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COVID-19: PANDEMIC IN INDIA; AN UPDATE

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ABSTRACT
Corona virus causes respiratory infection including pneumonia, cold, sneezing and coughing. Corona virus transmitted human to human or human to animal via airborne droplets. Corona virus enters in human cell through membrane ACE-2 exopeptidase receptor. There is a new public health crises threatening the world with the emergence and spread of 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The virus originated in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019. There have been around 96,000 reported cases of coronavirus disease 2019 (COVID-2019). The disease is transmitted by inhalation or contact with infected droplets and the incubation period ranges from 2 to 14 days. The symptoms are usually fever, cough, sore throat, breathlessness, fatigue, malaise among others. The disease is mild in most people; in some (usually the elderly and those with comorbidities), it may progress to pneumonia, acute respiratory distress syndrome (ARDS) and multi organ dysfunction. Many people are asymptomatic. The case fatality rate is estimated to range from 2 to 3%. Diagnosis is by demonstration of the virus in respiratory secretions by special molecular tests. Common laboratory findings include normal/ low white cell counts with elevated C-reactive protein (CRP). The computerized tomographic chest scan is usually abnormal even in those with no symptoms or mild disease. Treatment is essentially supportive; role of antiviral agents is yet to be established. Prevention entails home isolation of suspected cases and those with mild illnesses and strict infection control measures at hospitals that include contact and droplet precautions. The virus spreads faster than its two ancestors the SARS-CoV and Middle East respiratory syndrome coronavirus (MERS-CoV), but has lower fatality. The global impact of this new epidemic is yet uncertain.India has the second-highest number of confirmed cases in the world (after the United States) with nearly 20 million reported cases of COVID-19 infection and 249,992 deaths as of 11 May 2021.

KEYWORDS: COVID-19, Corona, Vaccination, Prevention, 2019-nCOV, SARS-CoV-2.

1. INTRODUCTION
Corona viruses (CoV) are a family of viruses called *coronaviridae*. The subfamily Coronavirinae has three genera, *alphacoronavirus*, *betacoronavirus* and *gammacoronavirus*. The subfamily *Torovirinae*has two genera, *torovirus* and *bafinivirus*. CoV can lead to a range of conditions as mild as the common cold, fever and cough and as severe as pneumonia, respiratory distress kidney failure or even death. A couple of coronaviruses were previously identified: MERS-CoV, which causes Middle East respiratory syndrome and was transmitted from dromedary camels to humans, and SARS-CoV, which causes severe acute respiratory syndrome and was transmitted from civet cats to humans.[1]

The COVID-19 pandemic in India is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first case of COVID-19 in India, which originated from China, was reported on 30 January 2020. India currently has the largest number of confirmed cases in Asia. As of May 2021, India has the second-highest number of confirmed cases in the world (after the United States) with nearly 20 million reported cases of COVID-19 infection and 249,992 deaths as of 11 May 2021.[2] The first cases of COVID-19 in India were reported in the towns of Thrissur, Alappuzha and Kasargod, all in the state of Kerala, among three Indian medical students who had returned from Wuhan.Lockdowns were announced in Kerala on 23 March, and in the rest of the country on 25 March. By mid-May 2020, five cities accounted for around half of all reported cases in the country: Mumbai, Delhi, Ahmedabad, Chennai and Thane. On 10 June, India's recoveries exceeded active cases for the

first time.[3] Infection rates started to drop in September, along with the number of new and active cases. Daily cases peaked mid-September with over 90,000 cases reported per-day, dropping to below 15,000 in January 2021.[4]

A second wave beginning in March 2021 was much larger than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medicines in parts of the country. By late April, India led the world in new and active cases. On 30 April 2021, it became the first country to report over 400,000 new cases in a 24-hour period.Experts believe that India's figures are vastly underreported due to poor infrastructure, low testing rates, and people dying at home.[5]

Corona viruses (CoV) are a huge family of viruses such as.

1. Middle East Respiratory Syndrome (MERS - CoV)
2. Severe Acute Respiratory Syndrome (SARS - CoV)
3. Novel corona virus (nCoV)

It is also known as zoonotic virus means it firstly spread in animals and then to human.[6-7]

