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THE OUTBREAK AND CHALLENGES OF NOVEL CORONAVIRUS (COVID-19): THE GLOBAL PANDEMIC EMERGENCY OF EARLY 2K20 AND INDIAN SCENARIO

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ABSTRACT

The outbreak of the newer novel coronavirus (2019-nCoV) was reported in late 2019 from Wuhan, Hubei Province (China), the epicenter of COVID-19. As of 31st March 2020, more than 805000 people have been found to be infected in more than 200 countries. As per the report of China's NHC there have been over 39500 deaths globally and 172000 recovered cases with hardest hit on Italy with over 11596 fatalities due to COVID-19. The intention of the current review is to explore the outbreak and challenges of COVID-19 as global pandemic with special emphasis to the Indian scenario and steps taken by the Government to cut its further spread. Looking at the COVID-19 trend in India, the first case was reported in late January 2020, since then, number of positive cases is increasing continuously. To tackle the situation, Hon'ble Prime Minister of India, Mr. Narendra Modi, called for Janta Curfew of one day and thereafter declared a 21 days lockdown till April 14th, 2020 to break the chain of coronavirus transmission. The India has more than 1552 COVID-19 cases with 49 deaths, and 102 completely recovered cases by 31st March, 2020.

Keywords: Novel coronavirus, COVID-19, Pandemic, 2K20 health emergency, Social distancing, Janta curfew, Lockdown

INTRODUCTION

The coronaviruses posed serious health threats to humans and other animals. The coronaviruses (CoVs) in the yesterdecades have revealed to be competent of infecting humans being **[1]**. The eruption of severe acute respiratory syndrome (SARS) in 2003 and, Middle-East respiratory syndrome (MERS) in 2012 has established the lethality of CoVs **[2, 3]**. A rehabilitated curiosity in coronavirus research has led to the breakthrough of several novel human CoVs and given that much advancement has been made in understanding its life cycle. The 'E' protein of coronavirus is a small, integral membrane protein concerned in quite a lot of aspects of the virus' life cycle including its pathogenesis **[4, 5]**. For the duration of 2002-03, SARS-CoV infected 8,000 people, with fatal outcome rate of ~10%. However, the outbreak of MERS-CoV during 2012 grabbed more than 1,700 people, with ~36% of fatality rate **[6, 7]**. In broad-spectrum, coronaviruses caused prevalent respiratory, gastrointestinal, and central nervous system diseases in humans and intimidating human health and economy **[8]**. The coronaviruses are talented in adapting to new environments through mutation and recombination with relative ease and consequently programmed to alter host range and tissue tropism efficiently **[9, 10]**. Therefore, health terrorization from coronaviruses are invariable and long-standing. Perceptive the virology of coronaviruses and scheming its stretch have imperative implications for global health and monetary stability.

In late 2K19, a novel viral pneumonia cases noticed in Wuhan, Hubei Province; named "2019 novel coronavirus (2019-nCoV)" on 12th January, 2020 **[11, 12]**. The virus liable for 2019-nCoV or COVID-19 was the mutated species of SARS-like corona viruses named SARS-CoV2 considerably larger than typical influenza, SARS and MERS viruses **[13]**. The SARS-CoV2 was approximately a descendant of a bat corona virus and closest to a virus of *Rhinolophus* bat with > 96% homology. However it was only 79% homologous to original SARS-CoV **[14]**. The near matching gene sequences of 90 analyzed cases from outside of China suggested its solitary species jump emergence during first week of December 2019 from an unknown host **[15, 16, 17]**. The symptoms of COVID-19 were fever, dry cough, fatigue, nasal congestion, sore throat and diarrhoea **[18]**. The antiviral drugs and variety of other acknowledged treatments were typically being prescribed for deteriorating patients on a kindhearted basis. The management of clinical trials to

avoid duplication and guarantee that results are rapidly available might be a challenge but the case numbers should facilitate rapid definitive results. The leading study on COVID-19 showed that the prevalence of elevated aminotransferases and bilirubin in people faring worst **[19]**. The keen inspection of available data assisted a higher prevalence of abnormal aminotransferase levels in severe COVID-19 disease that may lead to direct liver injury *via* viral hepatitis

Director, USCDC, Dr. Robert Redfield on 13th February 2020 stated that novel coronavirus really a global problem that's not going to go away in a week or two. He said the virus will be probably with us beyond this season, beyond this year and eventually the virus has found a foothold. Very soon will get community based transmission like season flu. Prof. of Epidemiology, Harvard School of Public Health Dr. Marc Lipsitch on 17th February 2K20 mentioned that COVID-19 is likely will be see a global pandemic. He presumed if pandemic happens, 40% to 70% peoples world-wide will likely to be infected in the coming year **[20]**. Director WHOHEP Dr. Michael Ryan said that all the predictions are important and we must careful with that. As per a report about 5K new infections per day occuring in China probably peak in its epicenter, Wuhan in about one month time; may be a month or later in whole China **[21]**.

As for as spread of novel coronavirus and its effect on human concern many preliminary research articles have already been published about this epidemic **[22, 23, 24]**. Authors conducted a scoping review to summarize and critically analyze published scientific articles regarding the new coronavirus to March, 2020 so far. This review aims to provide the evidence of early findings on epidemiology, causes, clinical diagnosis, along the prevention and control measures of COVID-19 in relation to zoogeography and source of infection. Ultimately this review will provide meaningful information for future research to same line and may hold up government decision making on strategies to grip this global pandemic public health emergency at community, national, and international level.

OUTBREAK OF NOVEL CORONAVIRUS COVID-19

The most up-to-date peril to comprehensive health is the unending outbreak of respiratory disease that was recently prearranged as name Coronavirus Disease 2019 (COVID-19) **[25]**. The coronavirus taxonomically relates to a family of viruses able to cause a variety of disease symptoms such as pneumonia, fever, breathing obscurity, and lung contagion in animals

world-wide, but the cases to affect humans' scares. The WHO admitted term 2019 novel coronavirus (2019-nCoV) to refer the strain of coronavirus that infect the lower respiratory tract of patients in Wuhan, China on 29th December, 2019 **[26, 27, 28]**. It was reported that a cluster of patients having said symptoms was linked to a local Huanan South China Seafood Market in Wuhan, Hubei Province, China in late 2K19 **[7]**. Based on the commencement of first case of such novel diseases, the Wuhan was said to be epicenter of 2019-nCoV or COVID-19 **[10, 29]**. In comeback to outbreak, the Chinese Center for Disease Control and Prevention (China CDC) provided a rapid response team to escort health authorities of Hubei province and Wuhan to carry out epidemiological and etiological investigations. It was reported that virus might be bat borne, and its exposure, transmission or spreading might related to Huanan seafood wholesale market **[11, 30]**. Thereafter scientists immediately came forward to work out the source of newer coronavirus, and first genome of COVID-19 published on 10th January 2020 **[10, 31]**. Within month, this virus spread hastily all the way through China during the Chinese New Year, a period of mass human mobility in China **[31]**. It was still too early to predict vulnerable or symptomatic population because early patterns reflected a trend analogous to SARS and MERS coronaviruses.

