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Coronavirus Pandemic

A comparative analysis of COVID-19 outbreak on age groups and both the sexes of population from India and other countries

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Abstract

Introduction: The study of epidemiological outcomes of COVID-19 in the affected countries needs to be conducted to implement an effective strategy.

Methodology: Our study included age and sex-based analysis of epidemiological data of infected and deceased patients from various countries. The patient data was graphically depicted with the slope's calculation to describe a gradual or steep spread of the disease along with subsequent rise or fall in the death reports.

Results: Population groups of 20-49 years of age and 50 years-above were highly vulnerable to infection. Interestingly, 20-49 years of age group was most affected in India. However, higher population of the deceased were reported in the 50 years-above in all countries. India and South Korea demonstrated a gradual appearance of COVID-19 positive cases than other countries illustrated by reduced slope %. Further the highest percentage of infected people and deaths were reported from the densely populated states of India. We observed a sex independent prevalence of COVID-19. The BCG and JE vaccine are unique in the vaccination regime of India and South Korea.

Conclusions: Reduced ACE-2 expression in the children's nasal epithelium may be responsible for reduced SARS-CoV-2 susceptibility. Countries showed varying patterns in COVID-19 spread and associated mortality. It may be influenced by factors, such as screening strategy, countries demography, implementation of lockdown, etc. Due to limited evidence, it would be difficult to point to the influence of the virus on either sexes. Although vaccines may stimulate non-specific immunity, experimental proofs are needed to demonstrate the potential of any vaccine against SARS-CoV-2.

Key words: COVID-19; SARS-CoV-2; age-group; epidemiology; immunization; India.

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Introduction

The horrifying situation of the coronavirus disease 2019 (COVID-19) pandemic has challenged human existence, unlike any other disease infecting almost every organ of the body [1,2]. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has infected more than 35 million people and claimed 1,051,786 lives worldwide as of October 6, 2020 [3]. The disease progression dynamics of a particular country gives a general idea about the effectiveness of the measures adopted to counter the pandemic. Understanding the epidemiological features of a disease will recognize the pattern of its progression and aid in decision-making for active surveillance and treatment. Strategies adopted by countries to combat the pandemic may provide an outline for countries that were affected later [4]. Although challenging, a comparative and comprehensive study to unzip the dynamics of disease progression in various countries during the early days of virus spread will help in strategy development [5]. Our article is motivated by the need for such kind of study and focuses on the variation of age and sex in COVID-19 occurrence in various countries. In addition the analysis of infection and death scenarios is included. We analysed the number of infected cases and deaths of 3 different age groups (0-19 years, 20-49 years of age and 50 years and above) of Australia, Germany, India, Italy, Netherlands, Norway, South Korea, and Spain. We have compared the disease occurrence in both the sexes of Australia, India, Norway, and South Korea. To represent the disease progression and mortality in each country, we have uniquely used geometrical measurement (calculation of slope %), which gives a clear perspective of disease progression. We have analyzed the SARS-CoV-2 infection and related death scenario in Indian states, to gain an understanding of the national situation of a developing country. With a vast population, India can become the disease hotspot or show ways to tackel the pandemic situation to other countries [6]. As India's epidemiological demography

is different from other countries, it becomes imperative to estimate further disease progression to enable a robust combat avenue. In addition, a glimpse of the vaccination regime of each country is also mentioned.

Methodology

Data collection and analysis

The data for age and sex distribution of COVID-19 patients were collected from the health ministry and websites of the countries between April 2nd to April 10, 2020. The data included all the reported COVID-19 cases till March 29th in Australia [7]; April 1st in Italy [8]; April 2nd in Germany [9], Netherland [10], and India [11,12]; April 3rd in Spain [13], and Norway [14]; and April 4th in South Korea [15]. Due to the unavailability of the English version of the data from Spain, the Netherlands, and Norway, we translated the data into English from Spanish, Dutch, and Norwegian languages respectively using the Google Translate®. For data from Australia the number of COVID-19 cases in each age group was calculated from the representative graphs [7]. Data for SARS-CoV-2 infected cases and death in Indian states till April 9, 2020, were obtained from the website of the Ministry of Health and Family Welfare Govt. of India [11]. The percentage of COVID-19 cases and deaths for each Indian state is calculated using the following formula-

$$\%\ of\ COVID-19\ cases\ in\ the\ state = (Number\ of\ COVID-19\ cases\ in\ the\ state \div Total\ number\ of\ COVID-19\ cases\ in\ India) \times 100$$

$$\%\ of\ COVID-19\ deaths\ in\ the\ state = (Number\ of\ COVID-19\ related\ death\ in\ the\ state \div Total\ number\ of\ COVID-19\ deaths\ in\ that\ state) \times 100$$

