



EFFECT OF AGE AND GENDER DIFFERENCE IN CORONA PATIENTS ADMITTED IN TERTIARY CARE HOSPITAL IN INDIA

Medical Science

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ABSTRACT

Objective: Novel coronavirus, now named as SARS-CoV-2, is a new pathogen, which is rapidly killing people worldwide. It may take years to discover the definite end points about how novel coronavirus infects people of diverse health conditions including age and gender groups. In this study, we investigated if age and gender are significant factors in SARS-CoV-2 infection.

Study Design And Setting: We extracted the data from hospitalized patients in Nemi Chand Medical College, Israna, Panipat. We compared the age of both groups male and female and tried to find out the any association of Covid-19 with gender or age. This is the first preliminary study investigating the role of gender and age difference in patients with COVID-19.

Results: Age was comparable between men and women in all data sets. In SARS patients, the gender role and age seems to be typically played a major role in COVID-19. The percentage of infected males were higher than that of females group.

Conclusion: The overall infection rate is growing with time for all age groups. However, significant variations across gender and age groups in the spread of the infection, while men and women have the same prevalence, men with COVID-19 are more at risk for worse outcomes and death, independent of age.

KEYWORDS

INTRODUCTION-

The COVID-19 pandemic in India is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). 30th January 2020 was the date when first case of COVID-19 in India reported, which primarily originated from China. After the United States has the second-highest number of confirmed cases in the world, India currently has the leading number of confirmed cases in Asia.^{[1][2][3]}

As we pooled the data we saw that the first case appeared in India in Kerala on 30 January of COVID-19 which rose to three migrated cases by 3 February data says that all students were coming back from Wuhan. Apart from these, no significant increase in transmissions was seen in February. Rather than these 22 new cases were reported, including 14 infected tourist members from an Italian tourist group on 4 March.^{[4][5]}

COVID-19 has contributed to a huge adverse shock globally. As the recording data says as of 10 March 2020 there have been 113702 laboratory confirmed cases and 4012 deaths globally^[6]. At the end of 2019 mostly in mid month of December fairly a number of cases of unusual pneumonia of weird etiology, were primarily detected and reported in Wuhan, Hubei province, China. Very shortly after these episode, the Chinese Center for Disease Control and Prevention (CDC) acknowledged the new coronavirus from the sample of throat swab of a patient as the contributory agent, and publicly announced it on 7 January 2020^[7]. The International Committee on Taxonomy of Viruses^[8] re-named provisionally named 2019-nCoV as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), one month after the first novel corona virus infected disease (COVID-19) was diagnosed^[9]. In 2019, the outburst of a new coronavirus SARS-CoV-2, which causes COVID-19 has been monitoring by Centers for Disease Control and Prevention (CDC). Panel of the authorities first recognized the virus in Wuhan, China.

Since then, the virus has multiply, spread, infect and extend to nearly every country, leading the World Health Organization (WHO) to declare a pandemic.

The European Centre for Disease Prevention and Control (ECDC) reported that the male-to-female ratio for COVID-19 deaths across the EU was 2.1. It is reported by the U.K.'s Office for National Statistics (ONS) that death rate due to COVID-19 for males were double that of the rate for females. For underlying causes that remain blurred and uncertain, why the novel coronavirus appears to present a significantly

elevated mortality risk to men than women.

A range of factors, together with the class, race, preexisting health status and uniqueness make some people much more susceptible. But there is one very huge gap that cannot be easily explained by either of these factors: the gender gap in mortality rates.

If we see the data globally we came to know that there are some discrepancies across the world that in some places men make up majority and in some women make the majority of cases the reason behind why men face a major risk of death than that of women, across the globe.

Beside of this the Chinese health power has announced that the total number of definite cases on the Chinese mainland has reached 76,936, and 2,442 people have died of the disease as of Feb 23. If we see the ratio of male and female patients died among the 2,442 deceased patients, most were old and two-thirds were males, though the detailed data has not been reported^[9]. This raises a question: Are men more prone to getting and dying from COVID-19?