STRUCTURE AND EVOLUTION OF CORONAVIRUS

The coronaviruses are bulky, enveloped, right handed single stranded RNA viruses (+ssRNA viruses) with largest genome ranging 27kb to 32kb to all RNA viruses **(Figure 1)**. The genome is jam-packed in a helical nucleocapsid protein (N) and additionally delimited by a larval sachet made of 3 structural proteins (membrane protein (M), envelope protein (E) for virus assemblage, and spike protein (S) to make possible virus doorway into host cells). There are a quantity of coronaviruses may program a supplementary envelope-coupled hemagglutinin esterase (HE) protein. The structural proteins made outsized protrusions at the exterior of virus called spike giving the outward show of crowns hence name *corona*, in Latin means crown **(Figure 2)**. In toting up to mediating virus entry, the spike is a key determinant of host range, tissue tropism and a major inducer of host immune responses **[32, 33]**.

The coronaviruses (Nidovirales: Coronaviridae) classified into four genera: *Alphacoronavirus* (alfa-CoV), *Betacoronavirus* (β-CoV), *Gammacoronavirus* (γ-CoV), and *Deltacoronavirus* (delta-CoV) **[4, 34]**. Among these, alfa-CoVs and β-CoVs infect mammals, γ-CoVs communicate a disease

to avian individuals, and delta-CoVs caused infection to both mammalian and avian fauna. The representative alfa-CoVs comprised human coronavirus NL63 (HCoV-NL63), porcine transmissible gastroenteritis coronavirus (PTGE-CoV), porcine epidemic diarrhea coronavirus (PED-CoV), and porcine respiratory coronavirus (PR-CoV) **[35]**. The envoy of β-CoVs contain severe acute respiratory syndrome coronavirus (SARS-CoV), middle east respiratory syndrome coronavirus (MERS-CoV), bat coronavirus HKU4, mouse hepatitis coronavirus (MH-CoV), bovine coronavirus (β -CoV), and human coronavirus OC43 **[36, 37]**. However, agent of γ-CoVs and delta-CoVs include avian infectious bronchitis coronavirus (AIB-CoV) and porcine deltacoronavirus (PdCoV), respectively **[38]**.

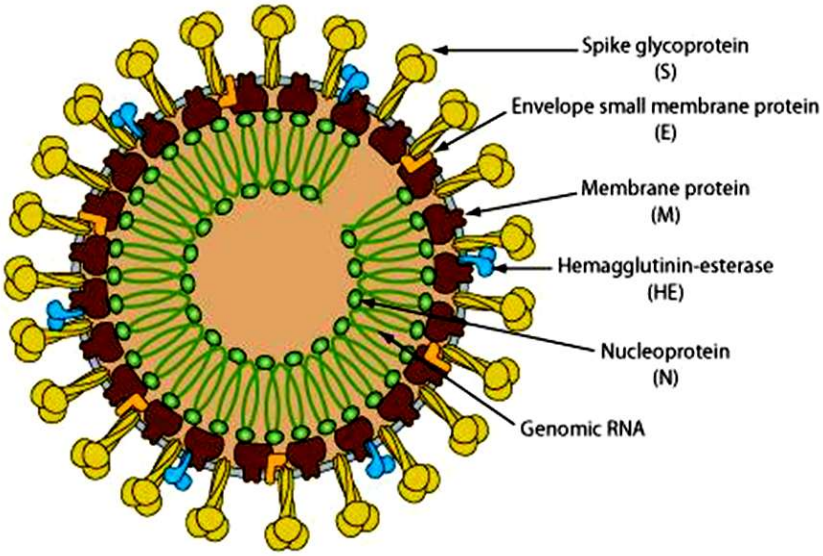

Figure 1: The schematic structural components of coronavirus.

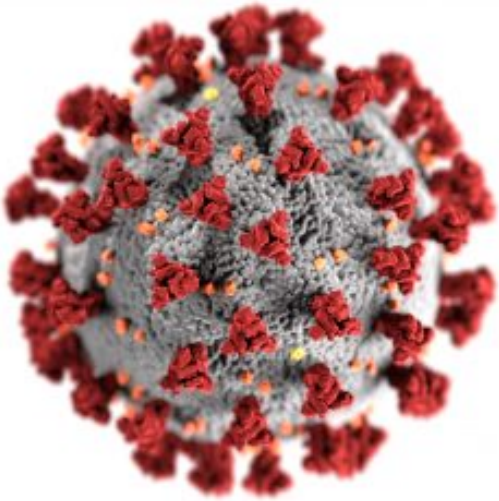

Figure 2: The ultrastructural morphology of coronavirus. ***Source: Cent. Dis. Cont. Prev. (CDC)***

SPREAD AND PATHOGENECITY OF COVID-19

The spreading and COVID-19 transmission in general *via* airborne droplets of nasal mucosa was noticed. After the entry to host cell, it replicates locally in ciliated epithelium, leading to cell damage and inflammation **[39, 40]**. Just passing an incubation period of nearly 3 days, it became symptomatic with common cold, including nasal obstruction, sneezing, runny nose, and infrequently cough. The disease determined in a few days, during that period virus may shed in nasal secretions **[41, 42]**. The peaks of incidence during winter taken place within few weeks and transformed in local epidemics lasting months. The equivalent serotype may come back to an area after more than a few years. The colds caused by coronaviruses cannot be illustrious clinically from other colds in any patient individual. The laboratory diagnosis may be made based on antibody titers in paired sera but the isolation of CoVs not an easy task. The introduction of nucleic acid hybridization tests including polymerase chain reaction (PCR) are now boon in diagnosis of the CoVs. The cure or treatment of common colds is symptomatic and no vaccines or specific drugs are available till date **[43]**. However, hygiene measures trim down the rate of transmission. The substantiation of some report showed that coronaviruses supposed to be foundation of lower airways disease due to direct invasion. Other manifestations like multiple sclerosis because of same viruses proposed by some earlier workers but the evidence was not clear-cut **[44]**.