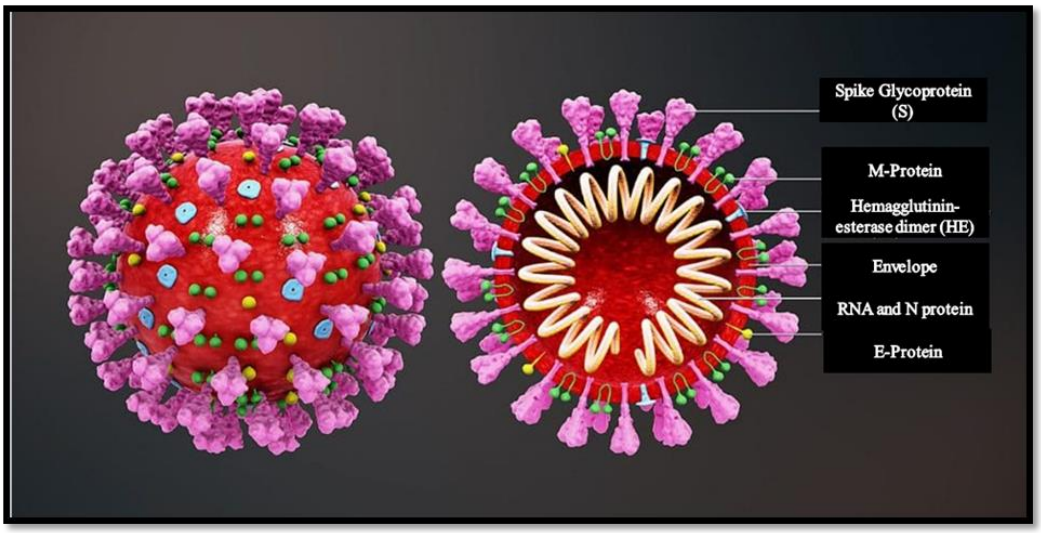


Fig 1.1: Basic Structure of Corona Virus.

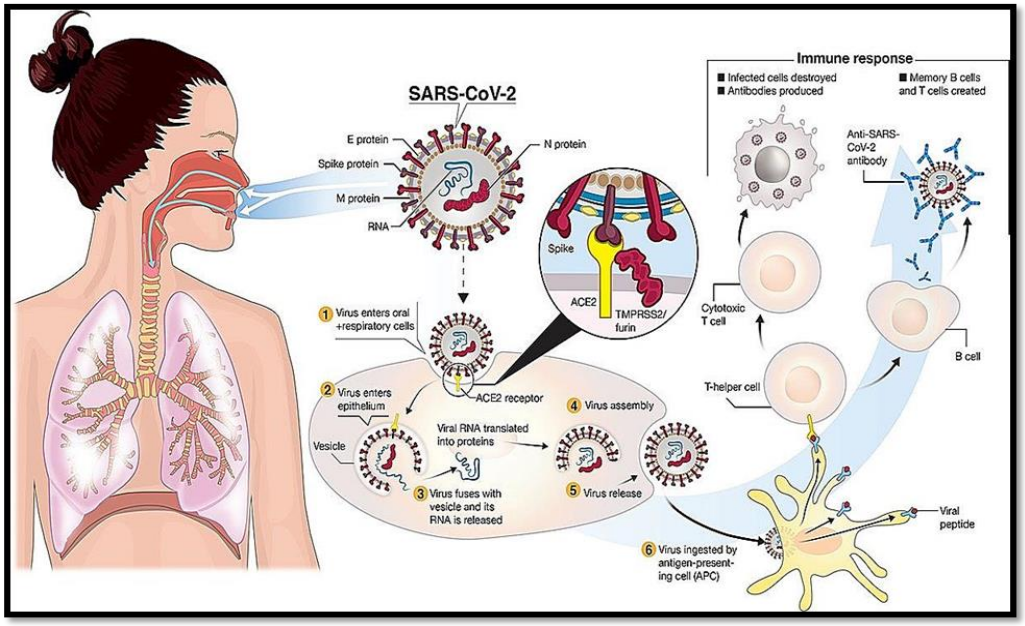


Fig: 1.2: Life cycle of Corona virus.

1. Virus enters oral respiratory cells
2. Virus enters epithelium
3. Virus fuses with vesicle and its RNA is released
4. Virus assembly
5. Virus release
6. Virus ingested by antigen-presenting cell (APC)

1.1 Origin and Spread of COVID-19

In December 2019, adults in Wuhan, capital city of Hubei province and a major transportation hub of China started presenting to local hospitals with severe pneumonia of unknown cause. Many of the initial cases had a common exposure to the Huanan wholesale seafood market that also traded live animals. The surveillance system (put into place after the SARS outbreak) was activated and respiratory samples of patients were sent to reference labs for etiologic investigations.[8] On December 31st 2019, China notified the outbreak to the World Health Organization and on 1st January the Huanan sea food market was closed. On 7th January the virus was identified as a coronavirus that had >95% homology with the bat coronavirus and > 70% similarity with the SARSCoV. Environmental samples from the Huanan sea food market also tested positive, signifying that the virus originated from there. The number of cases started increasing exponentially, some of which did not have exposure to the live animal market, suggestive of the fact that human-to-human transmission was occurring.[9] The first fatal case was reported on 11th Jan 2020. The massive migration of Chinese during the Chinese New Year fuelled the epidemic. Cases in other provinces of China, other countries (Thailand, Japan and South Korea in quick succession) were reported in people who were returning from Wuhan.[10]

