



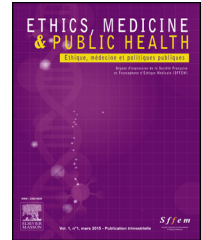
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## ORIGINAL ARTICLE

# A Study of the Correlation between the Dates of the First Covid Case and the First Covid Death of 25 Selected Countries to know the Virulence of the Covid-19 in Different Tropical Conditions

O. Jamsheela

EMEA College of Arts and Science, Kondotti, Kerala, India

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 Effect of Corona virus  
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 First COVID-19  
 reported case

## Summary

**Background.** – Since December 2019 the highly contagious COVID-19 virus has been spreading worldwide with a rapid spike in the number of deaths. The WHO declared COVID-19 to be a pandemic in March 2020. As of June 2020 it has been 7 months since the first case of COVID-19 was reported in Wuhan, China. So far, COVID-19 has affected more than 24 million people in 215 countries/territories, has caused more than 0.8 million deaths and spread unpredictably quickly among people worldwide. The infection rate in many nations continues to spike. After restraint of the initial outbreak failed, authorities turned to implementing new policies designed to slow the contagion of the virus and the spread of COVID-19 to a manageable rate. This paper presents a systematic analysis to examine in the 25 most affected countries the association between the dates of first death and the first case of the virus to analyse the virulence and also to examine the association between the first case and the virus spread.

**Methodology.** – Data from the WHO website were used. After filtering the data, we calculated the number of days between the first reported case in China and the first reported case in each of the countries, NDFC. Another variable, NDFD, the number of days between the first reported case and first reported case of each country, was also calculated. Then we established the correlation between NDFC and NDFD. Tables are used to show the statistics and charts in order to make the findings clearer.

E-mail address: [ojamshi@gmail.com](mailto:ojamshi@gmail.com)

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*Results.* – The date of the first death of each country is not dependant on the first case. When NDFC is high, the variable NDFD is homogeneously low. When the variable NDFC is low, the variable NDFD is heterogeneous. The virus could have been mutating and became more virulent during March. The countries with the highest number of deaths are not the most affected countries when analysing the death ratio of cases and population.

*Conclusions.* – COVID-19 has spread unpredictably quickly among people worldwide. In this critical situation, this paper presents a systematic analysis about the infected cases of COVID-19, deaths and association between first case and first death in each country. In order to obtain a true picture it is necessary to analyse the raw date in different dimensions, and at the end of the paper we will show a clear picture about which countries have controlled the virus very efficiently and which countries have been most affected by it to date.

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## Introduction

COVID-19 takes us 100 years back because of its safety measure of untouchability, which had been followed in many countries by mainstream as a social custom. The research on new viruses has also become a main research area in several countries with dangerous viruses and bacteria stored in the laboratories for research purposes.

Many pandemic and epidemic situations have been faced by our ancestors and many persons have been killed by emerging viruses such as Ebola virus, avian H7N9, SARS-CoV, or MERS-CoV, SARS-CoV-2, etc.

The new type of viral infection caused by the corona virus emerged in Wuhan City, China, and was first reported in November 2019 [1]. When China reported the situation to the world, the virus had already been exported from China and spread to other countries. Some studies reported that this novel virus may have been transferred from an animal source, such as bats, to human beings. On 31 December 2019 China alerted and informed the WHO of several flu-like cases in Wuhan. WHO issued a statement on 5 January 2020, by advising the member countries against and imposing restrictions on trade or travel with China because of the virus infection. WHO declared on 26 January that the global risk of the novel corona virus was 'high' rather than 'moderate' as they previously reported. WHO characterized COVID-19 as a pandemic on 11 March. On the same day, Director-General of WHO openly told the media that there were more than 118,000 cases in 114 countries, and 4291 people had lost their lives. The first officially recorded case of COVID-19 outside China was in Thailand in on 13 January 2020.