The WHO affirmed COVID-19 as global pandemic public health emergency of International concern **[45]**. The potential to worldwide or cross boundary international spread of COVID-19 *via* commercial public or private air travel had been assessed **[6]**. On February 14th 2K20, the Chinese CDC released information of 44672 confirmed cases since the outburst **[46]**. The findings showed that COVID-19 was easygoing for 81% of patients with 2.3% overall fatality rate. Among the confirmed cases, only 2.2% were under 20 years old with much milder clinical symptoms than adults. The severity of disease seems to be associated with age and elderly at most risk. The patients over 80 years of age had 14.8% Case Fatality Rate (CFR). The CFR was also amplified in patients with comorbidities together with cardiovascular, diabetes, chronic respiratory disease, hypertension, cancer etc. The ultimate ground of death was respiratory failure, shock or multiple organ failure. There is no rationale to accept as true that the global community is equipped for this emerging pandemic. We should be

ready in a way that can see drastic public health intervention implemented within days, along with aggressive and colossal contact tracing, monitoring (or quarantine) and early detection and remoteness in an endeavor to slow the progression. Most of the modeling suggested that harshness of illness was more likely influenza than SARS **[47, 48]**. The concern among the public health community and transmissibility global pandemics of COVID-19 is not yet fully understood.

The susceptibility known to be associated to age, sex, and other health conditions. Based on a report the median age of patients was 59 years. The males (56% of total patents) were at higher risk of morbidity and mortality than those with coexisting conditions. As per a study either child were less likely to infected, which would have vital epidemiologic implications, or their symptoms were so gentle and escaped detection, which has implications for community infections **[49]**. A little cases of COVID-19 have been described in children also, however, spectrum of illness was limited needs better understanding **[50]**. It was reported that COVID-19 occurred in children, causing moderate-to-severe respiratory illness, in early stage of outbreak **[51]**. Guan et al. reported mortality of 1.4% among 1099 patients had a wide spectrum of disease severity with laboratory-confirmed COVID-19 **[52]**. This suggested that the overall clinical consequences of COVID-19 may ultimately be more akin to those of a severe seasonal influenza or a pandemic influenza rather than a disease similar to SARS or MERS, which have had case fatality rates of 9 to 10% and 36%, respectively **[53, 54]**. The epidemic of COVID-19 has long-drawn-out from Wuhan throughout China and being exported to a growing number of countries and seen onward transmission, so called global pandemic **[55]**. The bang of an epidemic depends on number of infected candidature, infection's transmissibility, and clinical severity spectrum **[56]**. The COVID-19 rash is an austere knick-knack of ongoing challenge of emerging and reemerging infectious contagions and requirement of constant surveillance, prompt diagnosis, vigorous research to comprehend the basic biology of newer organisms and our susceptibilities to them, as well as to develop efficient countermeasures.

GLOBAL PANDEMIC SCENARIO OF COVID-19

Since late 2019, manifold cases happening unexplainable COVID-19 pneumonia were successively reported world-wide in more than 200 countries and WHO declared as global pandemic **[57]**. The WHO said that

about 1 out of 6 people become seriously ill due to COVID-19 in future. The elderly people with medical problems are at a bigger jeopardy of serious illness from novel COVID-19. As COVID-19 is viral pneumonia, therefore, antibiotics are useless in treatment; the antiviral drugs taken against flu will not work also. The recovery of patients depends on the potency of immune system. The NHS advised that anyone with symptoms COVID-19 should stay at home for at least 7 days and no need to have doctor**.** If patients living with other people, they should stay at home for at least 14 days, to avoid spreading the infection outside dwell. This will be application to everybody, despite the consequences of whether they have travelled abroad. In continuation of same many countries have imposed travel bans and lockdown state of affairs in order to attempt and halt the spread of COVID-19 virus. As of 31st March 2020, more than 805000 people have been found to be infected including more than 200 countries with over 39500 deaths, according to a report of COVID-19 coronavirus pandemic China's NHC **(Tables 1-6)**. Among the European countries Italy has been hardest hit with more than 11596 fatalities. Many of those who have died had underlying health conditions, however, more than 172,000 people were recovered from the coronavirus world-wide **(Figure 3)**. A report showed that nearly 180534 people have been found to be infected; 7176 death and 10440 recovered cases in Asian countries **(Table 1)**. However, African countries having 6196 COVID-19 cases with 197 deaths and 419 recovered cases by 31st March 2020 **(Table 2)**. On contrary the European countries were recorded with 451826 positive cases, nearly 30278 deaths and 66565 completely recovered patients **(Table 3)**. In North American countries the cases of COVID-19 recorded by 31st March were 202112 with 4304 deaths and 7549 cured cases, showed comparatively higher epidemics than Asian countries **(Table 4)**. In South American countries the cases of COVID-19 recorded comparative lower than the North American countries with 14615 infected cases, 382 deaths and 1057 recovered patients **(Table 5)**. In Australian or Oceanic countries the number of infection was significantly lower than the other countries with 5629 positive cases, 22 deaths and 411 cured cases reflected slow epidemics **(Table 6)**.

HOST, RESERVOIR AND ETIOLOGY

It was supposed that wild animal, bats as most possible host of 2019-nCoV and its outbreak in Wuhan city of China **[14]**. It required further authentication whether pneumonia infected by the COVID-19 (earlier to be known 2019-nCoV) was

transmitted directly from bats or through an intermediate or paratenic host. It was alleged that clarifying the source of virus will help in influential zoonoses or enzootic pattern of transmission **[58]**. Up to date literature survey reflected that the main infection source among people was the patients with pneumonia symptoms tainted by 2019-nCoV. The respiratory droplet transmission was the main itinerary of transmission, and it could also be transmitted from side to side through get in touch also **[59]**. Although the literatures dealing too many niceties, such as source of virus and its aptitude to spread among people remain scant and unknown. The cumulative ever-increasing number of cases showed the cryptogram of human-to-human transmission **[56]**. The COVID-19 samples were taken out from lower respiratory tract of patients with unexplainable pneumonia in Wuhan, showed that it was a novel coronavirus belonging to β-CoV genus. Its genetic individuality is significantly unusual from SARS and MERS CoVs **[60]**.