Transmission to healthcare workers caring for patients was described on 20th Jan, 2020. By 23rd January, the 11 million population of Wuhan was placed under lock down with restrictions of entry and exit from the region.[11] Soon this lock down was extended to other cities of Hubei province. Cases of COVID-19 in countries outside China were reported in those with no history of travel to China suggesting that local human-to-human transmission was occurring in these countries. Airports in different countries including India put in screening mechanisms to detect symptomatic people returning from China and placed them in isolation and testing them for COVID-19.[12] Soon it was apparent that the infection could be transmitted from asymptomatic people and also before onset of symptoms. Therefore, countries including India who evacuated their citizens from Wuhan through special flights or had travellers returning from China, placed all people symptomatic or otherwise in isolation for 14 days and tested them for the virus.[13] Cases continued to increase exponentially and modelling studies reported an epidemic doubling time of 1.8 days. In fact on the 12th of February, China changed its definition of confirmed cases to include patients with negative/ pending molecular tests but with clinical, radiologic and epidemiologic features of COVID-19 leading to an increase in cases by 15,000 in a single day.[14] As of 05/03/2020 96,000 cases worldwide (80,000 in China) and 87 other countries and 1 international conveyance (696, in the cruise ship Diamond Princess parked off the coast of Japan) have been reported. It is important to note that while the number of new cases has reduced in China lately, they have increased exponentially in other countries including South Korea, Italy and Iran. Of those infected, 20% are in critical condition, 25% have recovered, and 3310 (3013 in China and 297 in other countries) have died.[15] India, which had reported only 3 cases till 2/3/ 2020, has also seen a sudden spurt in cases. By 5/3/2020, 29 cases had been reported; mostly in Delhi, Jaipur and Agra in Italian tourists and their contacts. One case was reported in an Indian who traveled back from Vienna and exposed a large number of school children in a birthday party at a city hotel.[16] Many of the contacts of these cases have been quarantined. These numbers are possibly an underestimate of the infected and dead due to limitations of surveillance and testing.[17] Though the SARS-CoV-2 originated from bats, the intermediary animal through which it crossed over to humans is uncertain.

1.2 Pandemic conditions in India (2020)

On 12 January 2020, the WHO confirmed that a novel coronavirus was the cause of a respiratory illness in a cluster of people in Wuhan, Hubei, China, which was reported to the WHO on 31 December 2019. On 30 January 2020, India reported its first case of COVID-19 in Thrissur, Kerala, which rose to three cases by 3 February 2020; all were students returning from Wuhan.[18] Apart from these, no significant rise in transmissions was observed in February. On 4 March, 22 new cases were reported, including 14 infected members of an Italian tourist group. Transmissions increased over the month after several people with travel history to affected countries, and their contacts, tested positive. On 31 March, a TablighiJamaat religious congregation event in Delhi, which had taken place earlier in March, emerged as a superspreader event, after numerous cases across the country were traced back to it. On 18 April, the Health ministry announced that 4,291 cases were directly linked to the event. As of 4 April, about 22,000 people who came in contact with the TablighiJamaat missionaries had to be quarantined.[19-20]

On 2 May, around 4,000 stranded pilgrims returned from Hazur Sahib in Nanded, Maharashtra to Punjab. Many of them tested positive, including 27 bus drivers and conductors who had been part of the transport arrangement. By 13 May, 1,225 pilgrims had tested positive. In July 2020, it was estimated based on antibody tests that at least 57% of the inhabitants of Mumbai's slums may have been infected with COVID-19 at some point. A government panel on COVID-19 stated in October 2020 that the pandemic had peaked in India, and could come under control by February 2021.[21]

1.3 Pandemic conditions in India (2021)

India began its vaccination programme on 16 January 2021. On 19 January 2021, nearly a year after the first reported case in the country, Lakshadweep became the last region of India to report its first case. By February 2021, daily cases had fallen to 9,000 per-day. However,

by early-April 2021, a major *second wave* of infections took hold in the country; on 9 April, India surpassed 1 million active cases and by 12 April, India overtook Brazil as having the second-most COVID-19 cases worldwide, behind only the United States.[22]