In this study we observed that how COVID-19 risk differs between men and women across different age groups. Our study first preliminary and purely an epidemiological study that will be helpful for the better understanding of the relationship between age, sex, and COVID-19.

What Is New?

Paper Highlights-

- This is observed that males and females have the similar prevalence for COVID-19 in spite of then that what may be the underlying factors and causes that why men are more at risk for worse outcomes and death
- This is the first observational study in Haryana to exploring the role of gender difference and age with Novel Coronavirus Disease (COVID-19) existence.

MATERIALS & METHODS-

Clinical Characteristics- Diagnosed and reported cases of COVID-19 have a wide class of indications from mild complaints, such as fever and cough, to more critical cases associated with difficulty in breathing [7]¹⁰. Some of the most common symptoms include cough, fever, chills, shortness of breath (SOB), muscle aches, sore throat, unexplained loss of taste or smell, diarrhea, and headache [8]¹¹. Symptoms can be start as from mild and become more intense over 5 to 7 days, worsening if pneumonia develops in patients^[11]. Approximately, 1 out of 6 infected individuals become seriously ill and develop

difficulty in breathing, especially in the elderly with underlying health conditions^[12]. Quarantine period is recommended from 2 to 14 days because after exposure symptoms of COVID-19 may appear anytime. The average incubation period for COVID-19 is approximately 5.2 days^[13,14].

Patient And Data Sources-

The clinical data having recent contact history, clinical symptoms and signs, co morbidities, and laboratory reports upon admission were reviewed. In this single-centre study, patient's test centre confirmed as having Severe acute respiratory syndrome corona virus contagion conferring (SARS-CoV) to WHO provisional management and 494 total patient admitted with the chief underlying complaints in NC, Medical college, Panipat city, Haryana, remained enrolled for study. In total of 494 there were 357 males and 137 were females.

The first case with CoV was confirmed on 2nd March 2020 in Hunan province. The medical records of elderly CoV patients who were referred to these hospitals from 2nd March to 30th June 2020 were retrospectively reviewed and analyzed. Clinical outcomes on the basis of gender differences and age were followed up to 30th June 2020.

Epidemiological evidence, signs and indications on admission, laboratory as well as radiological results, stroke and forecast data were found from medical records. All information was double checked by two individual doctors. Clinical features along with underlying complaints and results of the two age groups were compared.

Statistical Analysis-

Statistical analyses were performed with SPSS (version 26.0). Constant variables are termed as the median (interquartile range, IQR). Unconditional variables are obtainable as n (%).

Observations-

A total of 497 confirmed as having SARS-CoV contagion were involved in the present study. In which 357 were males and 137 were females. The percentages of males were 72.3% and percentages of female were 27.7% (table 1). As the table shows more than double males were positive than that of females.

Table 1: Figures And Proportions Of Male And Female:

S.No	Gender	Total	Out of 494
1	Male	357	72.3%
2	Female	137	27.7%

As we have also segregated the patients on the basis of their age we observed in our study majority of patients were lying in the range of 20-40, both in male and female category. Ratio of males in this range were observed maximum 56.30%, on other hand the ratio of female in this range were lesser than that of males (20-40, 38.68%), table 2.

Table 2: Segregation Of Patients On The Basis Of Their Age:

S.No.	Gender	0-20	20-40	60-80	80-above	Total	Out of 494
1	Male	63	201	22	1	287	72.3%
2	female	40	53	3	0	96	27.7%
							Total= 494

Ratio of Male:Female = 2.60

Ratio of maximum male 20-40 = 201/357 ----- 56.30%

Ratio of maximum female 20-40 = 53/137 ----- 38.68%

The chief complaints observed in COVID patients were fever, cough, breathe lessness, weakness Myalgia, diarrhoea, skin change, mental change, hypertension + DM, COPD, asthma and sore throat. As we observed that the percentages of fever, cough and breath lessness were maximum than that of others complaints (table 3).