Since that time researchers have been publishing papers providing new information about COVID-19. Still the number of infected people continues its ominous climb. In the wake of the increase in the number of COVID cases, each country has followed different actions to control the spreading of the virus. Some countries have followed lockdowns, some others are waiting for herd immunity while some have increased testing. While the focus is on the rising number of COVID-19

cases, the fact is that a considerable number of people have died all over the world due to other kinds of virus or bacterial infections. The virus spread could have been controlled if it had been identified and proper precautions taken before it left the original source.

Nipah Virus (NiV) is a potential threat to global health security. NiV was first discovered in Malaysia in 1998 and subsequently in Singapore (1999), Bangladesh (2001) and Philippines in 2014. The first recorded outbreak of NiV in India was identified in Siliguri, West Bengal in 2001, affecting 66 persons with a mortality of 68%. The second was in Nadia, West Bengal in 2007, and affected five persons with 100% mortality. Nipah virus was designated one of ten priority diseases in the Research and Development Blueprint of 2018 by the World Health Organisation (WHO) [2]. The mortality rate of Nipah in Kerala was an alarming 88.9% (as of 7 June 2018) reported by Directorate of Health Services, Kerala [3]. It is many times higher than the mortality rate of Covid-19. The infected countries managed to control the spread of Nipah virus very efficiently.

The outbreak of the swine influenza virus of 2009 was not the first of its kind. Swine virus infections were observed in 1976 at an army training base in Fort Dix, New Jersey [4]. It has been proven that if this kind of virus can be detected sufficiently early, it can be controlled before it spreads as a pandemic in the world. Now each country is trying to control the spreading of the COVID virus in different ways, but all the countries unanimously follow common rules, ie, frequent hand wash, wearing a face mask, social distancing and staying home. But the UK, during the first stages of the virus spread, tried to get herd immunity to the people, a concept describing the point at which a population has developed protection against a disease. After the herd immunity concepts failed, the UK started following the above said four rules. Each country is now trying to explain that their concept is good by pointing to the number of cases, deaths and recoveries.

In this study, we attempt to analyse the statistics of COVID-19 effects related to different countries. By analysing the exact time duration taken by each country between

**Table 1** List of Variables Used.

No	Variable name	Description
1	DFC	Date of first reported case of each country
2	DFD	Date of first confirmed death of each country
3	NDFC	Number of days between DFC and first reported case in China (31/12/2020)
4	NDFD	Number of days between DFC and DFD
5	PC	The position of the country when the 215 countries are arranged according to the total number of cases

reporting its first case to report its first death, the mutation of the virus can be ascertained. Such findings and insights can be vital for taking exact safety measures on the global fight against COVID-19 (Table 1).

## Related work

While focusing on the rising number of COVID-19 cases and deaths in the world, many researches were being conducted to identify a vaccine against COVID-19. COVID-19 was first detected in November 2019 and had spread to other countries by January 2020, and many research papers had been published based on this topic within two or three months. Because of the vast number of published papers, many review papers also have been published. A review was conducted by selecting 65 research articles published before 31 January 2020 [5]. The authors analysed and discussed the epidemiology, causes, clinical diagnosis, prevention and control of this virus. One of their findings was that the majority of the papers, 67.7%, were published by Chinese scholars.

A considerable number of research papers have been published by analysing the symptoms of the virus infection. According to the latest reports, loss of smell and taste is considered to be an early symptom of COVID-19 infection. Some studies also have been conducted based on these symptoms. Another interesting study has been published by Luo et al. [6], in which the authors conducted a review on the use of Chinese herbals based on historical records and human evidence of SARS and H1N1 influenza prevention. They have concluded that these herbal formulae can be an alternative approach for prevention of COVID-19 in high-risk populations while waiting for the invention of a vaccine [6]. In another paper the authors studied the treatments being used, examined clinical and laboratory features and short-term outcomes (discharge or death) of patients with COVID-19. They have collected details of 102 patients of whom 17 died and 18 entered into intensive care unit (ICU) [7].