Multiple factors have been proposed to have potentially contributed to the sudden spike in cases, including highly-infectious variants of concern, a lack of preparations as temporary hospitals were often dismantled after cases started to decline, and new facilities were not built, and health and safety precautions being poorly-implemented or enforced during weddings, festivals (such as Holi on 29 March, and the HaridwarKumbhMela in April), sporting events (such as IPL), state and local elections in several states and in public places.[23] An economic slowdown put pressure on the government to lift restrictions, and there had been a feeling of exceptionalism based on the hope that India's young population and childhood immunisation scheme would blunt the impact of the virus.Models may have underestimated projected cases and deaths due to the under-reporting of cases in the country.[24] The HaridwarKumbhMela was linked to at least 1,700 positive cases between 10 and 14 April alone, and 68 cases among Hindu seers between 5-14th April.Politicians and activists have been criticised for holding rallies during the pandemic. Due to high demand, the vaccination programme began to be hit with supply issues; exports of the Oxford–AstraZeneca vaccine were suspended in order to meet domestic demand, there have been shortages of the raw materials required to manufacture vaccines domestically, while hesitancy and a lack of knowledge among poorer, rural communities has also impacted the programme.[25]

By late April, India passed 2.5 million active cases and was reporting an average of 300,000 new cases and 2,000 deaths per-day. On 26 April, India reported 350,000 new cases and over 2,800 deaths in one day.[26] On 30 April, India reported over 400,000 new cases and over 3,500 deaths in one day. The second wave placed a major strain on the healthcare system, including an ongoing shortage of liquid medical oxygen due to unanticipated demand, delays in transport, and a lack of cryogenic tankers.[27] On 21 April, 22 COVID-19 patients who required ventilators died at a hospital in Maharashtra after an accident caused a leak in its main oxygen supply.[28] On 23 April, Prime Minister met via videoconference with liquid oxygen suppliers, where he acknowledged the need to "provide solutions in a very short time", and acknowledged efforts such as increases in production, and the use of rail (with the Indian Railways transporting tankers via "Oxygen Express" trains)and air transport to deliver oxygen supplies.[29]

Table 1.1: Dashboard of situation of corona virus till 10-05-2021.

Total Samples Tested	**303,750,077**	**% of Total Samples**
Total positive cases	22,991,927	7.5%
New samples tested	1,474,606	0.4%
New positive cases	329,517	0.1%
Total active cases	3,720,695	1.2%
Total deaths	250,025	0.8%
Total recovered cases	19,021,207	6.2%

1.4 Types of CoVTesting

Molecular-based testing (RT-PCR)

- A molecular amplification test detects genetic material from a specific virus in patient samples. Most molecular tests for COVID-19 are called PCR tests; however, there are a few other molecular tests that are not called PCR.[30]
- PCR is currently the best way to test for current infection with COVID-19.[31]
- PCR molecular tests are processed in a lab and can take several days to return results.
- While this test detects current or recent infection from COVID-19, it is not useful in determining past exposure in fully recovered patients.[32]

Antigenic Testing (Rapid antigen testing)

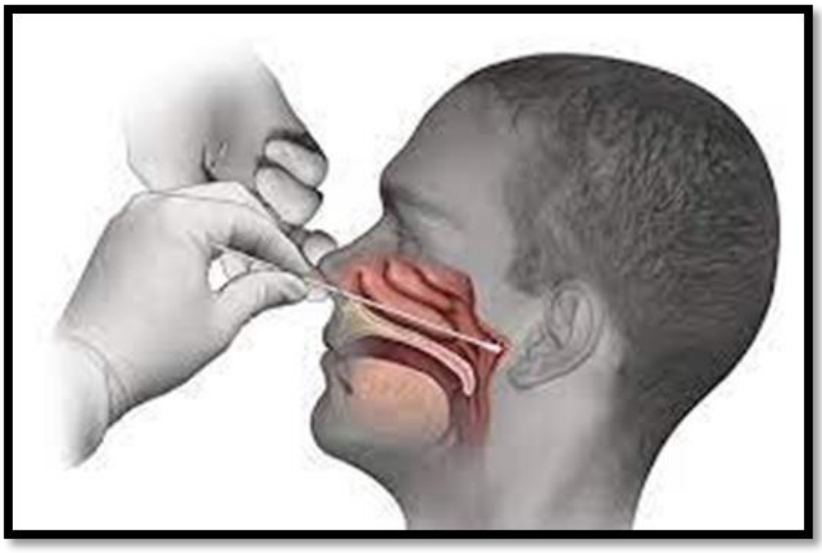
- An antigenic test can quickly detect fragments of proteins found on or within the virus that causes COVID-19.
- The test is similar to a rapid flu test and is usually performed at the point-of-care by collecting a sample from the nasal cavity using a swab. Most antigen tests return results in approximately 15 minutes.[33]
- While antigen tests can be less expensive and offer fast results, they are not as sensitive as PCR tests.This means a PCR test may be needed to confirm a test result in some situations.[34]
- The FDA recently authorized the first COVID-19 antigen test for use in properly certified laboratories, as well as for point-of-care testing in hospitals and urgent care clinics.[35]

