COMPREHENSIVE MEASURES TO THE THREATENING OF COVID-19: A STATISTICAL SURVEY ON PUBLICLY AVAILABLE CASE DATA

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Abstract

This survey is made primarily by using the review literatures on COVID-19 by the scientists who have implemented different methodologies for investigations. In the paper different type of studies, viz., observational, experimental, review articles, clinical trials and others are analyzed in order to facilitate information to the scientists and active workers engaged in this challenging field. COVID-19 scenario of India with reference to global picture as reported by World Health Organization (WHO) as their routine work is analyzed to investigate the emergence of threatening with a direction for probable control and preventive measure.

Keywords: *Novel Coronavirus, Health Care, World Health Organization, Preventive Measure, Clinical Trials, Acute Respiratory Distress Syndrome*

1. Introduction

Novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) originated in bats and was transmitted to humans through unknown intermediary animals in Wuhan of China in December 2019. The disease is transmitted by contact or inhalation with infected droplets with an incubation period from 2 to 14 days. World Health Organization (WHO) after the rapid spread of SARS-CoV-2 virus declared 'COVID-19 pandemic' on 11 March 2020 when hit all continents and caused thousands of deaths worldwide [1, 2]. A good number of papers have published on the topics from different parts of the globe focusing the variety of the observed symptoms and the processes of various treatments [1, 3] but yet no particular path has been proposed. For a better understanding of this pandemic, a critical survey of different scattered information is emphasized in this work. COVID-19 scenario of India with a brief global picture as reported by WHO is also considered for finding the emergence of new threatening The analyzing results with some interesting reports are focused within a broader context elaborating clinical presentation and supportive care strategies with a priority to the old people, sketching the probable features owing to COVID-19. Our results are coupled with evaluation of the landscape of current and future clinical trials including high-lighted areas of priority for future research.

2. Historical Backgrounds

During the past two decades there have been two events wherein crossover of animal beta corona viruses to human has caused severe disease. The first instance was in 2002–2003 when a new coronavirus of the β genera with origin in bat crossed over to human through the intermediary host of palm civet cat in the Guangdong province of China. This severe acute respiratory syndrome coronavirus affected 8422 people mainly in China and Hong Kong resulting 916 deaths with mortality rate 11% before being contained [4]. After a decade in 2012, the Middle East

respiratory syndrome coronavirus (MERS-CoV) again originated from bat emerged in Saudi Arabia with dromedary camel as the intermediate host. This time 2494 people were affected, causing 858 deaths with fatality rate 34% [5].

The viruses are enveloped positive sense RNA viruses having range from 60 nm to 140 nm in diameter with spike like projections on the surface. When viewed in electron microscope it looks like a crown like appearance and thus giving the name coronavirus [6]. Four types of corona viruses, viz., HKU1, NL63, 229E and OC43 have been in circulation in human with mild respiratory disease. In general, 2019-nCoV particles are spherical in shape, enveloped with some pleomorphic in electron micrographs [7]. Virus particles have distinctive spikes which make them the appearance of a solar corona (Figure 1).

a. Initial Spread of COVID-19

Adults in Wuhan of the capital city of Hubei province, in December 2019, started to send patients at the local hospitals with severe unknown cause pneumonia. Activating the surveillance system, respiratory patients were sent to reference labs for the purpose of etiologic investigations. On December 31, 2019, China notified the outbreak to the WHO. On January 7, 2020, the virus was detected as a coronavirus that had >95% homology with the bat coronavirus and > 70% similarity with the SARS-CoV. China tested samples from the Huanan sea food market and identified positive [8]. Soon the number of cases exponentially started to increase, suggesting that human-to-human transmission was occurring [9]. During the Chinese New Year, the massive migration of Chinese fuelled the epidemic at other provinces of China as well

as other neighbouring countries like Thailand, Japan and South Korea in a very short time. Transmission to healthcare workers was alarming as described on January 20, 2020. The 11 million population of Wuhan was placed under lock down on January 23, 2020 which was soon extended to other cities of Hubei province [10].

