The Current Scenario of COVID-19 Outbreak: Bringing World to a Halt

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Abstract

Viral infections are well known to pose a serious health threat if not treated on time, which is the current scenario of almost all nations of the world due to COVID19 pandemic. The disease believed to be originated from China in last December has killed >30,000 and infected around 550,000 worldwide in just a span of 3-4 months still poses a larger risk to the society due to unavailability of a potential drug or any other therapeutic intervention. However, the only treatment options available are the drugs prescribed in symptoms similar to those observed in COVID19 or by social distancing so as to halt the mode of human transmission from an infected person any further. Such a situation also highlights that, although we may have achieved scientific advancements in several other medical conditions but more efforts are warranted in near future to limit the spread of such pandemic outbreak. This review introduces the basic concept of COVID19, its epidemiology, diagnosis and management strategies to be followed till any therapeutic drug is made available over the counter.

Keywords: Coronaviruses, SARS-CoV, MERS-CoV, 2019-nCoV, COVID-19, Transmission

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1. INTRODUCTION

Among the several order of classification within the virus family, Coronavirus (CoV) contains a single stranded, positive sense RNA genome of 26-32 kb in length (Neuman et al., 2006). Such viruses have confirmed their existence in numerous avian hosts, including mammals. As a result novel mammalian coronaviruses are now regularly being recognized (Barcena et al., 2009). Such as in 2018, an unknown acute fatality with symptoms of diarrhoea in pigs was actually associated due to HKU2- related CoV of bats origin. Due to their widespread circulation and extremely infectious nature CoV are highly pathogenic to humans leading to development of mild clinical symptoms, with only exception in case of severe acute respiratory syndrome-CoV (SARS-CoV) and Middle-East respiratory syndrome-CoV (MERS-CoV), which were observed in 2002 and 2012 respectively (Zumla et al., 2016). In late 2019, the term novel-CoV (2019-nCoV) was coined for the virus exhibiting new strain of CoV, which when infected in humans showed signs and symptoms similar to those observed in pneumonia (Lu et al., 2020). But very recently, the International Committee on Taxonomy of Viruses have eventually named the virus as SARS-CoV-2. The World Health Organization (WHO) has announced the global spread of this disease caused by novel virus as coronavirus disease-2019 (COVID-19).
Repeated emergence and pandemic outbreak of such viruses pose a greater health risk, wherein the mode of transmission from human to human can barely be isolated (He et al., 2020).

The most common signs and symptoms observed in COVID-19 patients are fever (>98%), fatigue (>70%), dry cough (>55%) and diarrhoea (>35%). Moreover, the disease can be classified based on the severity into mild, moderate, severe and critical (Cook et al, 2020). The disease is said to be of mild occurrence in patients showing infection in upper respiratory tract accompanied by dry cough, nasal blockage, mild fever etc, thus accounting for majority (>80%) of cases reported so far. In case of moderate disease, shortness of breath with chest congestion and tachypnea is well observed. The condition of a patient is said to be serious with prominent features of pneumonia in conjugation with symptoms as observed during acute respiratory distress syndrome (Chen et al., 2020).

2. EPIDEMIOLOGY

Until March 10, 2020, WHO declared >110,000 confirmed cases globally, with maximum number (>71%) of fatalities cases from China and its nearby territories. Moreover, it is since then around 109 other countries have affirmed the presence of COVID-19. As of now (Figure-1), the number of confirmed COVID-19 cases worldwide has exponentially increased to 585,000 with 26,827 fatalities. Surprisingly, the majority of deaths (>9000) have now been reported in Italy, followed by Spain (4934) and even less in China mainland (3292). On the other hand, the total number of confirmed cases (>97,000) are now from USA, followed by Italy (86,498) and China (81,340) respectively. Interestingly in China and South Korea, which in starting of February 2020 had either maximum on zero number of confirmed cases, has now significantly less number of new confirmed COVID-19 patients, what could be termed as flattening the curve (Figure-2A).
Figure-1: The map depicts confirmed number of COVID-19 cases globally until March 27th, 2020 with maximum number from USA, Italy, China and Spain (World Health Organization, 2020).