Serological Testing

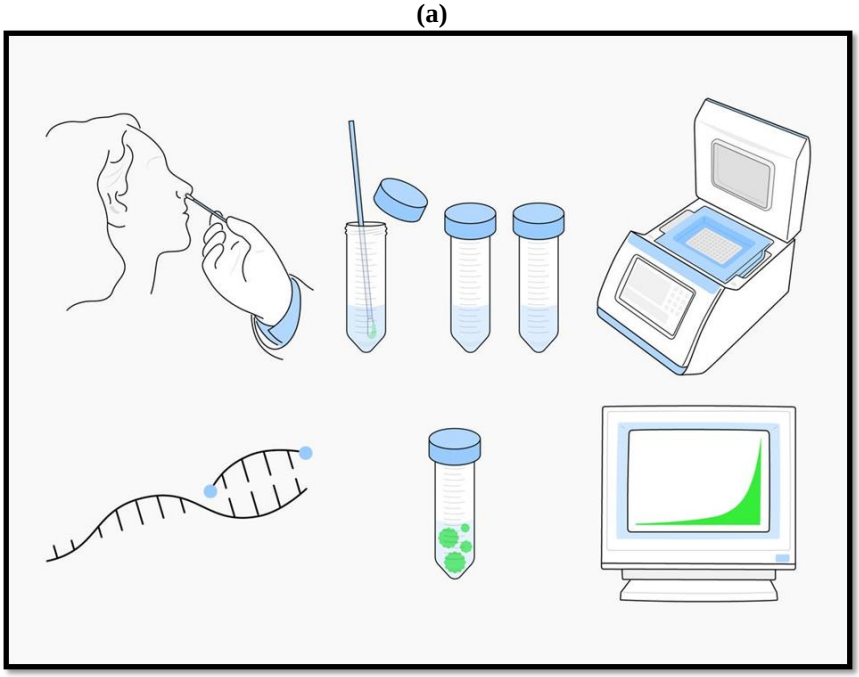
- A serological test is a blood test that looks for antibodies in your blood. It can detect the body's immune response to the infection caused by the virus, rather than detecting the virus itself.
- While these tests can detect previous exposure to COVID-19, they cannot reliably determine if a patient is currently infected and able to spread the

virus to others. We think it might take up to two weeks to develop antibodies to the virus.

- Because much is still unknown about how long immunity may last following COVID-19 infection, these tests may give a false sense of safety to patients. We do not yet know whether having antibodies to COVID-19 means that you can't get sick again.[36]
- Some antibody tests may cross react with other respiratory viruses resulting in false positive results--this means the test is detecting antibodies to a different virus, such as one of the common coronaviruses that many people have been exposed to in the past.[37]



(a)



(b)

Fig 1.3 (a) and (b): Testing of CoV.

1.4.1 Mechanism of testing

Diagnostics for COVID-19 typically fall into two broad categories: tests that detect proteins associated with the virus, known as immunoassays, and tests that detect the virus's genetic code, known as nucleic acid or molecular tests.Nucleic acid-based tests are the most sensitive in early detection of infection, and have been widely used during the COVID-19 pandemic. These tests typically rely on a decades-old technique called reverse transcription polymerase chain reaction, or RT-PCR.[38]

First a sample is taken by swabbing the nasal passages or throat. To find evidence of the virus, researchers use PCR to copy and amplify any segments of viral genetic

code found in the sample, which makes it easier to detect.[39] This typically involves adding reagents and enzymes, and raising and lowering the temperature of the mixture, known as thermal cycling. Software then determines when the number of copies of the target sequence exceeds a threshold, indicating if the novel coronavirus is present, and at what concentration.[40]

The other primary way to test for COVID-19 is with an immunoassay. Rather than analyzing genetic material, these tests detect proteins produced either by the virus itself, or by the body's immune system in response to the virus. The tests can detect evidence of past or current infections.[41] Viruses are covered in protein structures, called spikes that are unique to that virus. As the body's immune system kicks into gear to fight the infection, it produces its own unique proteins, called antibodies that attach to the protein structures on the virus. The unique linkage between antibodies and their respective viral proteins, or antigens, makes both parties good targets for diagnostics.[42] Immunoassays take advantage of this. Such tests use antibodies and antigens as bait to capture their respective partners. A sample is typically blood, plasma, or serum is run through the test, usually in the format of a lateral flow assay. Antibodies in the blood sample will recognize and bind with the antigens on the test. Likewise, viral antigens in the blood sample will bind with the antibodies on the test. Any binding that takes place indicates a positive result.[43]