Airports in India, similar to many other countries, started to maintain screening mechanisms for detecting symptomatic patients coming back from China. In principle, the passengers were placed in isolation for testing them COVID-19 and it was apparent that the infection could be transmitted from the asymptomatic person and even before the start of the symptoms. Countries including India, who evacuated their citizens from Wuhan through special flights or people who were returning from China, placed all people symptomatic or in isolation for 14 days and tested them for the virus. Soon cases were noticed to increase exponentially and modelling investigations confirmed an epidemic [11]. While India reported only 3 cases till March 2, 2020, observed a sudden enhancement by March 5, 2020 when 29 cases had been reported primarily from Delhi, Jaipur and Agra apparently because of Italian tourists and their contacts. One case was reported for an Indian who returned from Vienna and exposed many school children in a birthday party at a city hotel. Many of these cases were quarantined. It may be noted that these numbers are an underestimate of the infected and dead because of limitations of surveillance and testing. Covid-19 though originated from bats, the intermediary animals for crossing over to humans is yet uncertain. However, pangolins and snakes are two in the suspected list.
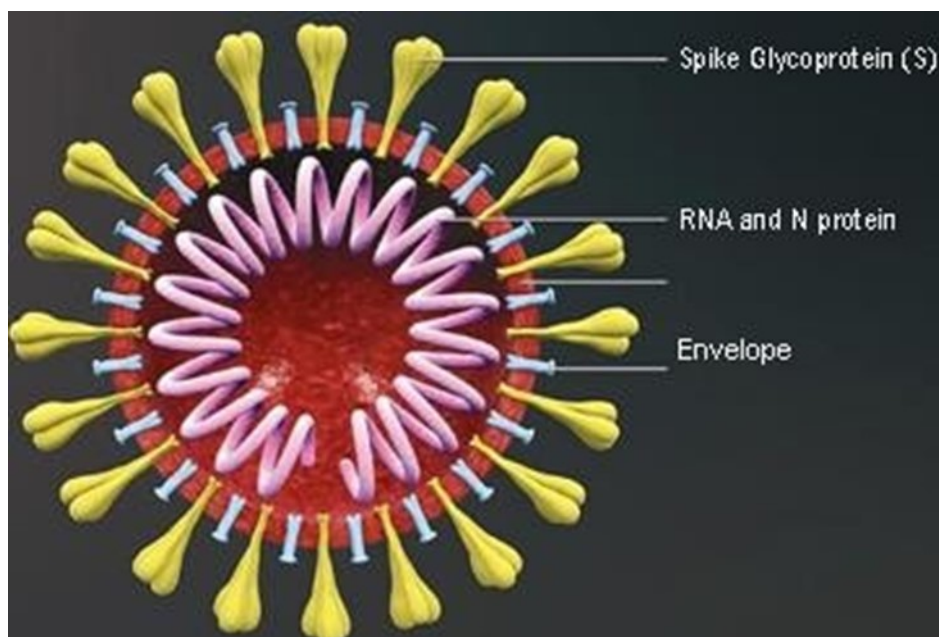
Figure 1 Structure of Coronavirus; virus particles have distinctive spikes to make them the appearance of a solar corona [7]

3. Asymptomatic States to Acute Respiratory Distress Syndrome

Clinical features of COVID-19 are widely varied from asymptomatic states to acute respiratory distress syndrome including multi organ dysfunction. The common clinical features exhibit fever in general, headache, fatigue, cough, sore throat, conjunctivitis, myalgia and breathlessness. By the end of the first week, for many patients, the disease can move to pneumonia, respiratory failure and even death. This development is related to extreme rise in inflammatory cytokines, e.g., IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1A, and TNFα [12]. Generally, the median time from the start of symptoms to dyspnea was 5 days, hospitalization 7 days and acute respiratory distress syndrome (ARDS) 8 days.

The most common symptoms of the patients are cough (38%) and fever (50%) [13].Complications are mainly noted as ARDS, acute lung injury, shock and acute

kidney injury. Recovery usually found in the 2nd or 3rd week. The median duration of hospital stay for those recovered was 10 days. Death and adverse outcomes are more common for the elderly as well as those with underlying co-morbidities (50– 75% of fatal cases). The overall fatality rate is estimated to range between 2 and 3% [14].

a. Rate of Infection, Incubation Period, Symptom and Risk factor

At the outbreak of Covid-19, an association of the animals was identified [15]. But with time the person-to-person transmission showed dominant role. It is occurred mainly through direct contact or through droplets spread due to coughing or sneezing of an infected person. It is critical to understand the incubation period because of its epidemic size. Linton et al. [16] found an average incubation period of 5.6 days [17]. According to various studies, the symptoms at the beginning are myalgia, sputum production, fever, cough, fatigue and

dyspnea. Some less common symptoms included diarrhea, nausea, hemoptysis, abdominal pain and vomiting [18]. For small percentage of patients sore throat and nasal congestion have noted. Older patients particularly patients with chronic underlying conditions have exhibited very poor outcomes [19].

