Age and Gender Variation of COVID-19 Patients Admitted at Tertiary Care Hospital During 2nd wave: Record Based Study (Pilot study)

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Abstract:

　　Introduction: There is variation in age group and gender of the COVID-19 infected patients being admitted in the hospital with severe to mild symptoms. COVID-19 affected both sex and age range of affected persons was from a newborn to 100-year-old individuals. **Objective**: To study the age group and gender wise distribution of cases admitted during 2nd wave of COVID-19. **Method**: In this record-based study, authors have analyzed the data of COVID-19 patients admitted at Tertiary care hospital, Bhavnagar in the month of April 2021 during the 2nd wave of COVID-19 and a total of 3,347 such patients were recorded. Patients were analysed for age group and gender using percentage. **Results**: It was found that males (55.27%) were affected more than the females (44.73%). The highest number of cases was recorded in the 40-60 years age group (48.4%) while 0-28 days were lowest (0.08%) among the total number of patients. **Conclusion**: There is a relation of COVID-19infection to age and gender since there were more old age people affected in the 1st wave and the trend followed on in the 2nd wave as well with some changes. Males were infected more in almost all age groups and the highest infection was in the 40 - 60 years age group. There can be biological factors affecting this along with immunity playing a part Finding of this study will be helpful to Doctors and researchers in predicting the age and gender pattern of COVID-19 infection which may help in preventing future waves.

Keywords: Age group, COVID-19, Gender, Tertiary care hospital.

Introduction:

　　Coronavirus is a large group of RNA viruses that scientists first discovered in the 1960s. COVID-19 is an acronym for one type of coronavirus infection, Corona Virus Disease 2019. There are hundreds of types of coronavirus pathogens, among which 3 can be transmitted from animals to humans. The particular one among them is SARS-CoV-2 (beta coronavirus causing COVID-19 in 2019). The novel virus SARS-Cov2 responsible for ongoing pandemic of COVID-19 since March 2020, was first found in China in late 2019 and was then declared as a global pandemic by WHO in 2020. This virus is highly infectious where a person faces symptoms of Flu-like illness to ARDS and has also turned fatal for many. It has challenged the global health systems and sciences, making it hard to survive for many.

The number of cases increases in the 2nd wave as compared to the 1st wave with high fatality in a short time interval and at present scenario case are only present in Kerala and other few states of India. It was also more fatal than the previous mutation which shows the variation in infectivity of the virus with its structural change. One of the contributing factors in this infectious change is the immune system of the individual and lack of immunization. The normal human immune system adapts during the foetal to infant stage, matures during adolescence to the adult stage with variability during pregnancy and decreases as the senescence approaches.[1] These fluctuations in the immune system throughout life pose a higher risk for complications in infants, pregnant women, and elderly. There are several components involved in differentiating the immune system based on gender and age. The variation in the level/count of immunoglobulins, CD4 and CD8 cells, B-cells, T-cells among males and females might be causing the variation in COVID-19 cases and deaths.[2-4] MOHFW declared COVID-19 immunization above 50 years of age nationwide in February 2021. So, age limit is a major drawback for higher incidence in younger age group as well as lack of awareness for immunization in older. The requirement of hospitalization after immunization with COVID-19 vaccine is in lower rang.[5] Among these are clinically important issues such as the time intervals between different stages in the progress of the disease needed to estimate the public-health infrastructure which needs to be made available. Also, the issue of long-term health impairment after recovering from hospitals is important.

The COVID-19 positive cases were continuously increasing in India during the second wave observed in June-July 2020, and little evidence was available highlighting the age and gender perspectives of this disease. Therefore, the present study was an attempt to study the association between age and gender among positive COVID-19 cases and it also discussed the possible biological reasons for the variation among different age categories and gender. The present analysis is expected to provide evidence for framing age and gender-specific public health policies and treatment of COVID-19 infections.

Method:

The present study is record based Study - pilot Study based on secondary data extracted from an authorized source, Administrative office of tertiary care hospital, Bhavnagar after getting permission from ethics committee, Bhavnagar. The cases reported between 01- 04-2021 to 30-04-2021 (1 month) were filtered in a separate file. A total of 3,347 records were separated based on age group and gender and data analysis done.

Data analysis

A secondary data analysis was performed for COVID-19 cases in tertiary care hospital of Bhavnagar. Descriptive statistics were used for reporting the mean, median, mode, standard deviation, percentage and count under various categories. The age and gender records for 3347 cases were analyzed.

Results:

Age group	Total Cases
0 - 28 days	3 (0.09)
28 days - 1 year	12 (0.36)
1 - 5 years	6 (0.18)
5 - 12 years	8 (0.24)
12 - 18 years	7 (0.21)
18 - 40 years	622 (18.6)
40 - 60 years	1621 (48.4)
60 - 80 years	973 (29.1)
80 - 100 years	95 (2.84)

The extracted data included 1850 (55.27%) males and 1,497 (44.73%) female patients. (Figure 1)Majority COVID-19 cases (47.14%) were found in the 40-60 years age category. (Table 1) The highest distribution of infected male (25.7%) in 40-60 years