Such a drastic fall is although hard to explain but could be due to greater impact of social distancing now declared in several countries, thereby halting the spread of such deadly disease more effectively (Ramphul and Mejias, 2020). Moreover, countries in close vicinity of China like Singapore, Hong Kong and Taiwan have less number of confirmed COVID-19 cases as reported till mid of March, achieved through early governmental decisions via consistent surveillance (Figure-2B). However, an increase in confirmed cases later this month suggests more efforts are required to contain the spread.

3. THE CURRENT SCENARIO

3.1 In United States of America and European countries

Until the recent updation in collection of data by WHO (Figure-3), it has been observed that besides China, USA with four other European nations (Italy, Spain, France and Germany) and Iran have reported a surge (>4000) in number of confirmed COVID-19 cases. The overall tally of confirmed cases per 1 million people is observed highest in Italy (1369.39), followed by Spain (1293.53), Germany (601.87), France (487.88), Iran (399.2), USA (296.89) and China (59.23) respectively. The global fatalities incurred as a result of this pandemic outbreak are > 26,500, with maximum deaths in Italy (>9000), followed by Spain (>4900), China (>3300), Iran (>2300), France (>2000), USA (>1500) respectively, with less number in Germany (>300).
Figure-2: The radar plot depicting (A) the current concept of curve flattening being observed in China and South Korea and (B) sparsely existence of COVID-19 cases in countries near to China (John Hopkins University, USA).

Besides these countries, there are other European nations (Switzerland, United Kingdom, Netherlands, Austria, Belgium, Portugal and Norway) who have recently confirmed the presence of COVID-19 with less severity, but the cases are increasing steadily over the weeks since its outbreak. Among these European nations, the maximum number of confirmed cases are from United Kingdom (11,662), followed by Switzerland (10,714).
Figure-3: The radar plot depicting the increasing trend of COVID-19 cases in countries other than China mainland (WHO, 2020).

Netherlands (7431), Austria (7029), Belgium (6235), Portugal (3544) and comparatively less in Norway (3156).

3.2 Asia pacific regions, Gulf countries and Russia

Besides China, several other countries showing an increased number of individuals affected by the pandemic outbreak (Figure-4A), the maximum number of confirmed COVID19 cases are reported from Australia (>3600) followed by Malaysia (>2000), Japan (>1490), Pakistan (>1200), Thailand (>1100), Indonesia (>1000), India (>800), Singapore (>750), Sri Lanka (>100), Bangladesh (>40), in comparison to <5 cases from Nepal and Bhutan respectively. In addition, Russia has >1200 confirmed cases so far.

The same scenario could also be observed in gulf countries (Figure-4B), with highest fatalities in Iran (>35,000), followed by Saudi Arabia (>1100), Qatar (>560), Iraq (>450), Bahrain (>470), United Arab Emirates (>400), Kuwait (>250) and Oman (>150) respectively. Thus, the spread of such deadly virus from a city in China to the rest of the world exposes the lack in preparedness by several developed nations which are believed to be medically advanced enough in comparison to developing nations like India.

4. Transmission

The initial view on the spread of COVID19 so rapidly was linked to direct exposure of humans to infected animals being sold at a local seafood market in China (Sun et al., 2020). Later, when clinically unfit individuals showing the signs and mild symptoms of the disease were diagnosed with the history of being in touch with the infected individuals surfaced. Thus, it now well accepted that the transmission could also be human to human, which is ever a more cause of worry. Such human to human transmission is majorly through respiratory droplets which ooze out while coughing or sneezing (Wang et al., 2020).
While, symptomatic individuals are the most common source of transmission, however, asymptomatic individuals could also serve as the carriers of the disease. In addition, it is believed that the incubation period of the virus is of 3-7 days followed by >12 days to develop the symptoms and an infected person can transmit the disease to two other healthy individuals due to virus having reproduction number of 2.2 (Fehr and Perlman, 2015). Since, such findings are based on the initially confirmed cases reported so far, therefore more critical analysis of the disease outbreak linked to its modes of transmission are warranted in near future.