Clinical risk factors associated with the extreme respiratory distress syndrome causing the patients to death with COVID-19 pneumonia is a matter of great concern. Analysis reveals that elevated coagulation function–related indicators, elevated inflammation-related indices, lymphocytopenia, neutrophilia are closely associated with higher risks causing development of ARDS [19]. Infection by COVID-19 results some non-specific symptoms like rhinovirus, influenza, adenovirus, respiratory syncytial virus, parain-fluenza virus and others early familiar human coronaviruses. The diagnosis can be further confirmed through microbiologic testing [20, 21].

b. Laboratorial Parameters to help the Diagnosis

For a COVID-19 patient, the most common ocular symptoms are conjunctivitis, conjunctival hyperemia, chemosis, epiphora and increased secretions. In a large number of cases patients are diagnosed higher white blood cell, procalcitonin, C-reaction protein, neutrophil, and lactate dehydrogenase [22].

The virus isolation and viral nucleic acid detection are the two major tests for the purpose of confirming the infection. Moreover some nonspecific parameters may be helpful, particularly in the early stage of the disease like leukopenia or a normal number of leukocytes with lymphopenia or increased monocytes [19, 21]. It is important to note that a procalcitonin, C-reaction protein or lactate dehydrogenase increase appears in COVID-19 infection [20].

Image abnormalities could also appear that vary with immunity, age, underlying diseases and infection stage. Some typical patterns have been reported at CT scan or chest X-ray which are multiple patchy shadows, ground-glass opacity, interstitial changes infiltrating shadows, and pulmonary consolidation [21, 23].

4. Indian Scenario with reference to Global Picture as per report of WHO

In order to provide accurate and useful information about COVID-19, the world health organization (WHO) is releasing over 200 daily situation reports. The dangerous virus rapidly spreads throughout the world infecting people when they come together. 2020 saw the world unite against the virus to international collaboration on research and innovation. The WHO established well scientific relationships and connections to facilitate the rapid development of vaccines, treatments and diagnostics. Altogether WHO hosted 38 Member State information sessions. During these information sessions a total of 79 countries shared the experiences of their countries with COVID-19 in the spirit of solidarity. The media have also been a partner and key audience. WHO always shared the latest developments and also participated in explaining the science series related to COVID-19 to the public.