One study was performed in China with 131 COVID-19 patients and analysed their CT scans to find any common clinical manifestations and concluded that the Chest

CT plays an important role in diagnosing COVID-19 [8]. Another work based on the CT manifestations with representative COVID-19 cases at a hospital was conducted to help the radiologists make a quick and accurate diagnosis and strengthen the recognition of the virus features [9]. A few studies have used Artificial Intelligence on the COVID-19 datasets to process the data and retrieve information, and some papers have analysed this topic [10]. One paper presented a 3D CNN network to automatically diagnose COVID-19 from the community acquired pneumonia (CAP) in chest computed tomography (CT) [11]. A different study was conducted [12] to analyse how the social media users interpret the term COVID-19. Many research papers have been published regarding the spread of the virus. One study was conducted to make a prediction of daily new cases on the Diamond Princess Cruise ship by estimating the reproductive number of the novel virus in the early stage of outbreak [13]. The study was begun because 355 COVID-19 cases had been confirmed on February 16, 2020 on the ship. Another research work was trying to identify the time between the beginning of symptoms and death or discharge from hospital [14]. Another research has been applied to a simulated Singaporean population to estimate the likelihood of human-to-human transmission of severe acute respiratory syndrome coronavirus by adapting an influenza epidemic simulation model. After the detection of 100 cases of community transmission, they estimated the cumulative number of SARS-CoV-2 infections at 80 days by using this model. In Hong Kong, some public health measures have been implemented to reduce the local transmission of corona virus disease 2019. The authors of the paper [15] analysed the effect of these safety measures and behavioural changes of the public on COVID-19 and influenza virus infections. The authors concluded that the control measures such as border restrictions, quarantine and isolation, distancing, and changes in population behaviour reduced transmission of COVID-19 and influenza in Hong Kong. The above mentioned related works discuss the symptoms, treatments, spread, death, effect on children, effect on other patients, the application of technology etc. on the COVID-19 pandemic situation. Very little research has dealt with the time duration from the first case reported and first reported death. Here in this study, we have selected the most affected 25 countries.

## Materials and methods

Many online databases are available concerning COVID-19 updates. There is no other means than to rely upon online data to avail the global data during this pandemic situation as manual data collection cannot be carried during this lockdown period. However, the reliability of the available data has to be confirmed before using it. Various databases have been considered and finally the data was collected from the website of 'World Health organization' (WHO) [16]. The tabular form of data was downloaded and stored in Excel data sheets. The advanced filter and sort options of Excel were used to pre-process the data. The information of first confirmed death of each country was also extracted from the graphical data available in the WHO website as was the number of tests conducted in each country [17]. To confirm the

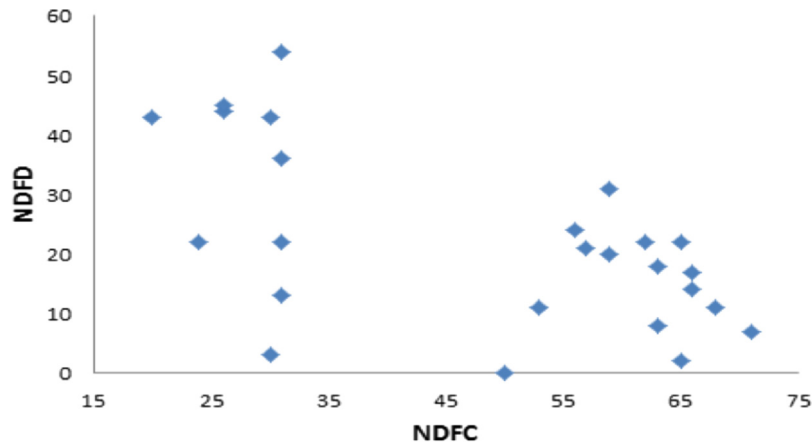


Figure 1. Correlation between NDFC and NDFD.

reliability of this data, first we crosschecked the other data with WHO website. The values such as NDFC and NDFD were calculated by using Excel formulas. Of the 215 countries, the 25 with the highest number of cases have been considered for this study.