Data of SARS-CoV-2 infected cases and deaths in the included countries were obtained from https://www.worldometers.info/coronavirus/ [16] until April 10, 2020, and represented in Figures 1 and 2. Importantly, all the reported SARS-CoV-2 infections are considered to be confirmed by the qRT PCR test, as instructed by WHO [17]. Further, we considered all the deaths are due to SARS-CoV-2 infection in the absence of any WHO defined inclusion and exclusion criteria for COVID-19 related deaths. The immunization data of India [11], Italy [18], Spain [19], Germany [20], USA [21], and South Korea [22] were collected from ministry of health website and processed.

Statistical analysis

Furthermore, a two-sample t-test between the proportions of infected males and females in each age group was performed to determine a significant difference between the SARS-CoV-2 infected male and female population. This was done using MedCalc statistical software (https://www.medcalc.org/calc/comparison_of_proportions.php). The t-statistic was significant at the 0.05 critical alpha level, $p < 0.05$ at CI-95%.

Slope percentage

Information geometry represents statistics in a simpler way. We have used geometric parameter slope to understand the COVID-19 progression dynamics comprehensively. The line graph for the number of cases and deaths in the included countries was plotted using GraphPad Prism 5. Each line's angle to the x-axis was measured using Online Protractor (https://www.ginifab.com/feeds/angle_measurement/). The values were expressed in degree and later converted to radian. The line's slope was calculated by using the formula tan θ, where θ is the angle in radian. Furthermore, the slope was expressed as a slope percentage (Table 1): slope = tan θ; where θ is the angle in radian.

Results

Age-wise division of COVID-19 confirmed cases and death reports in various countries

We collected the data of COVID-19 confirmed cases (%) and the number of death reports (%) from 8

Table 1. Calculation of slope for line graph representing the number of COVID-19 cases and death reports.

Country	Number of cases				Number of deaths			
	Angle of the curve		Slope (tanθ)	Slope%	Angle of the curve		Slope (tanθ)	Slope%
	In degree	In radian			In degree	In radian		
Germany	15	0.26	0.26	26.79	5	0.08	0.08	8.74
India	1	0.01	0.01	1.47	1	0.01	0.01	1.74
Italy	18	0.31	0.32	32.49	30	0.52	0.57	57.73
Netherlands	2	0.03	0.03	3.49	4	0.06	0.06	6.99
South Korea	1	0.01	0.01	1.74	1	0.01	0.01	1.74
Spain	26	0.45	0.48	48.77	26	0.45	0.48	48.77

distinct countries. Further, we divided the retrieved data into three major age groups; 0-19 years, 20-49 years, and 50 years-above. Interestingly, Germany, India, South Korea, Australia, and Norway have 47.26%, 62.2%, 51.26%, 50.54% and 48.54% infected people in 20-49 years, respectively (Table 2). Italy, the Netherlands, and Spain have 72.8%, 74.66%, and 71.37% of infected people respectively in the age group of 50 years-above. The number of infected people is least in the age group of 0-19 years among the three age groups in all the countries. The 20-49 years of age people are infected almost twice more than the 50 years-above population in Germany, and India. Moreover, the confirmed 50 years-above cases are approximately three-fold more than the 20-49 years of age people in Italy, the Netherlands, and Spain (Table 2). Interestingly, 26% of 20-49 years of age people are dead in India compared to other countries, where only 1-2% of deaths wee reported (Table 2). Approximately 98- 99% of deceased people belong to the 50 years-above age group in Italy, the Netherlands, South Korea, and Spain. Comparatively, 73% 50 years-above age population accounts for the deceased individuals in India (Table 2).