a. Educating Responders

With the first news of the disease outbreak at the beginning of January, 2020, the world health organization updates its dashboard for COVID-19 regularly to give a real-time snapshot of the pandemic. For helping frontline responders WHO provided free online training courses using the platform of open WHO. Figure 2 shows the online learning enrolments during January to December, 2020. The figure reveals that out of total enrolments of 4.7 M, enrolled in COVID-19 courses was 3.9 M [24].
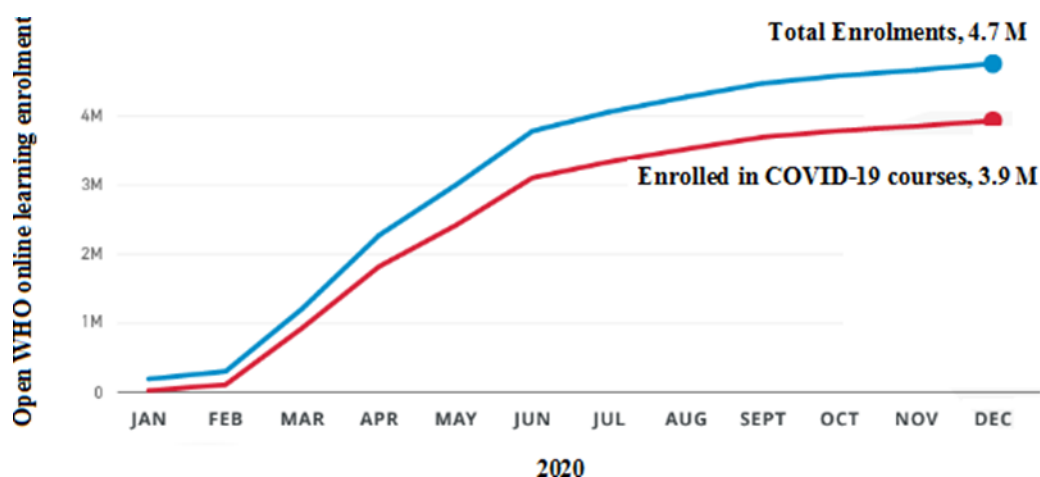
Figure 2 The online learning enrolments during January to December, 2020
[https://www.who.int/news-room/spotlight/a-year-without-precedent]
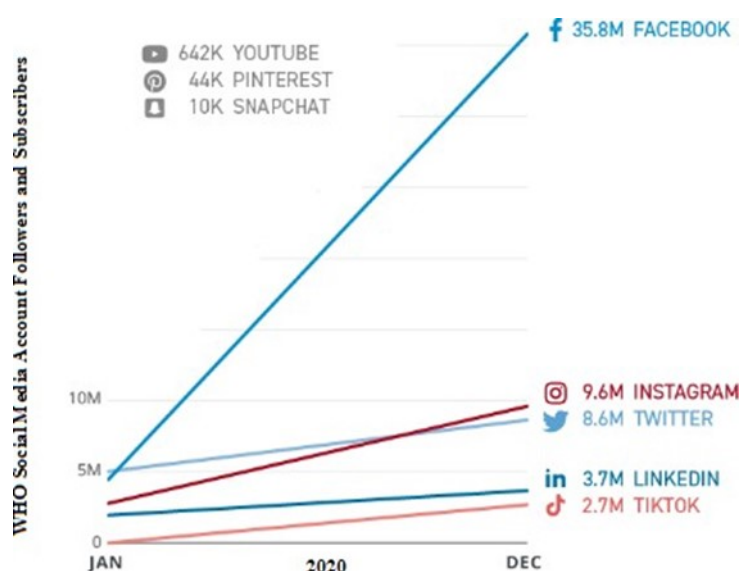

Figure 3 WHO social media account followers and subscribers during the year 2020
[https://www.who.int/news-room/spotlight/a-year-without-precedent]

For the purpose of spreading the world through social media, WHO launched different platforms in 2020, viz., Messenger, Snap chat, Tik Tok, GIPHY, Whatsapp, Twitch and Viber. Figure 3 shows the WHO social media account followers and subscribers. The highest number of 35.8 M is exhibited for the face book. With health workers, communicators, hospital directors, logisticians, lab technicians and politicians WHO has worked hand-in-hand and sent virtual and in-person missions of experts to different countries around the globe.

More than 30 countries invited WHO for the purpose of intra-action reviews to find and figure out what to fix next time for betterment. It was WHO supported the deployment of 70 Emergency Medical Teams to 44 countries

along with 840 national teams to mobilize, utilizing the epithelial–mesenchymal transition (EMT) methodology (Figure 4). Technical support, virtual training, equipment were provided by WHO as and when required. The data shown in the figure is reported by WHO as of December 8, 2020.

Within a month's time 2/3 of countries developed their lab testing capabilities but subsequently all the countries improved the testing quality significantly. As for example, the lab testing capabilities of the African nations dramatically increased over a period of six months owing to the support from WHO (Figure 5). In fact, it is true for all the other 54 countries. This data is reported by WHO as of December 8, 2020.

Figure 4 WHO supported the deployment of Emergency Medical Teams to different countries
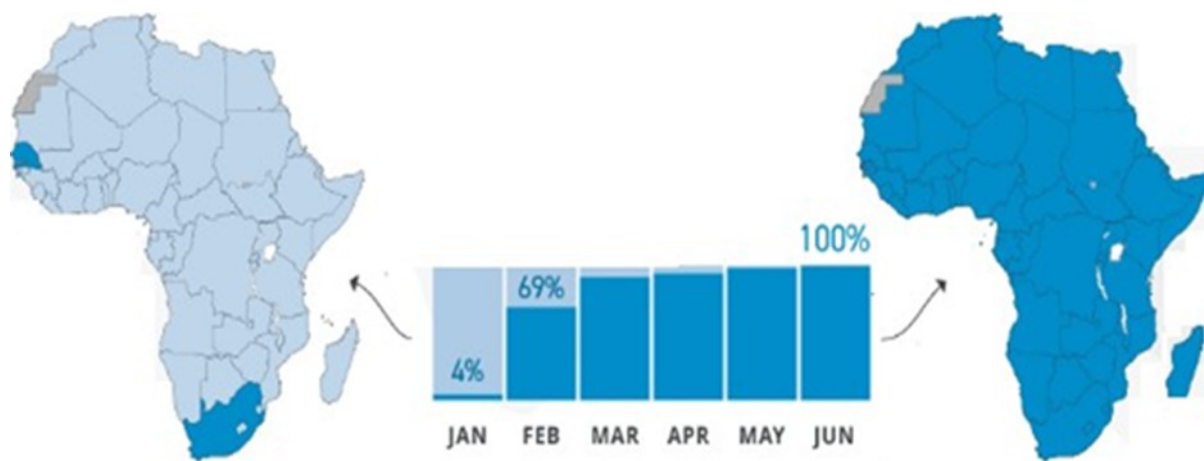