Table 3. Clinical Characteristics And Outcomes Of COVID-19

S.No.	Complaints	Numbers	Out of 78	Out of 494
1.	Fever	12	15.38%	2.4%
2.	Cough	12	15.38%	2.4%
3.	Breathe lessness	10	12.82%	2.0%
4.	Weakness Myalgia	5	6.4%	1.2%
5.	Diarrhoea	6	7.6%	1.0%
6.	Skin Change	4	5.1%	1.2%
7.	Mental Change	4	7.6%	0.80%
8.	Hypertension + DM	6	5.1%	1.2%
9.	COPD	7	5.1%	1.4%

10.	Asthma	5	7.6%	1.0%
11.	Sore throat	7	8.9%	1.0%
12.	Asymptomatic	416		84.2%

DISCUSSION-

In recent months, due to this corona pandemic (COVID-19) many countries get into disaster. Studies have also notified that rate of mortality of men are worse than that of females. It has been predictable that gender difference can involve the immune response to a pathogenic mediator, as well as the inclination for several respiratory diseases.^[15]

These types of diverse responses in males and females may be associated to the actions of sex hormones. Angiotensin-converting enzyme 2 (ACE2) acts as the receptor for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes COVID-19. The expression of ACE2 is influenced by sex hormones; therefore, we discussed in the present study that this could be one of the reasons why COVID-19 is more widespread in men than in women. Due to COVID-19 being a relatively new and understudied disease, the data available is limited or not adequate. Based on current information age is not a factor even co morbidities are also not solo to blame to widespread of this diseases according to clinical proficiency, the elderly, especially those in long-term care amenities and people of any age with serious underlying medical situation are at a greater risk of getting COVID-19^[15].

If we see the statistics of 18 different countries, the Global Health 50/50 project found same numbers of COVID-19 cases in men and women, except in Pakistan where 72% of cases were male.^[16]

As Pakistan is unusual in this set of data, there are doubts about the precision of reporting COVID-19 in women. In our study we see the data of Haryana people on an average men are found to be the greater risk than that of female (Table 2). In general, the observation that COVID-19 is just as common in men and women around the world will need to be verified with further testing, with pool data, with increases the sample size.

In all countries that report death rates by sex difference, men diagnosed with COVID-19 are more likely to die. The male/female ratio of deaths among confirmed cases ranges from 1.1 in Iran to 2.1 in Denmark and Greece. Data scored that the death ratio of male/female tends to be higher in older people.^[16]

These findings are not surprising. The outcomes of infection were worse for men than women during previous coronavirus epidemics: men had worse outcomes of illness from severe acute respiratory syndrome (SARS),^[17] and a higher risk of dying from Middle East respiratory syndrome (MERS).^[18] As we observed in our data patients with under lying conditions are more prone to developed COVID-19. Both sex and gender could have a role in explaining why men have poorer outcomes of COVID-19 infection than women, but no conclusive studies have yet been carried out.

One biological speculation explains the genetic disparity between men and women, particularly in view to the immune system. The X chromosome is recognized to contain the prime number of immune-related genes in the intact genome.^[19], with their XX chromosome, women have a dual copy of key immune genes contrasted to the single copy in XY men.

This enhance to both the general responses to infection (the innate response) and also to the more specific response to microbes including antibody development (adaptive immunity).^[20] Thus women's immune systems are usually more deliberate to acclimatize infections. This might mean women are able to tackle the novel corona virus more efficiently but this has not yet been established. In literature and earlier research, underlying diseases co morbidities increases the mortality rate in patients who get infected by COVID-19 with cardiac disease and diabetes being the most chief and significant risk factors.^[21] Once again, inadequate sample mass and insufficient point in time have led to limitations in the data collected.^[21,22]

Common co morbidities such as hypertension, COPD, diabetes, and cardio cerebrovascular disease were found to be the more significant risk factors in patients when compared with other underlying disease states.^[23] A retrospective meta-analysis including 1558 patients of COVID-19 was conducted until March 1, 2020, on patients with underlying co morbidities and the possibility for acquiring COVID-

19, we observed more or less the same in our patients that underlying conditions plays a significant role of developing COVID-19.