India and South Korea demonstrate a gradual appearance of COVID-19 positive cases than other countries illustrated by reduced slope percentage

As per the data availability, the date and number of COVID-19 positive cases reported until April 10, 2020, in Germany, India, Italy, the Netherlands, South Korea, and Spain were plotted. The initial COVID-19 cases appeared on January 30, 2020, and January 01, 2020, in India and South Korea respectively (Supplementary Figure 1). The actual data after linear fitting resulted in a line graph and considered for slope calculation. The number of infected individuals in India and South Korea increased considerably from March 2, 2020, represented by a 1.74% slope (Figure 1). Interestingly, there was a rise in the number of COVID-19 cases for Germany and the Netherlands from March 2, 2020, demonstrated by 26.79 and 3.49 slope percentage respectively. Importantly, Italy and Spain showed a steep rise in the number of COVID-19 infected cases and registered the slope percentage as 32.49% and 48.77%, respectively (Figure 1).

Figure 1. Comparison between the rise in the number of confirmed cases of COVID-19 among different countries. The plot resulting from March 2, 2020, until April 10, 2020, *vs.* the number of cases resulted in a slope unique to a particular country.

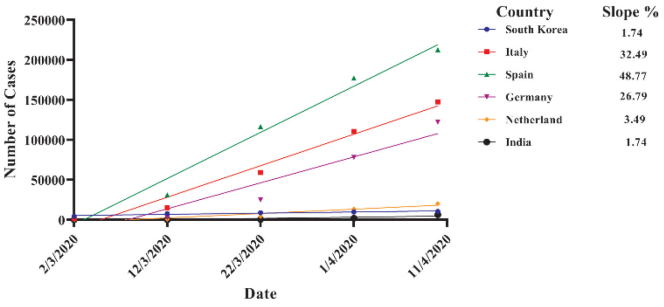


Figure 2. Comparison between the rise in the number of death reports due to SARS-CoV-2 infection among different countries. The plot resulting from March 6, 2020, reported until April 10, 2020, *vs.* the number of death reports resulted in a slope unique to a particular country.

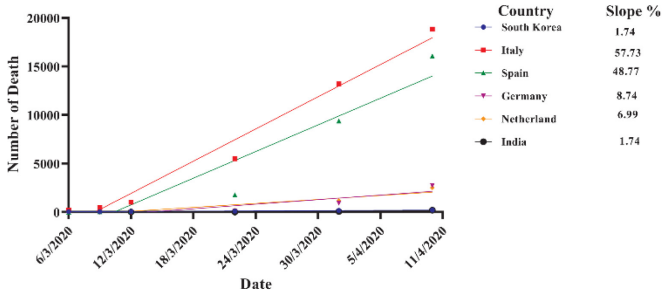


Table 2. Age-wise distribution of total confirmed cases (%) and death (%) of Australia, Germany, India, Italy, Netherlands, Norway, South Korea, and Spain.

Sr. no.	Country	0-19 years		20-49 years		50 years-above	
		Confirmed cases (%)	Deaths (%)	Confirmed cases (%)	Deaths (%)	Confirmed cases (%)	Deaths (%)
1	Australia	202 (3.95)	NA	2,575 (50.54)	NA	2,327 (45.59)	NA
2	Germany	1,982 (2.69)	NA	54,599 (47.26)	NA	18,184 (24.73)	NA
3	India	150 (5.9)	0 (0)	1,577 (62.2)	19 (26.3)	809 (31.9)	54 (73.7)
4	Italy	1,548 (1.4)	0 (0)	28,528 (25.8)	145(1.15)	80,498 (72.8)	12,403 (98.8)
5	Netherlands	160 (1.08)	0 (0)	3,544 (24.11)	2 (0.14)	10,973 (74.66)	1,337 (99.96)
6	Norway	258 (4.95)	NA	2,528 (48.54)	NA	2,292 (44)	NA
7	South Korea	664 (6.46)	0 (0)	5,257 (51.26)	3 (1.63)	4,344 (42.31)	181 (98.36)
8	Spain	334 (0.54)	1 (0.025)	17,693 (28.08)	54 (1.36)	44,966 (71.37)	3,898 (98.60)

*NA: Data not available.