The foundation of virus, time span of patients to discharging infective virus, and its pathogenesis are still not clear **[61]**. Based on at present epidemiological survey, the latency period of COVID-19 is generally ranged between 3 to 7 days, with an utmost of 14 days **[14]**. On contrary to SARS-CoV, the 2019-nCoV or COVID-19 is contagious during the latency period **[17]**. From contemporary knowledge of cases, most patients have a good prognosis, the symptoms of children are relatively mild, and a few patients are in critical condition. Death cases are more frequently seen in the elderly and those with chronic underlying diseases **[59]**.

SURFACE VIABILITY OF COVID-19

The aerosol and surface stability of emerging pandemic novel human coronavirus 2019-nCoV was analyzed and compared with most closely related SARS-CoV1 **[62, 63]**. The stability of SARS-CoV2 and SARS-CoV1 in aerosols and other various surfaces was evaluated and their decay rates estimated using a Bayesian regression model **[64, 65]**. The aerosols (<5μm) containing SARS-CoV2 and SARS-CoV1 tissue-culture infectious dose 50% [$TCID_{50}$] inoculums was alike to samples obtained from upper and lower respiratory tract **[66]**. The five variables (aerosols, plastic, stainless steel, copper, and cardboard) reflected that SARS-CoV2 (now COVID-19) remained viable in aerosols 3hrs with a diminution in infectious titer akin to SARS-CoV1 **[65]**. It was also observed that SARS-CoV2 was more stable on plastic and stainless steel than copper and cardboard, and viability was estimated to 72hrs **[65]**. The half lives of SARS-CoV2 and SARS-CoV1 were

parallel in aerosols, with median estimates of 1.1hrs to 1.2hrs, however on cardboard half life of SARS-CoV2 was longer in comparison to SARS-CoV1. The findings indicated that differences in epidemiologic characteristics of novel coroviruses probably rose together with viral heaps in upper respiratory tract and probability to shed and transmit virus while asymptomatic to COVID-19 **[62, 64]**.

PREVENTIVE MEASURES TO COVID-19

Although no any vaccine on hand to put off infection with newer novel coronavirus, but the necessary suggested steps (like: self quarantine, social distancing, cleanliness and hygiene) may reduce risk of infection among people. The WHO and CDC suggested subsequent safety measures to avoid COVID-19 spreads: **(a)** Keep away from large events and mass gatherings, **(b)** Stay away from close contact (maintain a gap of 6 feet) with anyone or symptomatic, **(c)** Remain distant yourself and others if COVID-19 spreading in community, particularly if having a top risk of serious illness, **(d)** Wash your hands over and over again with soap and water for at least 20 seconds, or exercise an alcohol-based hand sanitizer, **(e)** Face your mouth and nose with elbow or tissue paper during sneezing and coughing and let it thrown into closed dustbin, **(f)** Shun touching your eyes, nose and mouth from unclean hand, **(g)** Spurn allotment dishes, glasses, bedding and other household items if symptomatic, **(h)** Clean and disinfect surfaces habitually touch on daily basis, **(i)** Stay home, stay safe, work from home, avoid school and public areas if ailing, unless going to doctor, **(j)** keep away from public transportation if unwell, and **(k)** Offer mask and hand gloves.

The CDC did not recommend that healthy people wear a face mask to protect themselves from respiratory infection and COVID-19. Only be dressed in a mask if a health care consultant tells to do so. The WHO recommended avoiding eating raw or undercooked animal organs and contact to live animals may have touched by coronavirus carrier. People have a chronic medical condition and may have a higher risk of serious poor health, check with doctor to protect by hand. As the COVID-19 spreads around the globe, the Governments of most of infected countries have imposed legal or constitutional quarantines, travel bans and locked down on an unprecedented scale **[67, 68]**. The India along the China, Italy etc. has imposed complete lockdown and people have been subjected to legally enforceable quarantines or are in self-quarantine till 14th April, 2K20.

STEPS TO CURBING GLOBAL COVID-19 SPREAD

At the outset travel across the affected countries was disheartened and number of programmed flights and train journeys to be had considerably reduced to conceivably 10% of earlier movement. The profitable/ business and social actions became unimportant, with schools, restaurants; amusement spots, parks and nearly every shop were closed. The frequent hand hygiene and sanitization when in public and staying at home became norm in people. Thereafter the Central Government of nearly all affected countries and province was called for lockdown with all movement in and out of country or province. The locked down reflected in a downward trend in national and provincial epidemic curves, however, these measures are not sustainable. Sooner or later there will be a strategy to return to normality. Therefore, early identification, and segregation or cohorting of positive cases to elected sites at the core. In order to achieve this, hospitals, quarantine services, laboratories, together with epidemiology and media teams along with government and nongovernment agencies will need to be scaled up to provide effective and efficient care.

To cut the spread or treatment of COVID-19, school of scientists recognized compounds with activities against 2019-nCoV and other coronaviruses. A broad-spectrum antiviral intelligent to combat most coronaviruses identified to target 'main protease' vital for viral replication **[69]**. Using X-ray crystallography researchers designed a series of α-ketoamide compounds that would bind and block enzymes active site and experienced *in vitro* human cells. The same school of scholars has turned to other similarities between the different coronaviruses to find potential therapeutics and targets by exploring B-cell and T-cell spike and nucleocapsid protein epitopes to discover biomarkers that could be integrated into vaccines to elicit an immune response to COVID-19 or SARS-CoV2 **[70]**. Based on a report, no mutations have been observed in SARS-CoV2 epitopes, so immune targeting of these may offer fortification in opposition to COVID-19 **[71]**.

The Novavax joins the hand in coronavirus vaccine invention and announced pre-clinical animal trials for a number of multiple nanoparticle COVID-19 vaccines. According to the company, they will identify an optimal candidate very soon and start in on human testing by the end of spring 2020. The biotechnology company has notified its hard work to lend a hand in creating a vaccine against SARS-CoV2. The company stated that the application of recombinant protein

nanoparticle technology platform to generate antigens derived from the coronavirus spike protein along with Matrix-M™ adjuvant for final formulation of vaccine will be a boon shortly. But it presumes that no vaccine will be accessible for at least one year, likely a little longer because the phase 1 trials for safety and immunogenicity in human are to be expected within 3 months. In stipulations of therapeutics there is no known efficient pharmaceutical agent **[8, 72]**. The tentative agents include antivirals (for example: Griffithsin, a spike protein inhibitor), nucleoside analogues (e.g., remdesivir, ribavirin), protease inhibitors (like: lopinavir/ ritonavir), and immunomodulators (examples: interferon, chloroquine and immunoglobulins) **[31, 73]**. The corticosteroids will efficiently have advantage for immune mediated lung damage little later in course of disease **[74, 75]**.