### The Correlation between NDFC and NDFD

The correlation test was used to analyse the association between the NDFC and the NDFD of each country. The plotting of NDFC and NDFD in Fig. 1 showed an interesting and an important association between the two values. When NDFC was high, the variable NDFD was homogeneously low. When the variable NDFC was low, the variable NDFD was heterogeneous. This heterogeneity of NDFD can be explained by the different measures taken by the countries early in the pandemic. During the beginning of the pandemic situation, no proper studies were conducted on the virus, so the countries with a low NDFC value did not have enough experience with the virus. Therefore when NDFC was low each country had its own measures to control the virus and NDFD was heterogeneous. However when the NDFC was high, people knew the correct precautions to implement to control the virus spread. When the NDFC was high, the NDFD was low but homogeneously so because countries started to implement the common and popular control measures. Paradoxically enough, despite having COVID 19 deaths, some countries could not detect it at that time. For example, Turkey, where the NDFC was 71 the NDFD was 7 (Table 2).

### Number of cases and its Associations with the First Reported case and the First Confirmed Death

At the time of this study the COVID-19 was affecting 213 countries and territories around the world and two international conveyances (total 215) [17]. Various countries across the world were taking different steps to reduce the spread of the virus.

The basic reproduction number of the virus can be reduced through various strategies such as social distancing,

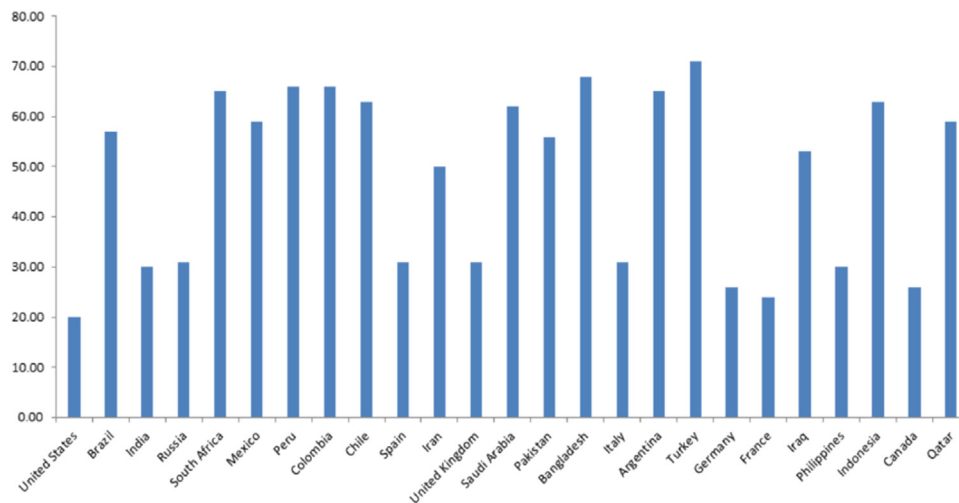
wearing a face mask, frequent hand wash etc. This section discusses how the virus has affected various countries. Out of the 215, 25 countries with the highest number of cases have been considered to analyse the first reported cases and the first confirmed deaths as shown in Table 2. The countries are sorted in descending order of number of cases. The first countries on the list have more cases than other countries while the last country on the list, Qatar, has the least number of reported cases. The countries with more than one hundred thousand cases are considered here. The third column contains the date of the first reported case (DFC) of each country, and the fourth column shows the number of days after the reporting of the first case in Wuhan, China (Dec 31, 2019) the country takes to report its first case. Fig. 2 is constructed based on the data in the fourth column. While observing the figure, we can see that the total number of cases in each country did not depend on the date of the first confirmed case of that country. The first case reported outside China was in Thailand on 13th January [18], but in Thailand only 58 deaths and 3351 total cases have been reported as on August 10/2020 [17]. Its population is more than 60 million; almost the same as France and it is in 11th position in the list of 215 affected countries. This indicates that the virus spread or DFC is not associated with the population size.