Figure 1: Gender variation of positive cases
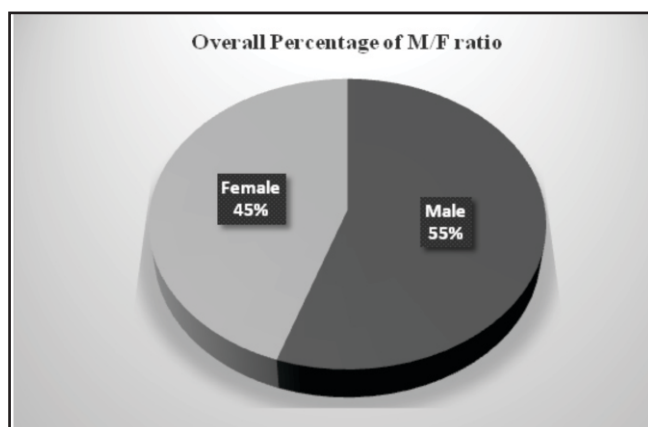
of age group and in females also (22.7%) in the same age group. Neonates were the least affected group involving 0.08%. Moreover, the difference between gender among age categories was found in age group of 18-40 years and 60-80 years.(Table 2) The most common age of all COVID-19 patients was 55 years (derived from mode of all age) with mean age (53.80±15.02) and the difference between the mean age of males (53.35±15.07 years) and females (54.32±14.93 years) was also statistically significant (p<0.001), with a mean age of COVID-19 infected males being significantly lower than that of the female counterparts.

Table 2: Age and gender wise distribution of cases

Age group	Male n (%)	Female n (%)
0 - 28 days	2 (0.05)	1 (0.03)
28 days - 1 year	6 (0.17)	6 (0.17)
1 - 5 years	2 (0.05)	4 (0.12)
5 - 12 years	5 (0.14)	3 (0.08)
12 - 18 years	3 (0.08)	4 (0.12)
18 - 40 years	374 (11.1)	248 (7.4)
40 - 60 years	861 (25.7)	760 (22.7)
60 - 80 years	544 (16.2)	429 (12.81)
80 - 100 years	53 (1.5)	42 (1.25)
Total	1850(55.2)	1497 (44.73)

Discussion:

The SARS-CoV-2 virus being a novel virus can infect human race irrespective of age categories and gender.[6] However, there exists individual variations in physiological functions, immune responses and risk factors across gender and age. There fore, the chances of getting infected might vary among gender and different age categories. The present study attempted to explore the category wise (age and gender) proportion of admitted cases. In this study, 3,347 COVID-19 patients' records were extracted and analyzed from the records found from Sir-T hospital to determine the role of age and gender, determining COVID-19 status among Indian population. Various studies across the globe showed that the older males were more susceptible (>50%) in getting infected by SARS-CoV-2. 60.3% of all cases were found to be males in a study among 5,700 hospitalized COVID-19 patients in the U.S.[5] In the present study, the male (55.27%) COVID-19 patients were higher than females (44.73%), and this trend remains consistent among all age categories. It may be due to lack of immunization below 60 years of age as of April, 2021. MOHFW declared vaccination for >60 years of age or lack of awareness for vaccination in older age group. There is reduce hospitalization of older age because of vaccine provided them before 2nd wave and it take 4 weeks to get immunity against corona virus. So, early development of immunization in <18 years of age group would be beneficial to prevent their involvement in the 3rd wave.

Several studies emphasized the higher susceptibility of males to viral infection and produced lower antibodies than women. The higher level of TRL7 (Toll-like receptor 7 - protein sensor of RNA viruses) among women produces high interferon-- which provides higher innate immunity to women.[7,8] In other diseases like cancer and HIV, the women also show greater innate immunity and greater response to vaccines.[15] The child and adult females show high CD4+ T cells and CD8+ T cells and higher CD4/CD8 ratio and proliferating T-cells compared to males. Regardless of age, the females tend to shows higher antibody response, immunoglobin levels and B cells which are further

enhanced by the genetic factors.[1,2] The analysis of present study depicted age-category wise variation in COVID-19 cases. The younger females and older males were at higher risk for getting infected and overall chances of recovery decreases as age increases. This may be because adaptive immunity plays a significant role in response to viral infection, and it declines after a certain age which makes us vulnerable to infections.

The prognosis of COVID-19 can be greatly affected by comorbidities and greater risk of developing critical and mortal conditions among male, elderly (>65 years) and smoking patients has been made evident by a study, which reflects that both age and gender have an important role in the development of COVID-19 infection. In recent studies, males were reported to have increased levels of plasma ACE2 concentration [9] and ACE2 is the receptor, required for cellular entry of SARS CoV-2. [10] The plasma ACE2 level was found to be highly correlated with immune signatures in lungs of males and older persons and less correlated among females and younger persons.[10] So, the chances of infection and death due to COVID-19 was higher among elderly males. This also has been corroborated by the results of the present study, where the chances of being COVID-19 infected were observed to be higher for males with increasing age. Another perspective for higher infection among males of higher ages was X and Y chromosomes-based variations. Both these chromosomes harbours genes which are involved in secreting the immune response elements but in females mosaic form of X chromosomes results in heterogeneous ACE2 allele. Thus, efficient form of ACE2 receptor is present only in half of all cells which limit the infection/attachment of SARS CoV-2 virus and provides relatively greater protection to females.

Conclusion:

The chances of getting infected with SARS-CoV-2 varies with age-categories and gender. Through this study we derived that there was male preponderance in between male and female in the number of cases admitted in the tertiary care hospital in the month of April. The females of lower age categories (40-60 years) have equal chances of getting infected as males, and as age increases (>60 years) the infection rate also increases. This variation in 2nd wave as compare to 1st wave may be due to lack of immunization below 50 years of age group up to April 2021. Thus, the trend leaned over to males having more susceptibility than females with elderly people getting infected easily compared to younger individuals.

Limitations:

This is a pilot study containing data of only one month of indoor patients in a tertiary care hospital due to which there are constraints. Collecting further data of patients along with other details like co-morbidities could give better generalization of the data and result thus obtained will give a clear view of pattern in the waves affecting the community.

Declaration:

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Conflict of Interest: Nil

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