1.5 Prevention and Vaccination

The WHO and other agencies such as the CDC have published protective measures to mitigate the spread of COVID-19. This involves frequent hand washing with handwash containing 60% of alcohol and soap for at least 20 seconds. Another important measure is avoiding close contact with sick people and keeping a social distance of 1 metre always to everyone who is coughing and sneezing.[44] Not touching the nose, eyes and mouth was also suggested. While coughing or sneezing, covering the mouth and nose with a cloth/tissue or the bent elbow is advised. Staying at home is recommended for those who are sick, and wearing a facial mask is advised when going out among people. Furthermore, it is recommended to clean and sterilise frequently touched surfaces such as phones and doorknobs on a daily basis. Staying at home as much as possible is advisable for those who are at higher risk for severe illness, to minimise the risk of exposure to COVID-19 during outbreaks.[45]

Several properties of this virus make prevention difficult namely, non-specific features of the disease, the infectivity even before onset of symptoms in the incubation period, transmission from asymptomatic people, long incubation period, tropism for mucosal surfaces such as the conjunctiva, prolonged duration of the illness and transmission even after clinical recovery.[46] Isolation of confirmed or suspected cases with mild illness at home is recommended. The ventilation at home should be good with sunlight to allow for destruction of virus. Patients should be asked to wear a simple surgical mask and practice cough hygiene. Caregivers should be asked to wear a surgical mask when in the same room as patient and use hand hygiene every 15–20 min.[47]

Healthcare workers should be provided with fit tested N95 respirators and protective suits and goggles. Airborne transmission precautions should be taken during aerosol generating procedures such as intubation, suction and tracheostomies.[48] All contacts including healthcare workers should be monitored for development of symptoms of COVID-19. Patients can be discharged from isolation once they are afebrile for atleast 3 days and have two consecutive negative molecular tests at 1 d sampling interval. This recommendation is different from pandemic flu where patients were asked to resume work/school once afebrile for 24 h or by day 7 of illness. Negative molecular tests were not a prerequisite for discharge. At the community level, people should be asked to avoid crowded areas and postpone non-essential travel to places with ongoing transmission. They should be asked to practice cough hygiene by coughing in sleeve/ tissue rather than hands and practice hand hygiene frequently every 15–20 min. Patients with respiratory symptoms should be asked to use surgical masks. The use of mask by healthy people in public places has not shown to protect against respiratory viral infections and is currently not recommended by WHO.[49]

India's Serum Institute of India licensed Oxford–AstraZeneca vaccine even before it was approved and built capacity to make 1.5–2.5 billion doses per year. On 1 January 2021, the Drug Controller General of India granted an emergency use authorisation for the vaccine, which was branded "Covishield" for domestic use. By this time, the company had stockpiled 50 million doses, but well short of its own target of 400 million.[50] The Government of India ordered 21 million doses to be delivered by February, but the company said no indication of any further orders were given. So the company began to export the remaining stocks. In March, after India saw a surge in COVID-19 cases, the Government put a block on all vaccine exports, and ordered 110 million doses from the Serum Institute. The company aims to produce 100 million doses per month, but, by May 2021, the production capacity was only 60–70 million doses. In January, India also approved BBV152 (Covaxin), a domestic vaccine developed by Bharat Biotech in association with the Indian Council of Medical Research and National Institute of Virology. This approval was met with some concern, as the vaccine had not then completed phase 3 trials.Due to this status, those receiving Covaxin were required to sign a consent form,while some states chose to relegate Covaxin to a "buffer stock" and primarily distribute the Oxford–AstraZeneca vaccine.[51]

In April 2021, India approved the Russian Sputnik V vaccine and awarded emergency use authorisation to Dr. Reddy's Laboratories. Several Indian companies have lined up to manufacture Sputnik V in India, to the tune of 850 million doses. But the initial shipment of 150 million Sputnik V doses came from Russia, on 1 May.[52]

India officially launched its vaccination program on 16 January. Over 160,000 doses were administered on the first day. By early May, it was reported that 160 million doses had been administered, and 30 million people had received two doses On 1 May 2021, the country began to offer vaccines to all residents 18 and over. Some states were unable to begin vaccination on the day due to shortage of vaccination supplies. Critics viewed this as a politcal decision because the requisite vaccine supplies for this range of population were simply not available.[53]