Among the 25 listed countries, ten (the USA, India, Russia, Spain, UK, Italy, Germany, France, Philippines and Canada) have reported its first case within one month. The 25 countries are sorted based on the total number of cases. These ten countries are neither on top of the list nor formed as a group of most affected countries. By analysing the another two countries from the top of the list, Brazil and South Africa reported their first case only after 57 and 60 days, but still they are in 2<sup>nd</sup> and 5th position in the list. By analysing Fig. 2, it is clear that the first reported case and the total number of cases in each country were not directly related with each other. No country could control the first spread of the virus because there were 118,000 cases in 100 countries when WHO declared COVID-19 a global pandemic on 11th of March 2020 [19].

The first confirmed death of each country depended on the controlling measures implemented by the country. The 5th column of Table 2 shows the date of first con-

**Table 2** List of most affected countries with the date of first reported case and the date of first confirmed death.

No	Country	DFC	NDFC	DFD	NDFD
1	United States	20-Jan-2020	20	03-Mar-2020	43
2	Brazil	26-Feb-2020	57	18-Mar-2020	21
3	India	30-Jan-2020	30	13-Mar-2020	43
4	Russia	31-Jan-2020	31	25-Mar-2020	54
5	South Africa	05-Mar-2020	65	27-Mar-2020	22
6	Mexico	28-Feb-2020	59	19-Mar-2020	20
7	Peru	06-Mar-2020	66	20-Mar-2020	14
8	Colombia	06-Mar-2020	66	23-Mar-2020	17
9	Chile	03-Mar-2020	63	21-Mar-2020	18
10	Spain	31-Jan-2020	31	13-Feb-2020	13
11	Iran	19-Feb-2020	50	19-Feb-2020	00
12	United Kingdom	31-Jan-2020	31	07-Mar-2020	36
13	Saudi Arabia	02-Mar-2020	62	24-Mar-2020	22
14	Pakistan	25-Feb-2020	56	20-Mar-2020	24
15	Bangladesh	08-Mar-2020	68	19-Mar-2020	11
16	Italy	31-Jan-2020	31	22-Feb-2020	22
17	Argentina	05-Mar-2020	65	07-Mar-2020	02
18	Turkey	11-Mar-2020	71	18-Mar-2020	07
19	Germany	26-Jan-2020	26	10-Mar-2020	44
20	France	24-Jan-2020	24	15-Feb-2020	22
21	Iraq	22-Feb-2020	53	04-Mar-2020	11
22	Philippines	30-Jan-2020	30	02-Feb-2020	03
23	Indonesia	03-Mar-2020	63	11-Mar-2020	08
24	Canada	26-Jan-2020	26	11-Mar-2020	45
25	Qatar	28-Feb-2020	59	30-Mar-2020	31

**Figure 2.** Country-wise NDFC.

firmed death of each country, dates taken from the WHO website [16]. The next column, ie, column 6 (NDFD), indicates the number of days between the first reported case (DFC) and the first confirmed death (DFD) of each country. The table has been sorted on descending order of the total number of cases which represents the data of the 6th column. From Fig. 3 it can be easily analysed that five countries reported their first COVID-19 death within ten days of their first case. The DFC values of the mentioned five countries differ, which indicates that the DFD value is not related to the DFC value, and shows that the early

deaths of the five countries do not depend on the date of the first case. Table 2, Fig. 2 and Fig. 3 indicate that the total number of infected cases are not associated with the date of the first reported cases and first confirmed deaths. Fig. 4 shows it very clearly, as the countries are ordered by the number of cases, and two bars indicate the DFC and DFD.

