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Review

Review of Novel Coronavirus Disease (COVID-19) in India on Available Database

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Abstract

Novel coronavirus also known as severe acute respiratory syndrome human coronavirus 2 (SARS-CoV-2) was emerged from Wuhan, China and have taken catastrophic form globally. India being a dense populated country is also in second stage of virus transmission. Bats were considered as its primary host but COVID-19 disease became pandemic via human to human transmission by droplet nuclei. The incubation period ranges upto 14 days and main symptoms of disease were noticed as atypical pneumonia, fever, difficult breathing, decreased SPO2 level and ultimately death due to respiratory failure depending upon immune status of the patients. India has witnessed 229 deaths so far while more than 6500 cases have been confirmed for COVID-19. Presently India has 21days complete lockdown and taken all immediate preventive measures for control of the disease. We aimed collection and compilation of scattered information about COVID-19 in India and so that this could be used in a suitable manner to combat the disease.

Keywords: COVID-19, India, novel coronavirus

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Novel coronavirus (nCoV-2019) also termed as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing novel coronavirus disease 2019 (COVID-19) is an ongoing pandemic outbreak of coronavirus family, initially appeared in city's Huanan Seafood Wholesale Market, Wuhan, Hubei Province, China, on 17th November 2019 in a 55-year-old person, according to the unpublished Chinese media reports.[1,2] Though, the cause of the illness has not been identified till but Bats were considered as primary reservoir of virus. China reported country office of World Health Organization (WHO) China regarding unusual pneumonia cases in Wuhan (central Hubei province) first time on 31st December 2019.[3,4] Chinese officials were thinking about recurrence of previously reported severe acute respiratory syndrome coronavirus (SARS-CoV) in 2002-03 in China or Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012 in Saudi Arabia.[5] Later on, Chinese Center for Disease Control and Prevention (CDC)[6] declared occurrence of novel coronavirus named as SARS-CoV-2 of betacoronavirus family and disease as coronavirus disease (COVID-19) having symptoms of SARS and common cold on 7th January 2020.[7] Tests required for detection of SARS-CoV (2002) and MERS-CoV (2012) were used for earlier detection of SARS-CoV-2.[8] This novel coronavirus has thought to be having the same lineage from those causing the SARS-CoV.[9] By March 2020 the number of cases in US, Europe, South East Asia and Africa has been increased tremendously and WHO declared COVID-19 situation as pandemic on the basis of alarming levels of spreading and severity.[2,3,10] Upto 10th April 2020 there were 1479168 confirmed cases and 87987 confirmed

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deaths occurred due to COVID-19 globally (211 countries) according to World Health Organization.[11] The mortality rate by SARS-CoV-2 or COVID-19 was observed as 5.94% which is lesser that SARS-CoV (10%) and MERS-CoV (37%).[12,13] Among total confirmed cases world-wide, 759661 cases were from Europe, 493173 cases from Americas, 117247 cases from western Pacific, 87882 cases from Eastern Mediterranean, 12156 cases from South East Asia and 8337 cases from Africa. Death proportionate was maximum in Italy (No. of deaths: 17669) followed by United states of Americas (14655), Spain (14555), and France (10853) on same date.[11]

SARS CoV-2 or COVID-19 in India

Novel coronavirus disease COVID-19 is epidemic in India and almost 6825 cases have been confirmed for COVID-19 upto 10th April 2020 according to Ministry of health and family welfare, Gov. of India.[14] Out of them, 5955 cases were in active stage and 641 have been recovered successfully. Death of 229 peoples have been recorded upto same date.[14] The first case was reported on 30th January 2020 in a female patient of Thrissur district, Kerala, India having travel history to Wuhan state, China.[14,15] While the SARS CoV-2 virus has become pandemic across the globe upto March 2020, the COVID-19 situation in India was under control. Only three confirmed case were reported upto 2nd March 2020 in India. On 4th–5th March 2020, group of 16 Italian tourist have been detected positive for SARS-CoV-2 and from here onwards the number confirmed cases increased tremendously but still no deaths were reported upto 10th March 2020.[15,16] The initial transmission of SARS-CoV-2 was in preliminary stage mainly due to contact of persons having foreign travel history. First 100 cases were detected after 43 days of first case reported i.e on 14th March 2020 but from now onwards the doubling time was calculated on an average of 2-4 days i.e 20th March 2020 (>200 cases), 22th March 2020 (>400 cases), 27th March 2020 (>800 cases), 31st March 2020 (>1600 cases), 4th April 2020 (>3200 cases) and 9th April 2020 (6729 cases) (Fig. 1).[14] The mortality of 3.35% was recorded in India so far. Now the infection has been achieved level of 2nd stage or local transmission.[15–17] Government of India has timely checked the situation and implemented several policies, sanitization and awareness, including 21 days complete lockdown of 1.3 billion population of India till 14th April 2020.[18] In spite of that, drastic increase in number of cases (approx. 30-35%) appeared was due to epicenter made by religious conference of peoples from diverse areas of India and world at Delhi, in March 2020. This particular hotspot spreads infection in counter parts of country and this may became the reason of entering into 3rd stage or community transmission of virus in upcoming days or weeks.[19,20]