COVID-19 AND REPUBLIC OF INDIA

Earlier to 29th December, 2019 nobody knew that a virus called SARS-CoV2 or 2019-nCoV would bring humanity to a halt. The outbreak of novel coronavirus in Wuhan, China during last week of December 2019 was take place from wholesale seafood wet market. Since then it has spread to more than 200 countries and infected over eight lakh people within duration of just three months. The deadly, contagious COVID-19 virus has crooked into a global pandemic, impacting businesses, travel, sports and day to day life of billions of people world-wide. Looking at the inclination in India, the first novel coronavirus was reported on 30th January, 2020 and cases improved to 3 by 3rd February, 2K20. Since then, the number of positive cases is continuously increasing, therefore to tackle the situation, Prime Narendra Modi, called for 'Janta Curfew' of one day (22nd March, 2020) and thereafter declared a '21 days lockdown' since 25th March to 14th April, 2020 to break the chain of coronavirus transmission. Furthermore, in a nationwide address PM urged people to practice social distancing, hygiene and cleanliness along the work at home also. The confirmed cases of coronavirus in India amplified by 10 times in just 15 days and by March 31st, 2020 the India has more than 1550 cases, over 47 deaths, and 102 completely recovered cases **(Figure 4, Table 7)**.

Table 1: The scenario of global pandemic coronavirus (COVID-19) in Asian countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	China	81554	3312	76052	25.	Kuwait	289	0	73
2.	Iran	44605	2898	14656	26.	Jordan	274	5	30
3.	Turkey	13531	214	243	27.	Cyprus	262	8	23
4.	South Korea	9887	165	5408	28.	Vietnam	212	0	58
5.	Israel	5591	21	163	29.	Oman	210	1	34
6.	Japan +DP*	2890	68	1027	30.	Afghanistan	196	4	5
7.	Malaysia	2766	43	537	31.	Uzbekistan	173	2	7
8.	Philippines	2311	96	49	32.	Sri Lanka	143	2	17
9.	Pakistan	2042	26	76	33.	Palestine	134	1	18
10.	Thailand	1771	12	342	34.	Brunei	129	1	45
11.	India	1590	45	123	35.	Georgia	115	0	21
12.	Saudi Arabia	1563	10	165	36.	Kyrgyzstan	111	0	3
13.	Indonesia	1528	136	81	37.	Cambodia	109	0	23
14.	Singapore	926	3	240	38.	Bangladesh	54	6	25
15.	Qatar	781	2	62	39.	Macao	41	0	10
16.	Hong Kong	715	4	128	40.	Maldives	18	0	13
17.	Iraq	694	50	170	41.	Myanmar	15	1	0
18.	UAE	664	6	61	42.	Mongolia	14	0	2
19.	Armenia	571	3	30	43.	Syria	10	2	0
20.	Bahrain	567	4	295	44.	Laos	9	0	0
21.	Lebanon	463	12	37	45.	Nepal	5	0	1
22.	Kazakhstan	369	3	22	46.	Bhutan	4	0	0
23.	Taiwan	329	5	39	47.	Timor-Leste	1	0	0
24.	Azerbaijan	298	5	26					

DP, Diamond Princess; UAE, United Arab Emirates
*Source: https://www.worldometers.info/coronavirus

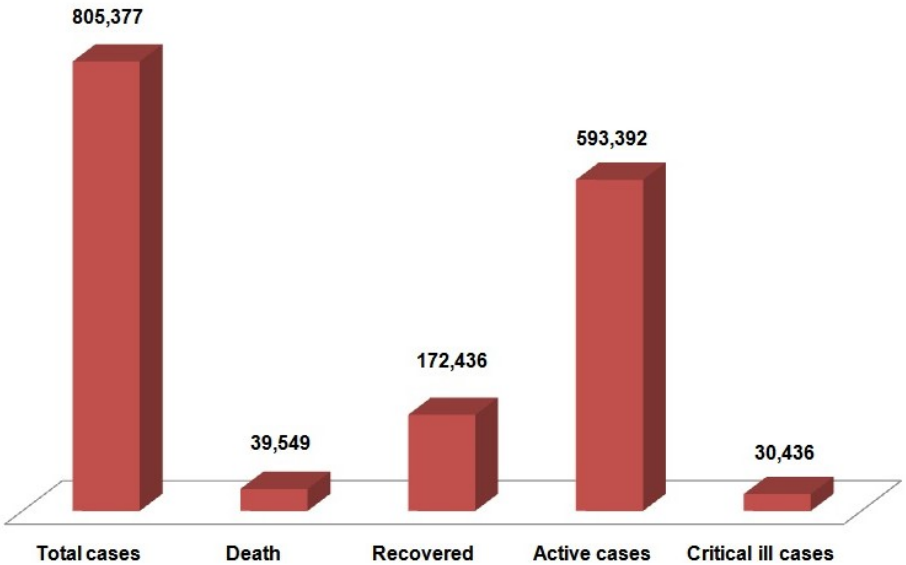

Figure 3: The chart showing global pandemic COVID-19 confirmed cases, deaths, recovered, critical ill and recovered cases by 31st March, 2020. ***Source: NHC China***