NDFC value is the number of days between DFC of each country and the first reported case in China (31/12/2020). When analysing the time onset of the value, we could find no specific reason to explain this. The time gap was because

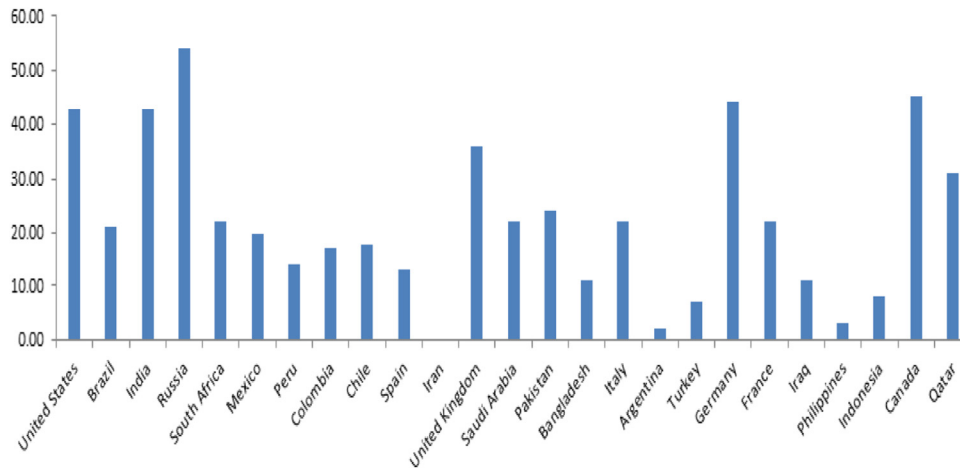


Figure 3. Country-wise NDFD.

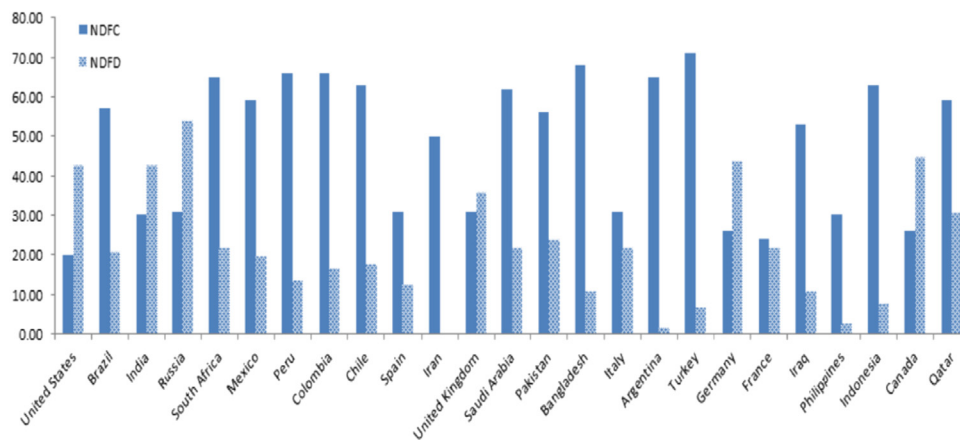


Figure 4. Country-wise NDFC and NDFD.

of the time taken by the virus to reach each destination by means of its carriers from China which is the largest producer of all kinds of products. People from all corners of the world travel to and from China. Moreover, there are many students traveling to different universities of China and Chinese students are also studying in other countries, which accelerates the spread of the virus everywhere. For example, the first COVID 19 case reported in India was a student from Kerala who was studying medicine in China [20].

Table 3 is sorted on the order of NDFC and shows an interesting factor. Most of the countries with a lower NDFC value have a higher NDFD value, which shows that the early first cases reported countries take more time to report its first death. In fact, those countries have not had sufficient time to implement the controlling factors because the virus had entered earlier than into other countries on an average of 26 days. The other countries, those after 7th position, have more time to control the virus because their NDFC is higher (average 56 days), but they have reported the deaths within an average of 16 days. Why did this happen? Another noticeable factor is that Iraq confirmed its first death on the same day of its first reported case. From the above it is clear that many countries were unable to identify and report their actual first case.