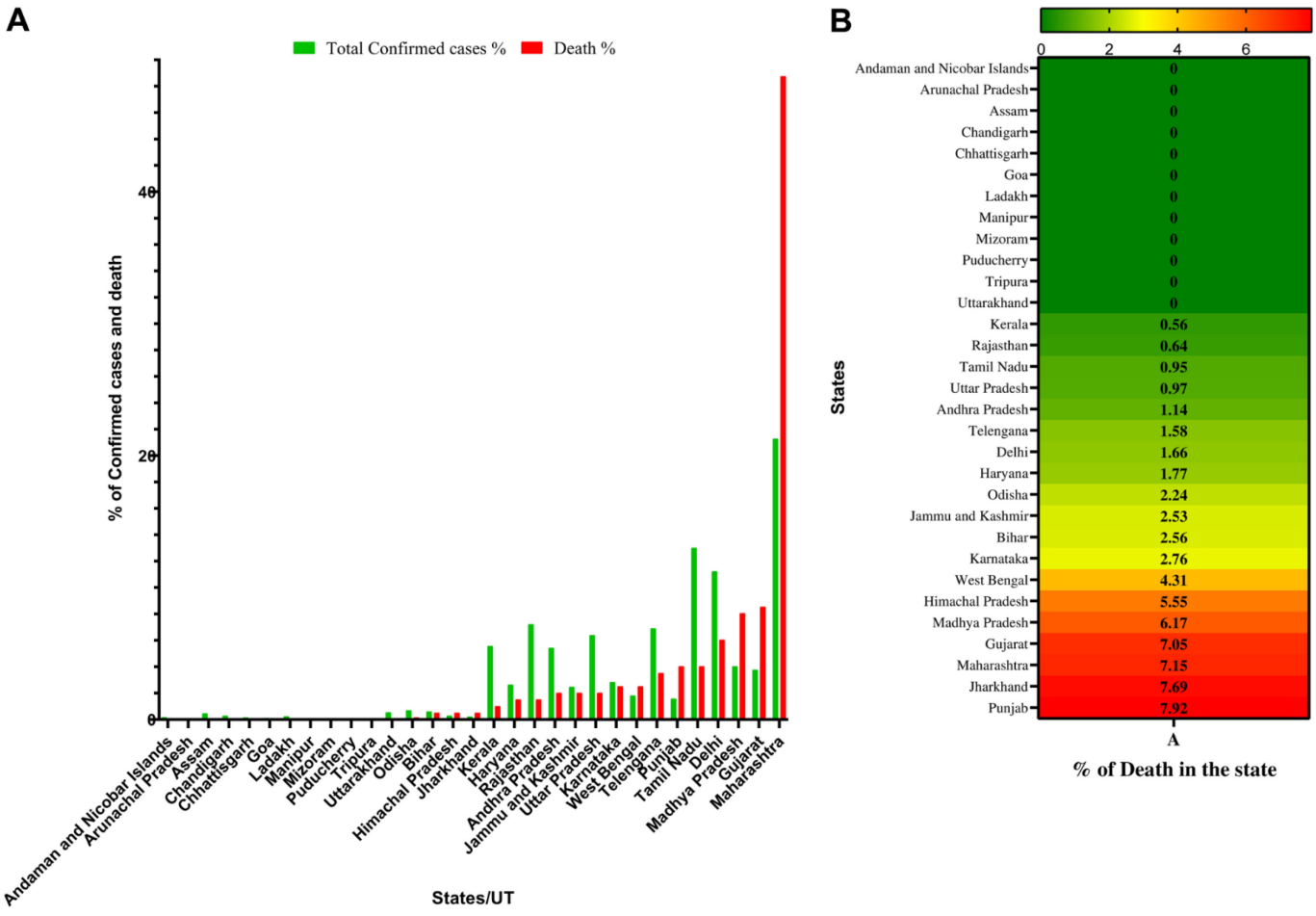
India and South Korea present a steady number of death reports until April 10, 2020, compared to other countries

The data obtained on comparing the number of deaths due to COVID-19 with date until April 10, 2020, provided us a graphical illustration that enabled us to calculate the slope of the line. The actual plot obtained from the number of deaths *vs.* the dates was presented in Supplemetary Figure 2. The graph after linear fitting of the actual data was obtained and variable slopes calculated for distinct countries provided information about the change (death reports). The slope percentage obtained for India, South Korea and the Netherland is 1.74%, which is less than other countries like Germany (8.74%), Italy (57.73%), and Spain (48.77%) (Figure 2).