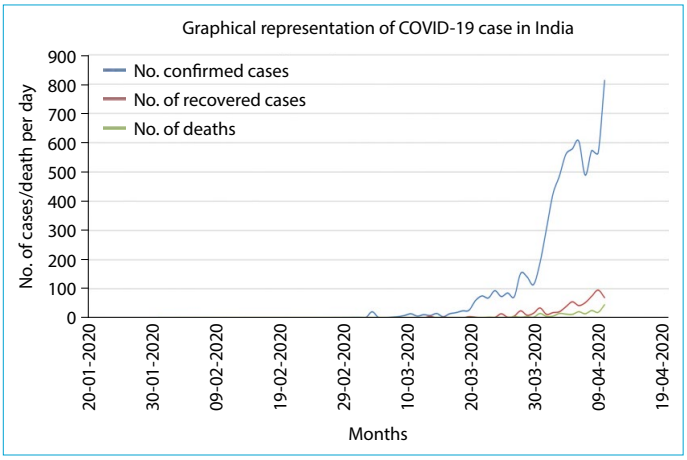

Figure 1. Graphical representation of No. of confirmed cases, No. of recovered cases and No. of deaths due to COVID-19 in India (Graph generated on the base of data retrieved from https://www.covid19india.org/).[14]

Virus Characteristics

The genome of the novel coronavirus SARS-CoV-2, causing atypical pneumonia in humans population of Wuhan, had 89% nucleotide identity with bat SARS-like-CoVZXC21 and 82% with that of human SARS-CoV and proved this as a new virus strain called SARS-CoV-2 or COVID-19.[21] Phylogenetic tree analysis using the whole genome sequences of SARS-CoV-2 with five severe SARS-CoV sequences, two MERS-CoV sequences and five from bat SARS-like coronavirus) from China origin showed that SARS-CoV-2 have formed different cluster and were more similar to Bat SARS-like coronavirus (almost 80%).[22] Human angiotensin converting enzyme receptor (ACE2 cell receptor) was recognized by both SARS-CoV and Novel coronaviruses SARS-CoV-2 by previously standardized animal models experiments.[23,24] SARS-CoV-2 genome is made up of spherical or pleomorphic (having diameter of approximately 60–140 nm), single-stranded enveloped RNA molecule covered with club shaped glycoprotein.[7] The genome consists of 29891 nucleotides which encodes 9860 amino acids. The Structural proteins are encoded by the four structural genes, including spike (S), envelope (E), membrane (M) and nucle-ocapsid (N) genes.[25] Corona viruses are four sub types such as alpha, beta, gamma and delta corona virus. Some of them were affect human of other affected animals such as pigs, birds, cats, mice and dogs.[26,27] SARS-CoV-2 or COVID-19 belongs to the beta CoVs category. The SARS-CoV-2 can be destroyed by ultraviolet rays and heat. Other lipid solvents including ether (75%), ethanol, chlorine-containing disinfectant, peroxyacetic acid and chloroform can also effectively inactivate this virus particle.[7]

Mode of Transmission and Pathogenicity

The initial cases of SARS-CoV-2 or COVID-19 were detected in human patients visited Hunan seafood market; Wuhan city in China indicates possibility of an unknown zoonotic pathogen. But later on, some cases were also detected that didn't have any history of visiting seafood market or any contact with animals, clearly indicated that there would be possibility of human to human transmission.[13] It was hypnotised that bats were primary reservoirs of the SARS-CoV-2 and human population acquired infection by ingesting raw meat of bats. However, the intermediate host was still unknown.[28] The SARS-CoV-2 was more transmissible than SARS-CoV may be due to genetic recombination of S protein in the RBD region of SARS-CoV-2, which may enhance its ability of transmission from human to human.[24]