By comparing the three figures and two tables we can conclude that the virus spread and the number of total cases are not directly related with the first corona case reported in each country, nor is the first death related to the first reported case. It clearly indicates that the death depends on various factors such as the controlling measures implemented by the countries and the immunity power of the citizens, etc

To evaluate the virus mutation, carefully analyse Table 2. Some of the countries which reported the first case in March also had their first death in March, but most of the countries with the first case in January or February also had their first case in March. This clearly indicates that the early affected viruses were less virulent than those reported in March. In the early period of the COVID-19, ie. Dec, Jan and Feb, many studies reported that the virus was not very harmful and the death rate was less than 2%. The above analysis suggests that the virus reported in March could have been a new mutated version of the virus and more virulent.

## COVID-19 Deaths, Population and Cases

The number of cases and the days of first death and first case have been analysed in the above sections, but the most

**Table 3** Country-wise NDFC and NDFD, Countries are sorted on NDFC values.

No	Country	NDFC	NDFD
1	United States	20	43
2	France	24	22
3	Germany	26	44
4	Canada	26	45
5	India	30	43
6	Philippines	30	3
7	Russia	31	54
8	Spain	31	13
9	United Kingdom	31	36
10	Italy	31	22
11	Iran	50	0
12	Iraq	53	11
13	Pakistan	56	24
14	Brazil	57	21
15	Mexico	59	20
16	Qatar	59	31
17	Saudi Arabia	62	22
18	Chile	63	18
19	Indonesia	63	8
20	South Africa	65	22
21	Argentina	65	2
22	Peru	66	14
23	Colombia	66	17
24	Bangladesh	68	11
25	Turkey	71	7

important matter to be discussed is the effect of the virus *ie*, the death rate of the COVID-19 patients. A number of studies have been published on this topic [21,22]. As it is not possible to list all 215 effected countries here, 25 countries have been selected based on the number of deaths. Table 4 contains only those countries which have reported more than 5000 COVID-19 deaths with the list sorted on the number of reported deaths of each country. USA and Brazil came as the first two countries in Table 4 because the total numbers of deaths are more than one hundred thousand in both the countries which is the highest number of deaths among all the 25 countries, but the death rate of these two countries are only 3% of the total cases. If the death ratio is considered, other countries have been more affected. At the time of this writing, UK, Italy and France had a death rate of more than 14% of the total number of patients. In addition, the number of reported cases of these countries was less than 0.5% of the population. Column 6 of Table 4 presents the percentage of deaths of the total cases of each country. Looking only at column 4, the real statistics of deaths cannot be analysed. Russia and South Africa have the lowest percentages of deaths, but both the countries are in 12th and 14th places respectively with the list arranged on the basis of the actual number of deaths.

The countries are arranged in Table 5 according to their death ratio of cases. The countries with a death rate greater than 5% have been selected and listed. Out of 215, only 21 countries have confirmed more than 5% deaths of the total cases, but eight countries on the top of the table have a rate above 10% of the total cases. The officially declared

**Table 4** Country-wise report, number of deaths ad death percentage of population

No	PC	Country	Deaths	% cases of population	% deaths of cases
1	1	USA	166192	159	3.16
2	2	Brazil	101857	1.44	3.33
3	6	Mexico	53003	0.38	10.91
4	12	UK	46526	0.46	14.93
5	3	India	45383	0.16	2.00
6	17	Italy	35209	0.41	14.04
7	20	France	30340	0.31	14.96
8	10	Spain	28576	0.79	7.72
9	7	Peru	21276	1.46	4.40
10	11	Iran	18616	0.39	5.66
11	4	Russia	15131	0.62	1.69
12	8	Colombia	13154	0.78	3.31
13	5	South Africa	10621	0.95	1.88
14	9	Chile	10139	1.96	2.70
15	37	Belgium	9879	0.64	13.24
16	19	Germany	9265	0.26	4.24
17	24	Canada	8987	0.32	7.48
18	42	Netherlands	6157	0.35	10.40
19	14	Pakistan	6112	0.13	2.14
20	28	Ecuador	5932	0.54	6.26
21	18	Turkey	5858	0.29	2.42
22	23	Indonesia	5824	0.05	4.52
23	33	Sweden	5766	0.82	6.95
24	21	Iraq	5464	0.38	3.56
25	27	Egypt	5035	0.09	5.26