Comparative analysis of total cases and death reports among different Indian states until April 4, 2020

We evaluated the total number of COVID-19 infected cases and deaths in 31 states and 6 Union territories (UTs) of India. The states exhibited a varying pattern of the total number of cases and deaths due to COVID-19 (Figure 3A). States with the highest number of confirmed cases (CC) and death reports (DR) include Maharashtra (CC-21.27%; DR- 48.74%), followed by Tamil Nadu, Delhi, Telangana, and Rajasthan. In addition, the states that report the minimum number of prevalent cases and deaths include Arunachal Pradesh (C.C-0.015%; D.R-0%), followed by Chhattisgarh, Andaman and Nicobar Islands, Chandigarh, and Assam (Figure 3A).

Figure 3. A) State-wise distribution of total confirmed cases (green) of COVID-19 along with the deaths (red) due to the infection in India till April 10, 2020. The highest number of infected cases and deaths due to SARS-CoV-2 were reported in Maharashtra, followed by Tamil Nadu, Delhi, Telangana, and Rajasthan. States/Union Territories with the least number of death cases were Andaman and Nicobar Islands, followed by Arunachal Pradesh, Assam, Chandigarh, and Chhattisgarh. **B**) Heat map representing the percentage of deaths in each state of India compared to the national average mortality value (3.10: as of April 04, 2020). The heat map represents a gradual increase in death cases from the top (green) to bottom (red), stating the lowest to highest percentage of deaths reported across India. The upper limit was set as 8 with mid value as 3 and lower limit as 0.



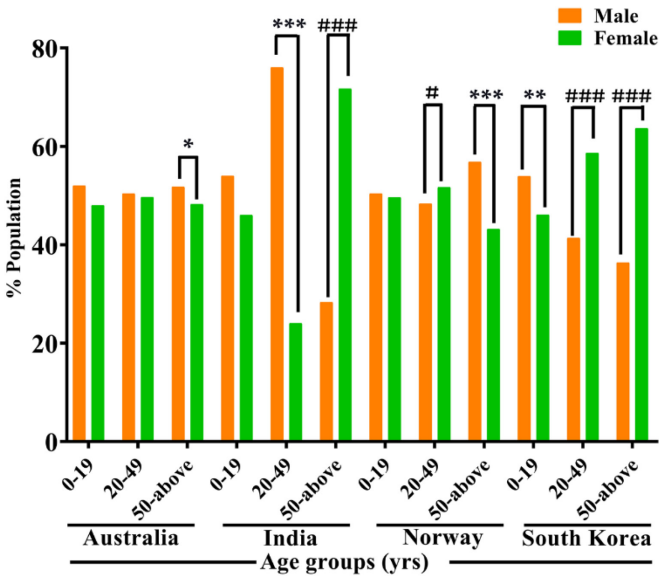
Comparison of state-wise death reports to the national average value of death percentage

We further investigated the deaths reported in particular states of India. Our study revealed that some states like West Bengal, Himachal Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Jharkhand, and Punjab demonstrated a markedly enhanced death percentage among the population. The percentage of death was explicitly more than the national average value mortality, i.e., 3.10, as on April 4, 2020. Similarly, many states/UTs, for example, Andaman and Nicobar Islands, Assam, Chhattisgarh, Ladakh, Mizoram, Tripura, reported a deflated percentage in the deceased people. A few states, namely Jammu and Kashmir, Bihar, and Karnataka, reported the death percentage close to the national death average (Figure 3B).

COVID-19 infection among males and females in various age groups

As per the data availability, we retrieved the data representing the male and female prevalence of COVID-19 in four countries. The total number of confirmed cases in three age groups were divided into numbers (Supplemetary Table 1) and percentage of male and female cases (Figure 4). We found that males were more infected by SARS-CoV-2 than females in the 0-19 years group compared to the others (Figure 4). Approximately, the number of males was almost 1.2-fold higher than females. Compared to all countries, males were significantly infected in South Korea ($P = 0.0043$) than females in the age of 0-19 years (Figure 4). The males were significantly infected more than females in the age group of 50 years-above in Australia ($P = 0.0152$), and Norway ($P < 0.0001$). Noticeably, females were more significantly infected in India ($P < 0.0001$), and South Korea ($P < 0.0001$) in the age group of 50 years-above. Also, in Norway ($P = 0.0176$), and South Korea ($P < 0.0001$), females showed significantly higher COVID-19 infection in the age group of 20-49 years of age contrary to India ($P < 0.0001$).