Figure 5 African nations increased their lab testing capabilities over a period of six months
[https://www.who.int/news-room/spotlight/a-year-without-precedent]

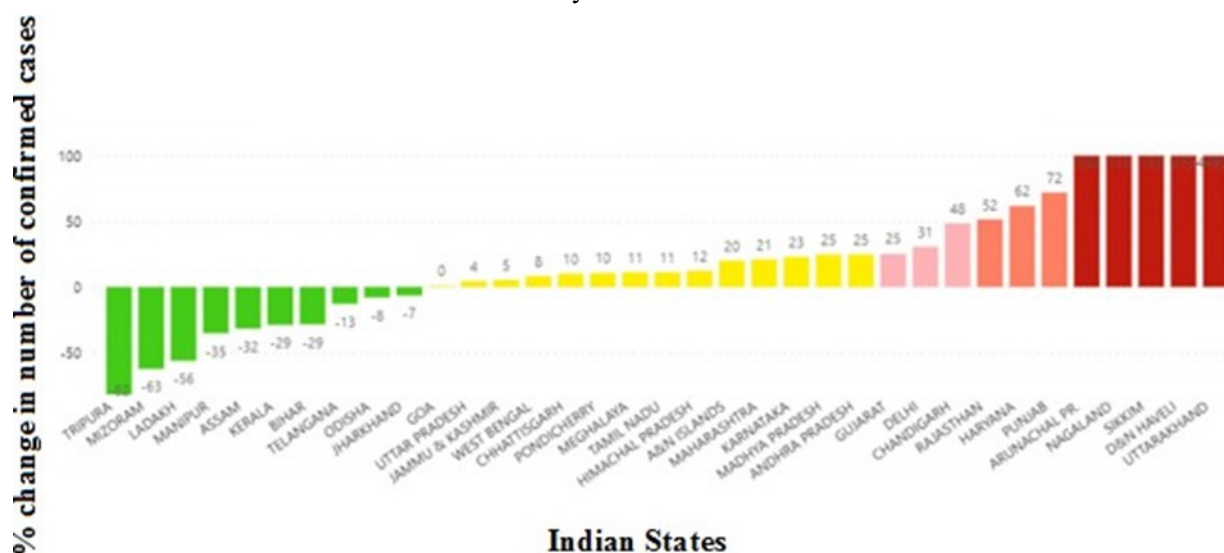| Feature	Year	Number
Total population	2016	132, 4 1, 71 000
Life expectancy at birth M/F	2019	69/72
Total expenditure on health as % of GDP	2014	4.69

Table 1 Key statistics of India

Figure 6 The percentage change in number of confirmed cases when compared for two consecutive weeks March 2 and March 9, 2021(Courtesy: WHO)

b. Covid-19 Scenarios across States of India

Table 1 represents the key statistics of India from WHO's Global Health Observatory. If we look at the WHO situation update report no. 58 of India, as of March 9, 2021, we find that a total number 1, 12, 44, 786 were the confirmed cases while the total number of deaths were 1, 57, 930. Out of 36 states and UTs, five states, viz., Maharashtra, Kerala, Karnataka, Andhra Pradesh and Tamil Nadu are affected more than 50% of total cases.

Figure 6 presents the reported data of WHO wherein the data for the two consecutive weeks March 2 and March 9, 2021 have compared and plotted showing the percentage change in number of confirmed cases. It is

seen from the figure that during the week ending March 9, a total of 24 states have shown an increase in the number of confirmed cases.