COVAXIN®, India's indigenous *COVID-19 vaccine* by Bharat Biotech is developed in collaboration with the Indian Council of Medical Research (ICMR) - National Institute of Virology (NIV).The indigenous, inactivated vaccine is developed and manufactured in Bharat Biotech's BSL-3 (Bio-Safety Level 3) *high containment facility*.The vaccine is developed using *Whole-Virion Inactivated Vero Cell* derived platform technology. Inactivated vaccines do not replicate and are therefore unlikely to revert and cause pathological effects. They contain dead virus, incapable of infecting people but still able to instruct the immune system to mount a defensive reaction against an infection.[54]

COVAXIN® is included along with immune-potentiators, also known as vaccine adjuvants, which are added to the vaccine to increase and boost its immunogenicity.The Bharat Biotech COVID-19 (COVAXIN) will be given to you as an injection into the deltoid muscle of ® the upper arm. COVAXIN vaccination series is 2 doses given 4 weeks apart. The Bharat Biotech COVID-19 Vaccine (COVAXIN) is a vaccine with approval for restricted use in emergency situation that may prevent COVID-19. The Central Licensing Authority has granted permission for the sale or distribution of COVAXIN for restricted use in emergency situation in public interest.[55]

2. CONCLUSION

The corona virus (COVID-19) spreads at an alarming rate all over the world. The outbreak of the virus has confronted the world's economic, medical and public health infrastructure. Elderly and immune compromised patients also are susceptible to the virus's mortal impacts. The virus can be controlled with the appropriate prevention strategies. Also, attempts have to be made to formulate systematic strategies to prevent such future zoonotic outbreaks. Apart from the rate since the rate of vaccination is increasing day by day which will help in reducing the outburst of virus and after understanding the facts and figures of corona and vaccination there are probability of decreasing the rate of pandemic[56]. In India the situation is getting better as the total number of cases was 2.4 Cr but good news is that the total number of recovered cases is 2.01 Cr and 2.6 lakhs death till 10-11-2021. So the statistics of corona clearly shows that the country is recovering in a good manner. Apart from that there are 39,274,256 people who are fully vaccinated in the country. Hence these reports are to prove that soon there will be a decrease in the death rate as well as positive cases in future[57].

3. REFERENCES

1. Lu R, Zhao X, Li J, *et al.* Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*, 2020; 395: 564– 574. https://doi.org/10.1016/S0140-6736(20)30251-8.
2. Chen N, Zhou M, Dong X, *et al.* Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*, 2020; 395(10223): 507– 513. https://doi.org/10.1016/S0140-6736.
3. Zhou P, Yang X-L, Wang X-G, *et al.* A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*, 2020; 579: 270– 273. https://doi.org/10.1038/s41586-020-2012-7.
4. Backer J, Klinkenberg D, Wallinga J. Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travellers from Wuhan, China, 20– 28 January 2020. *EuroSurveill*, 2020; 25: 2000062. https://doi.org/10.2807/1560-7917.ES.2020.25.5.2000062
5. Desselberger U. Virus taxonomy: classification and nomenclature of viruses. Seventh report of the International Committee on Taxonomy of Viruses. In: van Regenmortel MHV, Fauquet CM, Bishop DHL, Carstens EB, Estes MK, Lemon SM, Maniloff J, Mayo MA, McGeoch DJ, Pringle CR, Wickner RB, eds. *International Union of Microbiological Societies*. San Diego: Virus Research, 2002; 1162.
6. AlNajjar N, Attar L, Farahat F, *et al.* Psychobehavioural responses to the 2014 Middle East respiratory syndrome-novel corona virus (MERS CoV) among adults in two shopping malls in Jeddah, western Saudi Arabia. *Eastern Mediterranean Health Journal*, 2016; 22: 817– 823.
7. Li J, Li JJ, Xie X, *et al.* Game consumption and the 2019 novel coronavirus. *Lancet Infect Dis*, 2020; 20: 275– 276. https://doi.org/10.1016/S1473-3099(20)30063-3.
8. World Health Organization. Coronavirus disease (COVID-19) situation reports. https://www.who.int/emergencies/diseases/novel-coronavirus-2019.
9. Luk HKH, Li X, Fung J, *et al.* Molecular epidemiology, evolution and phylogeny of SARS coronavirus. *Infect Genet Evol*, 2019; 71: 21– 30.
10. Holshue ML, DeBolt C, Lindquist S, *et al.* First case of 2019 novel coronavirus in the United States. *N Engl J Med*. 2020; 382: 929– 936.