Table 2: The scenario of global pandemic coronavirus (COVID-19) in African countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	South Africa	1353	5	31	28.	Congo	19	0	0
2.	Algeria	716	44	46	29.	Gabon	18	1	0
3.	Egypt	710	46	157	30.	Eritrea	15	0	0
4.	Morocco	638	36	24	31.	EG	15	0	1
5.	Tunisia	394	10	3	32.	Namibia	11	0	2
6.	Burkina Faso	261	14	32	33.	Libya	10	0	0
7.	Réunion	247	0	1	34.	Seychelles	10	0	0
8.	Cameroon	223	6	5	35.	Eswatini	9	0	0
9.	Côte d'Ivoire	179	1	6	36.	Benin	9	0	1
10.	Senegal	175	1	40	37.	Zimbabwe	8	1	0
11.	Ghana	161	5	31	38.	Mozambique	8	0	0
12.	Mauritius	143	5	0	39.	Guinea-Bissau	8	0	0
13.	Nigeria	139	2	8	40.	Angola	7	2	1
14.	DR Congo	98	8	2	41.	Sudan	7	2	1
15.	Mayotte	94	1	10	42.	Chad	7	0	0
16.	Rwanda	75	0	0	43.	Mauritania	6	1	2
17.	Kenya	59	1	1	44.	Cabo Verde	6	1	0
18.	Madagascar	57	0	0	45.	Somalia	5	0	1
19.	Uganda	44	0	0	46.	Botswana	4	1	0
20.	Zambia	36	0	0	47.	Gambia	4	1	0
21.	Niger	34	3	0	48.	Liberia	3	0	0
22.	Togo	34	1	10	49	CAR	3	0	0
23.	Djibouti	30	0	0	50.	Burundi	2	0	0
24.	Ethiopia	29	0	2	51.	Sierra Leone	1	0	0
25.	Mali	28	2	0	52.	Burundi	2	0	0
26.	Guinea	22	0	0	53.	Sierra Leone	1	0	0
27.	Tanzania	19	1	1					

EG, Equatorial Guinea; CAR, Central African Republic; *Source: https://www.worldometers.info/coronavirus

Table 3: The scenario of global pandemic coronavirus (COVID-19) in European countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	Italy	105792	12428	15729	25.	Slovenia	802	15	10
2.	Spain	95923	8464	19259	26.	Estonia	745	4	26
3.	Germany	71808	775	15824	27.	Ukraine	669	17	8
4.	France	52128	3523	9444	28.	Lithuania	581	8	7
5.	UK	25150	1789	135	29.	Hungary	525	20	37
6.	Switzerland	16605	433	1823	30.	Latvia	446	0	1
7.	Belgium	12775	705	1696	31.	BH	430	13	17
8.	Netherlands	12595	1039	250	32.	Bulgaria	412	8	17
9.	Austria	10366	128	1095	33.	Andorra	376	12	10
10.	Portugal	7443	160	43	34.	Slovakia	363	0	3
11.	Norway	4651	39	13	35.	Moldova	353	4	18
12.	Sweden	4435	180	16	36.	NM	329	9	12
13.	CR	3330	32	45	37.	Albania	243	15	52
14.	Ireland	3235	71	5	38.	San Marino	236	26	13
15.	Denmark	2860	90	1	39.	Faeroe Islands	173	0	74
16.	Russia	2777	24	121	40.	Malta	169	0	2
17.	Poland	2347	35	7	41.	Belarus	163	1	47
18.	Romania	2245	85	220	42.	CI	159	3	0
19.	Luxembourg	2178	23	80	43.	Montenegro	120	2	0
20.	Finland	1418	17	10	44.	Gibraltar	69	0	34
21.	Greece	1314	49	52	45.	Liechtenstein	68	0	0
22.	Iceland	1135	2	198	46.	Isle of Man	60	0	0
23.	Serbia	900	23	42	47.	Monaco	52	1	2
24.	Croatia	867	6	67	48.	Holy See	6	0	0

UK, United Kingdom; CR, Czech Republic; BH, Bosnia and Herzegovina; NM, North Macedonia; CI, Channel Islands; Source: https://www.worldometers.info/coronavirus

Table 4: The scenario of global pandemic coronavirus (COVID-19) in North American countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	United States	188592	4056	6241	19.	Saint Lucia	13	0	1
2.	Canada	8612	101	1162	20.	Dominica	12	0	
3.	Mexico	1215	29	35	21.	Curaçao	11	1	2
4.	Panama	1181	30	9	22.	Greenland	10	0	2
5.	DR	1109	51	5	23.	Grenada	9	0	0
6.	Costa Rica	347	2	4	24.	SKN	8	0	0
7.	Cuba	186	6	8	25.	AB	7	0	0
8.	Honduras	172	10	3	26.	SB	6	0	1
9.	Martinique	128	3	27	27.	SM	6	0	0
10.	Guadeloupe	114	4	22	28.	Nicaragua	5	1	0
11.	TT	89	4	1	29.	Montserrat	5	0	0
12.	Aruba	55	0	1	30.	TC	5	0	0
13.	Jamaica	38	2	2	31.	Belize	3	0	0
14.	Guatemala	38	1	10	32.	BVI	3	0	0
15.	Barbados	34	0	0	33.	Anguilla	2	0	0
16.	El Salvador	32	1	0	34.	CN	2	0	0
17.	Bermuda	32	0	10	35.	SVG	1	0	1
18.	Saint Martin	16	1	2	36.	Cayman Islands	14	1	0

DR, Dominican Republic; TT, Trinidad and Tobago; SKN, Saint Kitts & Nevis; AB, Antigua and Barbuda; SB, Saint Barthelemy; SM, Saint Maarten; TC, Turks and Caicos; BVI, British Virgin Islands; CN, Caribbean Netherlands; SVG, St. Vincent & Grenadines

***Source: https://www.worldometers.info/coronavirus**

Table 5: The scenario of global pandemic coronavirus (COVID-19) in South American countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	Brazil	5812	202	127	8.	Venezuela	143	3	39
2.	Chile	2738	12	156	9.	Bolivia	115	7	0
3.	Ecuador	2302	79	54	10.	Paraguay	69	3	1
4.	Peru	1065	30	394	11.	FG	51	0	6
5.	Argentina	1054	27	240	12.	Guyana	12	2	0
6.	Colombia	906	16	15	13.	Suriname	10	0	0
7.	Uruguay	338	1	25					

FG, French Guiana

***Source: https://www.worldometers.info/coronavirus**

Table 6: The scenario of global pandemic coronavirus (COVID-19) in Australian countries/ province up to 31st March, 2020

S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered	S. No.	Country/ Province	Total Cases	Total Deaths	Total Recovered
1.	Australia	4862	21	337	4.	NC	16	0	0
2.	New Zealand	708	1	74	5.	Fiji	5	0	0
3.	FP	37	0	0	6.	PNG	1	0	0