Of the cases reported worldwide, symptoms of COVID-19 ranged from mild, moderate respiratory disease to severe illness, which involves intubation and mechanical ventilation. Since there is a period where the patient is asymptomatic, and the incubation period is between 2 and 14 days, it is not easy to set up an early diagnosis, or to reduce the spread of the infection if the patient is unknowingly exposed. However, in this incubation period, if the respiratory symptoms extend, it is important to look for immediate care to start the proper treatment management.^[24,25]

Therefore, patients with co morbidities should take all essential safety measures to avoid getting infected with SARS CoV-2, as reported earlier that they usually have the worst prognosis^[26]. These precautions include regular hand washing with soap and water or use of alcohol-based hand sanitizer, restraining person-to-person contact and committed social distancing, proper wearing a homemade or purchased face mask in public places, and overall restrictive going to anywhere in public areas at this time unless and until it is necessary. Hence, this is the high burning time for the alertness to everyone for a worldwide public health campaign to move up consciousness, on reducing the trouble of these co morbidity illnesses causing deaths in COVID-19 infected patients.

In conclusion this is the very first preliminary study to scrutinize the role of gender differences with the worse outcomes of COVID-19 in Haryana. While the men and female have the same prevalence but males are so much exposed to COVID -19, than that female this is irrespective of age. So there may be so many underlying factors like co-morbidities, sex differences, hormonal differences and cytokines networking can put all together towards their impact on the better understanding of this virus spread and control over this corona pandemic. More clinical, epidemiological, basic research regarding proper treatment regime, diagnostic markers for the early assessment are in urgent needed in near future.

A foremost limitations of the study was the self-reporting of co morbidities at the time of admission, lack of awareness and/or the lack of diagnostic testing and last but not least less number of sample size and insufficient time.

REFERENCES:

1. "India most infected by Covid-19 among Asian countries, leaves Turkey behind". *Hindustan Times*. 29 May 2020. Retrieved 30 May 2020.
2. "India's Covid cases world's 2nd highest - Times of India". *The Times of India*.
3. "India becomes third worst affected country by coronavirus, overtakes Russia". *Deccan Herald*. *New Delhi*. Retrieved 5 July 2020. *Kulkarni, Sagar (5 July 2020)*.
4. "India confirms its first coronavirus case". *CNBC*. *Reid, David (30 January 2020)*.
5. "COVID-19, 6 members of Delhi patient's family test positive for coronavirus". *Perappadan, Bindu Shajan (4 March 2020)*. *The Hindu*. ISSN 0971-751X. Retrieved 2 May 2020.
6. "India's case count crosses 100,000, Delhi eases restrictions: Covid-19 news today". *Hindustan Times*. 19 May 2020. Retrieved 20 May 2020.
7. Tan WJX, Ma XJ, "A novel coronavirus genome identified in a cluster of pneumonia cases—Wuhan, China 2019-2020. *China CDC Weekly* 2020;2:61–2.
8. Gorbalenya SCB AE, Baric RS, de Groot RJ, Drosten C, Gulyaeva AA, Haagmans BL, et al. bioRxiv 2020. Severe acute respiratory syndrome-related coronavirus: the species and its viruses—a statement of the Coronavirus Study Group.; doi:http://dx.doi.org/10.1101/20200207937862 [Accessed 11 Mar 2020].
9. Xiaoli Zhang¹, Huan Cai¹, Jianhua Hu¹, Jiangshan Lian, Jueqing Gu, Shanyan Zhang, Chanyuan Ye, Yingfeng Lu, Ciliang Jin, Guodong Yu, Hongyu Jia, Yimin Zhang, Jifang Sheng*, Lanjuan Li*, Yida Yang*. Epidemiological, clinical characteristics of cases of SARS-CoV-2 infection with abnormal imaging findings. *International Journal of Infectious Diseases* 94(2020)81–87.
10. CDC. Coronavirus (COVID-19): symptoms of coronavirus. Centers for Disease Control and Prevention. 2020. [Accessed April 18, 2020, <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>].
11. Coronavirus symptoms: frequently asked questions. Maragakis LL. *Johns Hopkins Medicine*. 2020; [Accessed April 18, 2020, <https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-symptoms-frequently-asked-questions>].
12. WHO. Q & A on corona viruses (COVID-19). World Health Organization. 2020. [Accessed April 18, 2020, <https://www.who.int/news-room/q-a-detail/q-a-corona-viruses>].
13. Paudel SS. A meta-analysis of 2019 novel coronavirus patient clinical characteristics and comorbidities. *Research Square*. 2020. <https://doi.org/10.21203/rs.3.rs-21831/v1> [Accessed April 18, 2020, <https://www.researchsquare.com/article/rs-21831/v1>].
14. Li Q, Med M, Guan X, Wu P, Wang X, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *NEJM J Med*. 2020;382:1199–207. [Accessed April 18, 2020, <https://www.nejm.org/doi/full/10.1056/NEJMoa2001316>].
15. CDC. Coronavirus (COVID-19): symptoms of coronavirus. Centers for Disease Control and Prevention. 2020. [Accessed April 18, 2020, <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>].
16. COVID-19 sex-disaggregated data tracker. *Global Health 5050*. 2020 Apr.
17. Karlberg J, Chong DS, Lai WY. Do men have a higher case fatality rate of severe acute respiratory syndrome than women do? *American Journal of Epidemiology*. 2004 Feb;159(3):229-231. DOI: 10.1093/aje/kwh056.
18. Chen X, Chughtai AA, Dyda A, MacIntyre CR. Comparative epidemiology of Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia and South Korea.. *Emerging Microbes & Infections*. 2017 Jun;6(6):e51. DOI: 10.1038/em.2017.40.