Air borne transmission via Droplet nuclei in air due to coughing, sneezing etc. was commonly observed in spreading of the disease. These droplets may enter into lungs via the mouth or nasal mucosa during inhalation.[4] SARS-CoV-2 was found more stable on plastic and stainless steel than on copper and cardboard, and viable up to 72 hours after application to these surfaces.[29] However, it was still unclear that transmission of virus may occur via touching an infected surface or object and then touching their mouth, nose, or possibly eyes. The incubation time could be generally within 3 to 7 days and up to 2 weeks depending upon immune status of the patients.[21] The clinical symptoms may be mild, severe and critical form. Mild disease has non-pneumonia or mild pneumonia like symptoms occurred mainly in 81% of the cases. Severe form (14% of the cases) may show symptoms like fever, dyspnea, high respiratory frequency (≥30/min), low blood oxygen saturation SpO_2 (≤93%). Critical condition (in 5% cases) resulted into respiratory failure, septic shock, and/or multiple organ failure.[7]

SARS-CoV-2 replicates poorly in dogs, pigs, chickens, and ducks, but ferrets and cats are permissive to infection.[30] US confirmed death of a 4-year-old Malayan tiger tested positive for novel coronavirus SARS-CoV-2 virus at Bronx Zoo in New York City. The tiger was infected by close contact of COVID-19 positive tiger attendant.[31] However, no human to animal transmission has been reported till date. Epidemiological data showed that SARS-CoV-2 infected cases were doubled in number in every week. The basic reproduction number or infection rate (R0- R naught) is 2.2 world-wide.[7] This R0 value denotes that each patient can infect an additional 2.2 individuals. The SARS-CoV epidemic in 2002-2003 as more severe as R0 value of that was 3.[32] In general, the larger the value of R0 signifies harder it to control the epidemic. The infection rate of SARS-CoV-2 or COVID-19 in India is reported to be 1.7, which is significantly lower than worst affected countries.[33]

Preventive Measures for Control of COVID-19 Disease

There is no specific antiviral treatment has been proven effectively to treat SARS-CoV-2 or COVID-19 patients. Still there is no vaccine yet. Some countries have did in vitro drug trials for COVID-19 based on SARS-CoV and MERS-CoV trials and proposed several possible drugs such as lopinavir/ritonavir (400/100 mg every 12 hours), chloroquine (500 mg every 12 hours), and hydroxychloroquine (200 mg every 12 hours). India being prone to malaria has high number hydroxychloroquine manufacturing. Many of the developed and developing countries have given demands for hydroxychloroquine. But none of the drug molecule has been approved by WHO for COVID-19 treatment yet.[7] Proper protective measures are the only option for inhibition of disease spread. The WHO and other organizations have issued general guidance to follow for all counties. This includes social distancing, proper hygienic measures, surface disinfection, proper hand wash or sanitization, avoiding social gathering, use of face masks etc.[12] Government officials of India had begun the battle with announcement of Janta Curfeu on 22nd March 2020 followed by 21 days complete lockdown in the country from 24th March to 14 April 2020.[35,36] Over 1 lakh samples have been tested across the country and more authorized government and private laboratories were included for achieving the target of testing 1 lac tests per day in upcoming months.[37,38] The Indian Council of Medical Research has approved rapid antibody test kits for screening new emerging hotspots of SARS-CoV-2 virus in the country. The RT-PCR using for genotypic detection of SARS-CoV-2 is little time consuming (4-5 hrs) and required skilled professionals. So the Rapid antibiotic kits will enhance traceability of hidden infection.[38]

Conclusion

India is in second stage of virus transmission and may enter into community transmission stage like other countries i.e Europe, US and China. So the upcoming few weeks of April 2020 are very crucial for prevention and control of pandemic COVID-19 in. There is paucity of current information regarding epidemiology, duration of human transmission, and clinical spectrum of disease, therapeutic investigation, vaccine development etc. which could be fulfilled by more experimentation. Along with research, preventive measure could be very important for inhibiting the rate of virus transmission. Tracing infected persons rapidly by testing and isolating them, could practically suppress virus transmission. Proper quarantine of confirmed as well as doubtful cases should be done very efficiently.

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