FP, French Polynesia; NC, New Caledonia; PNG, Papua New Guinea

***Source: https://www.worldometers.info/coronavirus**

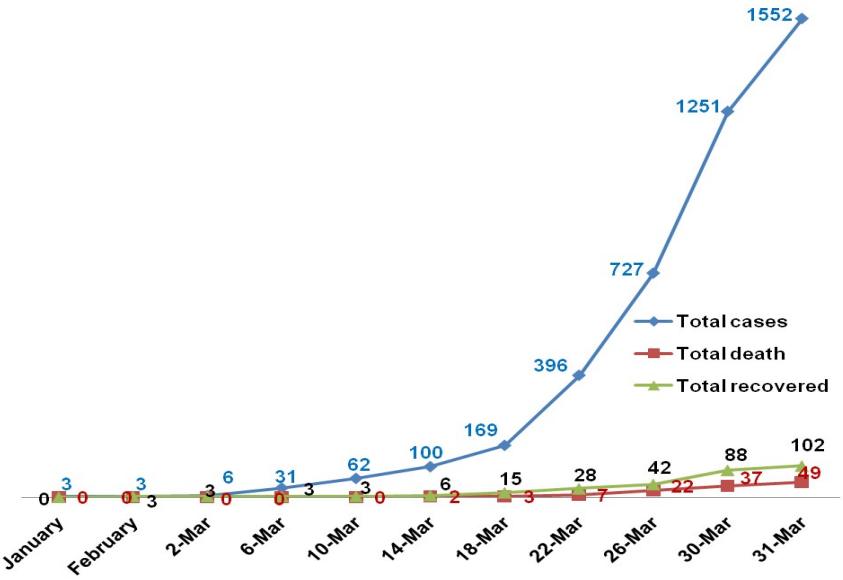

Figure 4: The graph showing total confirmed cases, death and recovered cases of pandemic COVID-19 in India by 31st March, 2020

***Source: WHO, https://www.deccanherald.com/coronavirus-india**

Table 7: The scenario of global pandemic coronavirus (COVID-19) in India up to 31st March, 2020

S. No.	State/ Union Territory	Total Cases	Total Deaths	S. No.	State/ Union Territory	Total Cases	Total Deaths
1.	Maharashtra	302	11	15.	West Bengal	27	5
2.	Kerala	215	3	16.	Bihar	16	1
3.	Tamil Nadu	124	1	17.	Chandigarh	13	0
4.	Delhi	121	2	18.	Ladakh	13	0
5.	Uttar Pradesh	103	0	19.	ANI	10	0
6.	Karnataka	101	3	20.	Chhattisgarh	8	0
7.	Rajasthan	93		21.	Uttarakhand	7	0
8.	Gujarat	73	5	22.	Goa	6	0
9.	Telangana	71	6	23.	Himachal Pradesh	4	1
10.	Madhya Pradesh	66	5	24.	Odisha	3	0
11.	Jammu and Kashmir	55	2	25.	Puducherry	1	0
12.	Andhra Pradesh	44	0	26.	Manipur	1	0
13.	Punjab	41	4	27.	Mizoram	1	0
14.	Haryana	39	0	28.	Assam	1	0

ANI, Andaman and Nicobar Islands

***Source: https://www.deccanherald.com/national/coronavirus-india**

Since beginning of January 2K20, WHO India as a member of the Joint Monitoring Group has been providing broadcasting with technical advice, guidance and resources for enhanced vigilance, preparedness and response to 2019-nCoV at both national and domestic level. On 30th January 2020, Director-General WHO declared the outbreak of novel coronavirus (2019-nCoV) and constituted a Public Health Emergency of International Concern (PHEIC) as per the advice of International Heath Regulations (IHR) emergency committee. As on 31st January 2020, a total of 9720 confirmed cases and 213 deaths have been reported in China because of its epicenter in Wuhan City, Hubei province which rapidly extended to all other provinces of China. Outside of China, 19 countries including

India (1 case) have reported a total of 106 confirmed cases, among them most with travel history from China by 31st January 2K20. On 30th January 2020, a laboratory confirmed case of 2019-nCoV was reported in Kerala with travel history to Wuhan and taken cared in hospital isolation ward. The Prime Minister's Office and the Ministry of Health, Family and Welfare (MoHFW) were closely monitoring 2019-nCoV situation and intensifying preparedness and response efforts. The public health preparedness including surveillance, diagnostics, hospital preparedness, infection prevention and control, logistics and risk communication was being constantly reviewed by the national and state health authorities along with National Centre for Disease Control (NCDC) and has activated Strategic Health Operations Centre (SHOC) room to provide command and control functions and a helpline opened to answer public queries. The MoHFW and Ministry of Civil Aviation have initiated in flight announcements and entry screening for symptoms of fever and cough for travelers coming from China at 21 airports of India. People who live in or have visited an area of China that has been affected by recent outbreak which was initially Wuhan City, Hubei Province but has subsequently extended elsewhere in China including family members or health care workers, who were caring for a person infected with 2019-nCoV. The human-to-human transmission based on current available information, and might be transmitted either through droplets or contact also under keen consideration. The MoHFW issued a travel advisory and counseling Indians to avoid non-essential travel to China.

The National Institute of Virology, Pune, equipped with international standards of expertise and capacity, has been testing samples of COVID-19 (formerly 2019-nCoV). So far 49 samples have been tested, of which 48 were negative by 30th January, 2020. From 31st January 2020, 12 additional labs have started to function. The MoHFW has advised states to open their control rooms, appoint a nodal officer and popularize the control room number to enhance coordination between actors. The WHO India continues committee to maintain regular communication with WHO South-East Asia Regional Office and WHO Headquarters as well as MoHFW, NCDC, ICMR, other agencies and countries through International Health Regulations (IHR) mechanisms.

The three cases of COVID-19 reported from Kerala have fully recovered and been discharged from the hospital on 20th February 2020. The Prime Minister's Office, MoHFW and Cabinet Secretary

were closely monitoring the situation of COVID-19 in India round the clock. The Government of India (GoI) previously issued travel advisories requesting the public to refrain from travelling to China, and from 26th February, 2K20 this advisory applied also to Iran, Italy and Republic of Korea. People coming from these countries or having travel history, since 10th February 2020, may be quarantined for 14 days on their arrival to India. On 22nd February 2020, Govt. of India announced that universal screening at airports will also apply for flights arriving from Indonesia, Kathmandu, Malaysia and Vietnam (in addition to China, Hongkong, Japan, Republic of Korea, Singapore and Thailand as being done previously).