19. Bianchi I, Lleo A, Gershwin ME, Invernizzi P. The X chromosome and immune associated genes. *Journal of Autoimmunity*. 2012 May;38(2-3):187-92. DOI: 10.1016/j.jaut.2011.11.012.
20. Klein SL, Flanagan KL. Sex differences in immune responses. *Nature Reviews Immunology*. 2016 Oct;16(10):626-638. DOI: 10.1038/nri.2016.90.
21. Li B, Yang J, Zhao F, Zhi L, Wang X, et al. Prevalence and impact of cardiovascular metabolic diseases on COVID-19 in China. *Clin Res Cardiol*. 2020;109:531–538. doi: 10.1007/s00392-020-01626-9. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
22. Adekunle Sanyaolu, Chuku Okorie, Aleksandra Marinkovic, Risha Patidar, Kokab Younis, Priyank Desai, Zaheeda Hosein, Inderbir Padda, Jasmine Mangat, and Mohsin Altaf. SN Compr Clin Med. Comorbidity and its Impact on Patients with COVID-19.. 2020 Jun 25: 1–8.
23. Wang B, Li R, Lu Z, Huang Y. Does comorbidity increase the risk of patients with COVID-19: Evidence from meta-analysis. *Aging (Albany NY)*. 2020;12(7):6049–57. <https://doi.org/10.18632/aging.103000> [Accessed May 30, 2020, <https://pubmed.ncbi.nlm.nih.gov/32267833/>].
24. Wei-jie Guan¹, Wen-hua Liang, Yi Zhao, Heng-rui Liang et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. *Eur Respir J* 2020; 55: 2000547.
25. Murphy TE, McAvay GJ, Allore HG, et al. Contributions of COPD, asthma, and ten comorbid conditions to health care utilization and patient-centered outcomes among US adults with obstructive airway disease. *Int J Chron Obstruct Pulmon Dis* 2017; 12: 2515–2522.
26. Adekunle Sanyaolu¹ & Chuku Okorie & Aleksandra Marinkovic & Risha Patidar & Kokab Younis & Priyank Desai & Zaheeda Hosein & Inderbir Padda & Jasmine Mangat & Mohsin Altaf, Comorbidity and its Impact on Patients with COVID-19. *SN Compr. Clin. Med.* Accepted: 12 June 2020.