In responding to COVID-19, WHO Country Office (WCO) for India is continuing work in close collaboration with Ministry of Health and Family Welfare (MoHFW) at the national, state and district level. For the coordination part, WCO continues to provide technical support to MoHFW through Joint Monitoring Group at the national level and through task force/control rooms at the state and district level. Figure 7 shows the daily cases and daily deaths from April 2020 onwards as reported on 15 February 2021 by WCO COVID-19 Dashboard using MoHFW data (Report No. 57).
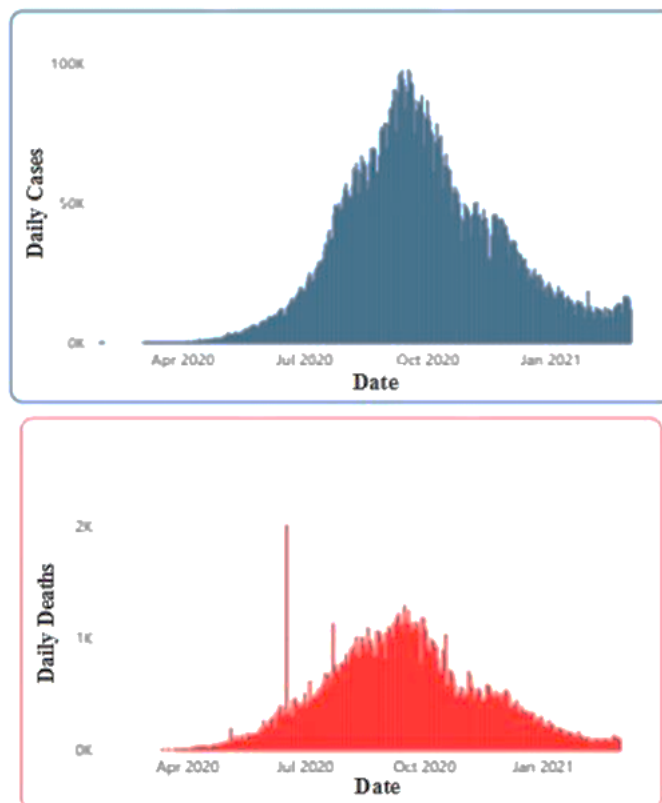
Figure 7 Daily cases and daily deaths from April 2020 onwards as reported on 15 February 2021
(Courtesy: WCO COVID-19 Dashboard)

As on March 01, 2021, the percentage increase/decrease in COVID-19 cases across the different states of India are given in Figure 8. It is important to note that we need to take adequate precautions yet for its growing threatening and there is no scope at all to relax, particularly noting its enhanced number for both daily cases and daily deaths in India and many other parts of the globe.
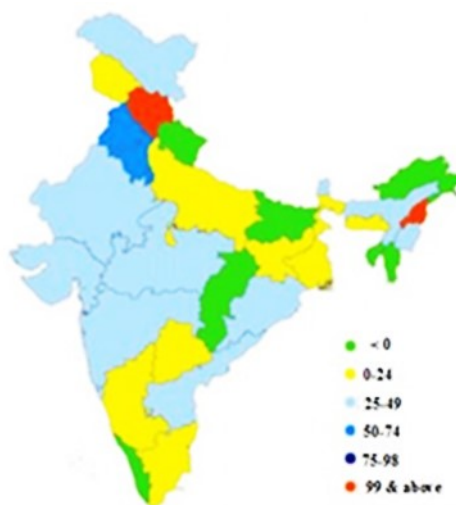

Figure 8 Percentage increase/decrease in COVID-19 across Indian states, as on March 1, 2021
(Courtesy: WHO)

5. Conclusions

In order to reduce the rate of disease transmission so far the most effective way recommended is the social isolation. Owing to the pandemic situation different countries in the world are stopping many regular activities increasing the unemployment rate of the countries which is a serious economic issue. It is true that the virus outbreak has challenged the economic, medical and public health infrastructure of different countries. The new threatening of COVID-19, as noticed from the WHO reported data will tell in due course how the virus will impact our lives globally including the tropical countries like India. It is alarming that future outbreaks of viruses and pathogens of zoonotic origin are likely to continue. So, besides curbing this outbreak, special efforts should be made to devise comprehensive measures of its prevention. The knowledge gathered so far should be utilized properly for its implementation and further development. Governments, health authorities and social organizations throughout the globe is sincerely working to assist in the next steps against the coronavirus.

Acknowledgements

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