On 11th March 2020, WHO declared the novel coronavirus disease (COVID-19) outbreak as a global pandemic (an epidemic that has spread worldwide affecting a large number of people). On the same day, the Hon'ble Prime Minister of India, constituted a high-level Group of Ministers (GOM) to review, monitor and evaluate the preparedness and measures taken regarding management of COVID-19 in the country. Government of India has invoked powers under the Epidemic Diseases Act, 1897 to enhance preparedness and containment of the virus and declared COVID-19 a 'notified disaster' under the 'Disaster Management Act 2005'. The community surveillance, quarantine, isolation wards, adequate PPEs, trained manpower, rapid response teams for COVID-19 being strengthened further in all States and UTs. As on 14th March 2020, a total of 84 cases of COVID-19 have been reported in India (67 Indian nationals and 17 foreign nationals; and of them 10 were cured, with 2 death cases).

The Prime Minister's Office (PMO), MoHFW and Cabinet Secretary are closely monitoring the situation round the clock and all the states and UTs of India have been advised to invoke the provisions under 'Section 2 of the Epidemic Disease Act 1897', which includes special measures to be taken by the Centre to "prescribe regulations as to dangerous epidemic disease" by 14th March 2K20. The Central Government has declared the COVID-19 outbreak in the country a "notified disaster", in a move called "a special one-time dispensation", to provide compensation and aid to infected people and the families of those who died due to the virus. Funds for this and other measures will be drawn from the State Disaster Response Funds (SDRF). Travel advisories had been issued by MoHFW from time to time. Starting from 15th March 2020, all existing visas, except diplomatic, official, UN/International Organizations,

employment, project visas, stand suspended until 15th April 2020 with few exceptions (Nepalese and Bhutanese nationals). All international passengers entering India now required to furnish duly filled self declaration form and underwent universal health screening at the designated counters at all points of entry. As of 14th March, there were 52 laboratories identified by the Indian Council of Medical Research, for testing of COVID-19. A total of 57 laboratories have been identified to support sample collection and referral by 15th March, 2020.

Govt of India including 23 states/UTs and New Delhi have issued orders allowing only essential services to operate in 75 districts with confirmed COVID-19 cases until 31st March, 2020. The focus was on closure of all activities except essential services such as hospitals, telecom, pharmacy, provision stores etc. The Hon'ble Prime Minister of India Shri Narendra Modi called for 'Janata Curfew' on 22nd March, 2K20 from 7AM to 9PM, urging people to stay home except those in essential services, enforcing publicled social distancing interventions. In consultation with medical professionals, detailed advisory has been issued for all health establishments to avoid non-urgent hospitalization and minimize elective surgeries. Allaying concern of the logistics for COVID-19 management particularly masks and hand sanitizers; Government has notified an order under the 'Essential Commodities (ECs) Act, 1955' to declare these items as Essential Commodities up to 30th June 2020. No scheduled international commercial passenger aircraft shall take off from any foreign airport for any airport in India, since 22nd March, 2020 till 29th March, 2020. All train services will be suspended till 31st March 2020 including sub urban rail services, metro rail services and interstate passenger transport. The goods trains may continue to operate for facilitating availability of essential commodities. These restrictions were temporary but considered critical to break the chain of transmission. The State Governments have been requested to ensure that while such measures being taken, necessary steps must be ensured to minimize discomfort to the poor and vulnerable sections of the society.

Hon'ble Prime Minister Mr. Narendra Modi, in exercise of the powers under 'section 6(2)(i) of the Disaster Management Act, 2005', issued an order for State/UTs prescribing lockdown for containment of COVID-19 epidemic in the country for a period of 21 days with effect from 25th March, 2020 to 14th April, 2020. India's response to COVID-19 has been pre-emptive, pro-active and graded with

high-level political commitment and a 'whole Government' approach to respond to the COVID-19 pandemic. The WHO Country office for India is working closely with MoHFW to strengthen surveillance, build capacity of health system and optimize 'window of opportunity' created by mandatory physical distancing in India. All incoming international flights have been suspended and as of 25th March, 2020 (through an order) extension of suspension has been made till 14th April 2020. Indian railways issued an order that the period from 22nd March to 14th April, 2020 will be treated under "Force Majeure". Passenger movement has been restricted including inter-state travel, all efforts to ensure availability of essential commodities through its uninterrupted freight services in place. The ICMR has issued guidelines for use of commercial kits for nasal/throat swab based diagnosis of COVID-19 and 104 out of 119 proposed labs in public sector are functional for COVID-19 or SARS-CoV2 test. Additionally, a total of 15 private labs in 7 states are functional and test has been conducted with an efficiency of 96% across India by 31st March, 2020.

CONCLUSION

The review of the earlier available literature showed that the coronaviruses are large, enveloped single stranded RNA viruses with largest genome among RNA viruses. The intention of the current review was to explore the outbreak and challenges of novel coronavirus COVID-19 (SARS-CoV2) as a global pandemic with special reference to the Indian scenario and the steps taken by the Government of India to engrave the further spread of the COVID-19. The first case of the novel coronavirus (2019-nCoV) was reported in late 2019 from the wet market of Wuhan (China), the epicenter of COVID-19. As of 31st March 2020, more than 805000 people have been found to be infected in more than 200 countries. As per the report of China's NHC there have been over 39500 deaths globally and 172000 recovered cases with hardest hit on Italy with over 11596 fatalities due to COVID-19. In the Indian perspective, the first case of COVID-19 was reported in the last week of January 2020. Since then, the number of positive cases was augmented continuously. As the potential of worldwide or cross boundary international spread of COVID-19 *via* commercial air travel had been assessed. Therefore, to tackle the situation, Hon'ble Prime Minister of India, Mr. Narendra Modi, urged people to practice social distancing and self quarantine for at least 14 days and 'Janta Curfew' of one day (22nd March, 2020) and thereafter declared a 21 days 'complete lockdown' till 14th April, 2020 to break the chain of

coronavirus transmission. The confirmed cases of coronavirus in India replicates by 10 folds in a fortnight and as of March 31st, 2020 with more than 1550 COVID-19 cases, over 47 deaths, and 102 completely recovered cases. This review will be a key stone in meaningful information for future research and might be possible to assist agencies decision making on strategies to handle this global pandemic public health emergency at the community, national, and international level.

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CONFLICTS OF INTEREST

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