COMMENTARY

Gender Disparity in COVID-19: Are Men More Susceptible?

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Coronavirus disease-2019 (COVID-19) has given a rude awakening to the entire mankind and has exposed the fault lines, challenging the robustness of the healthcare delivery system across globe including developed countries. Currently, India is ranked third in total number of COVID-19 cases, though observed infection rate and mortality is one of the lowest when compared to other countries. At the same time, number of tests conducted per million population is also the lowest.[1]

India has been one of the oldest civilizations and predominantly being a paternalistic society, the gender disparities have been pervasive at all stages and field of life be it is sex-selective abortion, nutrition, education, employment, access to healthcare delivery, exposure to various disease-causing processes, hospital admission, morbidity, mortality, etc. Cultural and behavioral differences exist between the gender, which play a prominent role in the exposure to pathogens. In addition, differential expression of certain genes in male and female can have an impact on disease susceptibility.

SARS-CoV-2 enters the lungs through the ACE2 enzyme, a member of the renin-angiotensin system (RAS). Although there are no data for the lung, the expressions of RAS components in other tissues are modulated by sex hormones (androgen and estrogen), which could theoretically explain the gender disparity in COVID-19.[2] Male predominance could partially be explained by transmembrane protease serine 2 (TMPRSS2), a cell surface protein that is expressed by epithelial cells of specific tissues including those in the aerodigestive tract. Coronaviruses as well as influenza viruses critically depend on TMPRSS2 for entry and spread in the host.[3]

Current study, *Demographic characteristics of patients with COVID-19: A preliminary report from Northern India*, though being a preliminary analysis, conducted at PGIMER, Chandigarh, has highlighted a very pertinent issue of gender disparity in COVID-19 and brought this issue to forefront afresh. Chandigarh is among regions reporting lowest number of cases, and with study not having a sizeable number, male preponderance in terms of morbidity (60%) and mortality (M:F = 4:3) is evident, though its significance has not been commented upon. Details on gender variation in suspected patients who reported to healthcare facility and, subsequently, tested for COVID-19 would have helped us understand the issue of gender disparity in a better manner.

Mumbai and Delhi have been the two biggest hotspots in India contributing to more than 20% of total cases of the entire country.[4] There is hardly any literature from Mumbai analyzing the gender disparity in COVID-19. However, published studies from Delhi, though again being an analysis of limited number of preliminary cases reported at Safdarjung Hospital and Ram Manohar Lohia Hospital, have alluded to the male preponderance of COVID-19 in terms of morbidity and mortality.[5,6] Studies from Jaipur and Bhilwara in Rajasthan are also pointing toward the increased prevalence in male gender.[7,8] Data from AIIMS, New Delhi, which has rendered patientcare services to more than 4,000 COVID-positive cases, have revealed the male predilection in terms of morbidity and mortality. Of the total admitted cases, 70% were males and the overall mortality rate was 20%. Observed mortality in males was twice that of in females, which clearly indicates the susceptibility of male gender to COVID-19.

The sex differences in clinical outcomes could be also caused by preexisting comorbidities, such as hypertension, cardiovascular disease, and diabetes, which were almost always present in severe and lethal COVID-19 cases and tended to be more frequent and more severe in men due to their lifestyle and behavioral reasons.[3] Sex-disaggregated data from 26 countries indicate that the overall case fatality ratio in men is higher than in women. The proportion of death observed among men compared to women ranges from 0.4 to 2.57 (with only five countries having this proportion below one).[9]

Many countries do not report their COVID-19 cases and deaths disaggregated by sex (separately for women and men), and many more do not report data disaggregated by both sex and age. There are also limited data available on testing for COVID-19 in men and women.[9] Variation in sex difference of COVID-19 in India, with preponderance of male gender in terms of morbidity, must be interpreted carefully as India is having the lowest testing rate in world. Access of healthcare services to female patients has been an issue in various developing countries including India.

Based on the available preliminary evidence from India and data available globally, gender disparity in terms of morbidity has been variable and inconclusive because of various reasons. In the Indian setting, studies with larger and representative samples are required to conclusively establish the gender disparity in terms of morbidity. However, it can be concluded that proportionately more males are dying because of COVID-19 compared to females, which in certain countries is more than twice.

Pandemics precipitates inequalities for women and girls and discrimination of other marginalized groups such as persons with disabilities and those in extreme poverty. This needs to be considered, given different impacts surrounding the detection and access to treatment for women and men.[10] Though in pandemic/epidemic of novel diseases it may take some time to gather evidence on the disease epidemiology, however, the robust data collection mechanism should be in place so that relevant information may

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be extracted for timely interventions and making necessary policy changes. Notwithstanding this, the gender, social, behavioral, and religious factors must be taken into consideration while designing any public health emergency response.

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