Figure 4. Age-wise distribution of male and female in Australia, India, Norway and South Korea. P-values of < 0.05, < 0.01 and < 0.001 were considered statistically significant and represented with #/*, ##/** and ###/***, denoting a higher/lower number of males compared to females.



Bacille Calmette-Guerin (BCG) and Japanese encephalitis (JE) vaccine exclusive in the immunization program of India and South Korea

We obtained the data of the vaccination regime of each country to understand the differences in the vaccine programs followed by all the countries. Our study provided hint towards the exclusive mention of the BCG vaccine, which is used for tuberculosis (TB) disease and the JE vaccine in the vaccination program of India and South Korea (Table 3). Additionally, Spain and the USA mentioned the flu vaccine administration in their vaccination program, unlike other countries. Further vaccines for Rotavirus were encouraged in India and the USA. Nevertheless, the vaccination system of India and Italy excluded the Human Papillomavirus vaccine (Table 3).

Table 3. Details of vaccines included in the National Immunization Program of different countries.

Country	Vaccines													
	BCG	OPV	Hep B	Pentavalent	RV	PCV	MMR	JE	Hib	Varicella	MC	Flu	HPV	Hep A
Germany	×	√	√	√	×	√	√	×	√	√	√	×	√	×
India	√	√	√	√	√	√	√	√	√	*	*	×	×	*
Italy	×	√	√	√	×	√	√	×	√	√	√	×	×	×
South Korea	√	√	√	√	×	√	√	√	√	√	×	×	√	√
Spain	×	√	×	√	×	√	√	×	√	√	√	√	√	×
USA	×	√	√	√	√	√	√	×	√	√	√	√	√	√

*: Vaccines recommended for high-risk individuals in India [43] not included in Universal Immunisation Programme of Government of India. NB: BCG- Bacille Calmette-Guérin, OPV- Polio, PCV- Pneumoniae, MMR- Measles- rubella-mumps, Hib- *Haemophilus influenzae* b, HepA- Hepatitis A, JE- Japanese Encephalitis, MC- *Meningococcal C,* RV- Rota virus, HPV- Human Papilloma virus, (Pentavalent vaccine - diphtheria, pertussis, tetanus, and hepatitis B and *Haemophilus influenzae* type b).

Discussion

The estimated median incubation period of SARS-CoV-2 infection is 5.1 days, and symptoms usually appear in 14 days after exposure [23]. Some countries report a steady rise in the number of COVID-19 patients, while few countries report a plateau in the growth curve of COVID-19 [3]. It is imperative to discuss the rising and falling cases of COVID-19 and associated deaths. Therefore, we compared the data of various countries available on publicly available sources to analyse the total number of confirmed cases and deaths under three age groups: 0-19 years, 20-49 years, and 50 years-above. The data showed that the highest number of confirmed cases were in the 20-49 years, or 50 years-above age group. Many earlier COVID-19 studies suggest that the 50 years-above population is more prone to infection than other age groups due to compromised immunity and prevalent health ailments [24]. The study also indicates that people above 50 years residing in facilities like nursing homes are at a higher risk due to congregate living [24]. The 20-49 years old age group is more exposed to the virus because many of them serve in the society compared to other age groups, who stay at home. Children are less vulnerable to SARS-CoV-2 due to the reduced expression of angiotensin-converting enzyme 2 (ACE-2) in their nasal epithelium [24]. Importantly, a detailed study of the role of ACE-2 in SARS-CoV-2 internalization is needed. Furthermore, the COVID-19 mortality analysis revealed a major population from India in the age group of 20-49 years compared to other countries (Table 1). The availability of adequate health facilities, access to health resources, or detection of the infection in developing countries compared to the developed countries can be contributing factors to this scenario. A similar report from Pakistan discusses the concern of weak health care system in developing countries in COVID-19 spread [25].

