comorbidities are potential risk factors for disease progression and poor prognosis [4,19].

Regarding clinical symptoms, no significant difference was seen between males and females. Fever, cough and breathlessness were the common presentations in both groups. This is in contrast to the study done by Meng et al [18] where they found a significant correlation of sex with clinical characteristics of covid 19 patients. Cao et al [20] observed in their study that The most common symptom of patients with COVID-19 was fever (86.3%), which was followed by cough (71.3%), expectoration (42.5%), shortness of breath (37.5%), fatigue (37.5%) and anorexia (30.0%) they also found that The median time from symptom onset to hospital admission was 3.5 days and the median time to the diagnosis of severe illness was 7 days. No study has compared the difference in time from symptom onset to diagnosis among gender as in present study. Time from onset of symptoms to diagnosis was also almost same in both sexes, median days (3.2 days males and 3.8 days females)

The gold standard molecular method for coronavirus disease 2019 (COVID-19) diagnosis is real-time reverse transcription polymerase chain reaction (RT-PCR) 21. Real-time RT-PCR cycle threshold (Ct) values represent the number of amplification cycles required for the target gene to exceed a threshold level. Currently it has not been established that whether SARSCoV- 2 Ct values can guide patient management decisions or not although few researches have reported on the correlation between SARS-CoV-2 Ct values and mortality [21]. Buchan et al examined the relationship between CT value and patient age to determine any age-dependent difference in viral load or test sensitivity [22].Continuous research is being done on covid 19 since the day pandemic was declared, regular studies are being published however still limited data is available on the correlation of ct values with clinico-epidemiological profile and clinical outcome. We determined the correlation between the cycle threshold (Ct) value and PCR positivity and analyzed the distribution of ct values across sex to see if any useful clinical information is established. No other study has correlated ct values with gender. Based on the distribution of observed ct values no significant difference between males and females with for both E gene and Rdrp gene was found in the present study suggesting equivalent test performance irrespective of patient gender. Very low positive PCR positivity correlated significantly (P=0.037) with male gender. However, the ct values for very low PCR positive lied in the range 21-30 ct and 31 to 40 ct (figure 1). The ct values for medium PCR positivity ranged from 11 to 40 ct for both E and Rdrp gene. This implies that ct values are not a reliable indicator for predicting the level of PCR positivity whether high, medium or low as there are no clear cut ct values that will lie in the respective high, medium or low PCR positive categories.

Limitation of this study was small sample size and that retrospective analysis was done of available data in hospitalized patients of single center only and whether similar findings will be seen in asymptomatic patients also is not established. Detailed clinical outcome data was not available and so the role of gender on mortality could not be observed as most other studies have done and found that gender is a risk factor for higher severity and mortality in patients with COVID-19, independent of age and susceptibility [14,18].

Conclusion

Interpretation of the gender differences among covid patients must be made with great caution. For better understanding reporting and analysis of data by sex and age should be done in order to highlight the significant differences such as male sex acting as a risk factor for severe disease. As a result of which health inequities related to COVID-19 will therefore be addressed.

Knowledge on gender wise comparison of hospitalized SARS Coronavirus 2 positive patients may definitely improve our understanding of COVID-19 and help the healthcare systems to be ready for future coronavirus epidemics or pandemics.

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