No	PC	Country	Number of cases	Deaths	% cases of population	% deaths of cases
J	133	Yemen	1,832	518	0.01	28.28
2	20	France	202,775	30,340	0.31	14.96
3	12	UK	311,641	46,526	0.46	14.93
4	17	Italy	250,825	35,209	0.41	14.04
5	37	Belgium	74,620	9,879	0.64	13.24
6	105	Hungary	4,746	605	0.05	12.75
7	6	Mexico	485,836	53,003	0.38	10.91
8	42	Netherlands	59,194	6,157	0.35	10.40
9	10	Spain	370,060	28,576	0.79	7.72
10	24	Canada	120,132	8,987	0.32	7.48
11	33	Sweden	82,972	5,766	0.82	6.95
12	64	Ireland	26,768	1,772	0.54	6.62
13	80	Sudan	11,956	781	0.03	6.53
14	144	Liberia	1,240	79	0.02	6.37
15	28	Ecuador	94,701	5,932	0.54	6.26
16	147	Niger	1,158	69	0.00	5.96
17	126	Slovenia	2,272	129	0.11	5.68
18	11	Iran	328,844	18,616	0.39	5.66
19	31	China	84,712	4,634	0.01	5.47
20	55	Switzerland	36,708	1,987	0.42	5.41
21	27	Egypt	95,666	5,035	0.09	5.26

No	PC	Country	Number of cases	Total deaths	Death© 1 million population	Population	% cases of population	% deaths of cases
1	37	Belgium	74620	9879	852	11595289	0.6	13.2
2	12	UK	311641	46526	685	67925918	0.5	14.9
3	07	Peru	483133	21276	644	33021340	1.5	4.4
4	10	Spain	370060	28576	611	46756846	0.8	7.7
5	17	Italy	250825	35209	582	60451600	0.4	14.0
6	33	Sweden	82972	5766	571	10106283	0.8	6.9
7	09	Chile	375044	10139	530	19134305	2.0	2.7
8	01	USA	5251446	166192	502	331219304	1.6	3.2

death rate of COVID-19 ranges from 0.75% to 3%. The death rate also depends on the number of tests. If the countries conducted more tests, there is a possibility to increase the number of cases, therefore it will decrease the death rate. The real statistics of COVID-19 death can be calculated as the ratio of the population, which is shown in Table 6. The 215 countries were also sorted on the death ratio of the population, and we selected eight countries which have more than 500 deaths per one million populations. Column 6 represents the death ratio of population. When considering the total number of deaths, USA and Brazil have more deaths than the other countries. But considering the percentage of deaths of the cases, Yemen, France, UK and Italy have higher death rates than other countries. Another group of countries, ie, Belgium, UK, Peru, Spain, Italy, Sweden, Chile and USA, have higher death rates when compared to the death ratio of the population. The death ratio of population was not associated with the death rate of cases, which is shown in last column.

## Conclusion

With COVID-19 spread continuing unabated throughout the world, each country has been implementing different controlling measures. The COVID-19 mutation and deaths are analysed by considering all the countries with the virus spread. Many sites, including official sites, are giving the data in different forms such as tables, graphs and numbers. While analysing the data as it is, no one will get a clear picture about the statistics of the effect of the virus. The aim of this analysis is to unveil the hidden knowledge, which can be achieved by looking at the data in different dimensions. At present more than 24 million COVID-19 infected cases and more than 0.8 million COVID-19 deaths have been reported worldwide, meanwhile more than 16.6 million recovered cases have also been reported. The number of recovered is also spiking with the reported cases which gives great relief to the people everywhere. Pandemics are affecting peoples' lives in different ways and will end by leaving some

sad memories and some new habits. We will overcome this crisis too.

## Human and animal rights

The author declares that the work described has not involved experimentation on humans or animals.

## Informed consent and patient details

The author declares that the work described does not involve patients or volunteers.

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The author declares that he has no competing interest.

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