Our study brings out a critical perspective related to a comparative analysis of the rise in the number of cases and deaths in various countries concerning the initial reports until April 10, 2020. It is clear that, though India and South Korea were comparable in their slope percentage for the increase in COVID-19 cases (Figure 1), the rise in the number of death reports differed (Figure 2). It indicated that South Korea is slightly better than India in managing the health of infected COVID-19 individuals. This can also be correlated to the early response of South Korea to COVID-19. The country performed meticulous screening of infected individuals during the initial times of pandemic, i.e., till March 22, 2020 [26–28]. If we look into India's screening strategy, the country performed less screening compared to South Korea till March 22, 2020, however, increased the rate of screening from March 23, 2020, onwards. Also India imposed a strict lockdown since March 24, 2020 [26,29]. Importantly, the reaction time to the pandemic remains equally important. How quick the diagnosis or treatment is provided to an individual with the infection may determine the progression of disease severity and mortality, thereby affecting the overall scenario.

Also, in the case of the Netherland, the spread of COVID-19 is gradual compared to high mortality. The slow increase in the number of cases may be due to the country-wise lockdown introduced early from March 15, 2020 [26]. Various other norms executed by the country included maintaining social distancing, restriction on large gatherings, and closure of schools and universities [30]. For Italy, the spread and death patterns were almost similar, which enabled us to conclude that the number of deceased people fall in the category of infected ones. The increased number of confirmed cases and dead may be due to reduced screening and lack of strict social distancing measures [31,32]. Surprisingly, Spain showed a steep spread of the virus and death (Figure 2) though lockdown was introduced from March 14, 2020 [33]. Germany demonstrated a steep rise in deceased cases with its first case of death reported almost two months from the date of the first report of the infection (Figure 2). Germany lacked the introduction of stringent rules on social distancing measures and performed lesser screening of infected individuals during the initial stage of pandemic [26,34].

Further we evaluated the COVID-19 confirmed cases and death reports from India in greater detail, to understand the contribution of various states to the overall COVID-19 Indian scenario. As of April 4, 2020, the highest percentage of infected people and deaths were from states like Maharashtra, Delhi, Rajasthan, and Tamil Nadu, which are the municipal areas comprising of slum areas, densely populated old cities, along with migrant laborer camps [35]. These states also reported a high rate of international traffic compared to other Indian states (Figure 3A). The minimum affected states and UTs are geographically secluded like the Andaman and Nicobar Islands, Arunachal Pradesh, Chhattisgarh, and Assam. The environmental conditions are generally hostile for travel and movement. Therefore, we suggest that the spread of the virus may be prevented by mechanical barriers and restricted movement of individuals, making isolation evident for containment of SARS-

CoV-2. A study by Ghosh *et al.* mentioned the importance of close monitoring of casual mobility to avoid the spread of the virus [36]. We compared the death reports to the national average death value, i.e., 3.10% (Figure 3B). We found that some of the states tested more samples; therefore, they may compose a fair share of infection at the national level though it displayed a reduction in death percentage than the national average. For example, Tamil Nadu, Telangana, and Uttar Pradesh registered greater disease spread corresponded by values 4.02%, 3.51%, 2.01% deaths respectively and in comparison the deaths in the states corroborated to 0.95%, 1.58%, 0.97%, respectively, which is less than the national average value, i.e., 3.10% (Figure 3). Besides, some Indian states registered delayed spread, started late screening, and in fact, tested lesser samples; however, an enhanced percentage of COVID-19 deaths were reported. These states include Bihar, Himachal Pradesh, Jharkhand, Odisha, and Punjab which recorded 0.50%, 0.50%, 0.50%, 0.15%, and 4.02% cases, respectively. Although, the actual death percentage in these states were higher. Notably, several states registered almost equal percentage of reported COVID-19 and death cases (Figure 3). These findings provided us with possible state-level influence on COVID-19 at the national level. Although the conclusion of what might be precisely responsible for the infected cases and deaths due to COVID-19 cannot be drawn, there may be many reasons. The disease outcome may be affected by the testing strategy of suspected cases, the definition of suspected cases, the original population structure of each country, whether the control measures (social distance, wearing masks, washing hands etc.) were strictly followed by the public or not, etc.