5. Diagnosis and prognosis

The difficulty faced by the medical practitioners is that, since the initial symptoms of the of the disease in its early stages are nonspecific, therefore multiple level of diagnostic approaches are to be considered which generally overlaps with several other diseases or infections of the respiratory tract having similar signs and symptoms such as Adenovirus, Rhinovirus (common cold), Influenza, Para-influenza, Respiratory syncytial virus (RSV) etc (Cascella et al., 2020). This poses a greater challenge in providing a specific medical treatment to the infected individual in a short span of time. The guidelines issued by WHO suggests samples from the infected persons in such a scenario be collected from both the upper and lower respiratory tracts, which are to be
later checked for COVID-19 specific viral RNA existence. Moreover, if the test comes out to be positive, it is advised to be repeated at least twice in a span of few hours in order to rule out any discrepancies (Velavan and Meyer, 2020).

In addition, several countries including India has adopted the criteria of close monitoring the infected individual/s for at least 14 days under critical care and if found confirmed for COVID19, such patients are isolated from the community and quarantined extensively. Prognostic studies concluded from initial reports suggest that, the mortality rate is between 1-2% depending on the country affected by COVID19, with majority of fatalities observed only in patients >50 years of age (Cascella et al., 2020).

6. Prevention to be adopted during COVID19

At this moment when no therapeutic treatment is available, preventive strategies should be adopted to contain the disease transmission. Few of the preventive guidelines issued in best of the public interest include recommendations from WHO such as: 1). to avoid close contact with infected person showing any symptoms of respiratory illness, 2). infected or recently recovered persons showing symptoms of common cold and dry cough should be more careful in coming close contact with healthy individuals, 3). individuals with weak immune system should be more careful as they are more prone to such infections, 4). to wash hands very often, especially after coming in contact with a suspected person, and 5.) to maintain hygienic conditions as much as possible (Qian et al, 2020). Besides these, preventive approaches are also undertaken to quarantine the individuals who have travelled to a country having large scale outbreak of COVID19.

7. Management during COVID19

An effective approach in managing such a pandemic outbreak with no therapeutic intervention available would be social isolation. Since, most of potential drugs are either in a pre-clinical stage of screening or few are expected to enter the clinical trials, the chances of having an effective medication in next few months are very limited (Chan et al., 2020). Few in-vitro or in-vivo reports (unpublished data) from the leading research centres across the world have screened therapeutic compounds against such coronaviruses, but their fate in clinical trials is uncertain. Very recently, research groups from China and Australia have begun pre-clinical testing of a putative drug candidate. Furthermore, the National Institute for Allergy and Infectious Diseases (NIAID, USA) has also announced that a phase-1 clinical trial is underway for nCoV immunization in Washington. Thus, the only treatment option available for COVID19 patients include symptomatic care and oxygen therapy which could be achieved by administering with available drugs prescribed in symptoms as those overlapping with COVID19. Moreover, it is advised that unnecessary usage of antibiotics should be avoided. An in-vitro study using antiviral drug remdesivir is currently under investigation and has shown to be protective against SARS-CoV-2 and in few clinically under trial patients of COVID19 as well. Moreover, this drug has passed initial stages of clinical trials in China and USA, suggesting a putative candidate drug may soon be available for treating COVID19 (Gordon et al., 2020). Furthermore, a fusion inhibitor currently under observation has also shown to target HR1 domain of spike protein in coronavirus, thus emphasizing its potential in combating COVID-19 more efficiently (Xia et al., 2019).

8. Conclusion

Since the pandemic outbreak due to COVID19 still poses a threat to all the nations across the world, but at the same time also exposes the lacunae existing in readiness of health departments in combating such viral
attacks. The only prevention at the moment would be to adopt social distancing and extensive surveillance for few weeks, especially for immuno compromised individuals who are at greater risk in comparison to youth. Since, no therapeutic drug is readily available to treat COVID19 at the moment, suggests more medical intelligence and collective efforts are required in near future to combat such a pandemic occurrence.

BIBLIOGRAPHY