We have investigated a few factors worth considering apart from the above mentioned widely discussed reasons. These include the impact of hormonal differences in males and females in general SARS-CoV-2 disease pathogenesis and vaccination programs of a country. Although some studies reported that females have better immune resistance than males due to the female sex hormone, estrogen, we found no specific sex-based pattern of COVID-19 prevalence [31]. On the other hand, if we consider the disease severity, according to case-fatality WHO data, the death proportions for every 100 persons, 2.8 men, and 1.7 women are reported [37]. Due to limited evidences, it would be difficult to point the virus's influence on either of the sexes. Moreover, genetic predisposition and lifestyle are to be considered before concluding the sex-dependent COVID-19 infectivity pattern. Further, we investigated the vaccination regime of countries to bring in the forefront the aspect of vaccination in virus disease pathogenesis. Recent reports suggest using the BCG vaccine as a potential therapeutic for COVID-19 infection due to its non-specific effects against many viruses [38,39]. There is an exclusionary mention of the vaccine in the vaccination program of India and South Korea (Table 3). It is suggested that the live BCG vaccine can trigger metabolic and epigenetic alterations that may aggravate innate immune response to consequential infections, a mechanism termed as trained immunity [40]. Therefore, the vaccine may be effective against viremia and subsequently aid in rapid recovery. The Netherlands and Australia have already commenced the randomized controlled trials to investigate the significance of BCG-Danish in the reduction of COVID-19 severity [41]. However, WHO doesn't recommend the vaccine for COVID-19 outside the purposes of clinical trials. Studies supporting the use of the vaccine in the disease may be affected by numerous confounders like variations in national demographics, an overall load of the disease, detecting and reporting rates, interventions like social distancing, or quarantine, followed by the stage of the pandemic in a country [38]. It is necessary to provide experimental proofs that demonstrate the potential of BCG or any vaccine against SARS-CoV-2 infection [42].

Limitations

The study does not talk about the infection rate. The data presenting the total population number of a country at any given time of the year would be influenced by data collection time. This would not necessarily coincide with the time of data collection of COVID-19 infected individuals. Therefore, it would be hard to say that out of those many total people, a number of people were infected/dead due to COVID-19. Another limitation of the study is that much of the data is not publicly available. The infection data correlates to certain hotspots/disease epicenters and is representative of the whole country. Under such circumstances considering the total population of a country for comparison purposes may be misleading. The cities within countries also consist of migrant workers from various other countries/nearby cities/villages. These people are often not the registered residents of that particular country/region; therefore, although they might be counted under COVID-19 positive category on infection, they may not necessarily be a part of the country's/cities total population.

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Authors' Contributions

HCJ, SJ and BB analyzed and interpreted the epidemiological data of various countries and states. BB and SJ collected the information from various sources. SJ, BB and HCJ contribute to writing the manuscript and finalize it. All authors read and approved the final manuscript.

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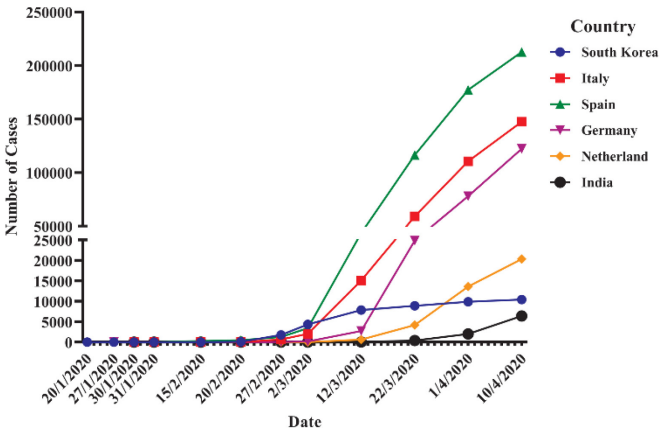
Annex – Supplementary Items

Supplementary Table 1. Age-wise number of male and female in Australia, India, Norway and South Korea.

Sr. no.	Country	0-19 years		20-49 years		50 years-above	
		Male	Female	Male	Female	Male	Female
1	Australia	105	97	1,297	1,278	1,205	1,122
2	India	74	63	822	259	165	418
3	Norway	130	128	1,222	1,306	1,302	1,120
4	South Korea	358	306	2,175	3,082	1,579	2,765

Supplementary Figure 1. Comparison between the rise in the number of confirmed cases of COVID-19 among different countries. The plot resulting from the date of the first case until April 10, 2020, *vs*. the number of cases resulted in a slope unique to a particular country.



Supplementary Figure 2. Comparison between the rise in the number of death reports due to SARS-CoV-2 infection among different countries. The plot resulting from the date of first death reported until April 10, 2020, *vs.* the number of death reports resulted in a slope unique to a particular country.