11. Hui DS, Azhar EI, Madani TA, *et al.* Novel coronavirus outbreak in Wuhan. *China. Int J Infect Dis*, 2019; 2020: 264– 266.
12. Shen K, Yang Y, Wang T, et al. Novel coronavirus infection in children: experts' consensus statement. *World J Pediatr*, 2020; 16: 223– 231. https://doi.org/10.1007/s12519-020-00343-7
13. Xu K, Cai H, Shen Y, *et al.* Management of corona virus disease-19 (COVID-19): the Zhejiang experience. *Jour Zhejiang Univ*, 2020; 49. https://doi.org/10.3785/j.issn.1008-9292.2020.02.02
14. Bai SL, Wang JY, Zhou YQ, *et al.* Analysis of the first family epidemic situation of new coronavirus pneumonia in Gansu Province. *Chin J Prev Med*, 2020; 54: E005.
15. Xiao SY, Wu Y, Liu H, *et al.* Evolving status of the 2019 novel coronavirus infections: proposal of conventional serologic assays for disease diagnostics and infection monitoring. *J Med Virol*, 2020; 92: 464– 467.
16. Rasmussen SA, Smulian JC, Lednicky JA, *et al.* Coronavirus disease 2019 (COVID-19) and pregnancy: what obstetricians need to know. *Am J Obstet Gynecol*, 2020; 222: 415– 426. https://doi.org/10.1016/j.ajog.2020.02.017
17. Schwartz DA, Graham AL. Potential maternal and infant outcomes from (Wuhan) Coronavirus 2019-nCoV infecting pregnant women: lessons from SARS, MERS and other human coronavirus infections. *Viruses*, 2020; 12: E194. https://doi.org/10.3390/v12020194
18. Zhu H, Wang L, Fang C, *et al.* Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr*, 2020; 9: 51– 60.
19. Chen H, Guo J, Wang C, *et al.* Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet*, 2020; 395: 809– 815. https://doi.org/10.1016/S0140-6736(20)30360-3.
20. Li Q, Guan X, Wu P, *et al.* Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*, 2020; 382: e32.
21. Gautret P, Lagier J-C, Parola P, *et al.* Hydroxychloroquine and azithromycin as Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet. 2020. https://doi.org/10. 1016/S0140-6736(20)30185-9 a treatment of COVID-19: results of an open-label non-randomized clinical trial. *Int J Antimicrob Agents*, 2020; 56: 105949. https://doi.org/10.1016/j.ijantimicag.2020.105949.
22. Huang C, Wang Y, Li X, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet, 2020; 395: 497–506.
23. Li Q, Guan X, Wu P, *et al.* Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med. 2020. https://doi.org/10.1056/NEJMoa2001316.
24. Cheng ZJ, Shan J. 2019 novel coronavirus: where we are and what we know. Infection, 2020; 1–9. https://doi.org/10.1007/s15010-020- 01401-y.
25. Zou L, Ruan F, Huang M, *et al*. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. N Engl J Med. 2020. https://doi.org/10.1056/NEJMc2001737.
26. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and its inactivation with biocidal agents. J Hosp Infect, 2020 Feb 6. pii: S0195–6701(20)30046–3.
27. Chen H, Guo J, Wang C, *et al.* Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. Lancet, 2020. https://doi.org/10.1016/S0140-6736(20)30360-3.
28. Chen N, Zhou M, Dong X, *et al.* Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet, 2020; 395: 507–13.
29. Wang D, Hu B, Hu C, *et al.* Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus–infected pneumonia in Wuhan, China. JAMA. 2020. https://doi.org/10.1001/jama.2020.1585.
30. Xu XW, Wu XX, Jiang XG, *et al*. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series. BMJ, 2020; 368: m606.
31. Wang XF, Yuan J, Zheng YJ, *et al.* Clinical and epidemiological characteristics of 34 children with 2019 novel coronavirus infection in Shenzhen. [Article in Chinese]. ZhonghuaErKeZaZhi, 2020; 58: E008.
32. Chen F, Liu ZS, Zhang FR, *et al.* First case of severe childhood novel coronavirus pneumonia in China. ZhonghuaErKeZaZhi, 2020; 58: E005.
33. Zeng LK, Tao XW, Yuan WH, Wang J, Liu X, Liu ZS. First case of neonate infected with novel coronavirus pneumonia in China. ZhonghuaErKeZaZhi, 2020; 58: E009.
34. Jin YH, Cai L, Cheng ZS, *et al.* A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus [2019-nCoV] infected pneumonia [standard version]. Mil Med Res, 2020; 7: 4.
35. Huang P, Liu T, Huang L, *et al*. Use of chest CT in combination with negative RT-PCR assay for the 2019 novel coronavirus but high clinical suspicion. Radiology. 2020. https://doi.org/10.1148/radiol.2020200330.
36. Russell CD, Millar JE, Baillie JK. Clinical evidence does not support corticosteroid treatment for 2019-nCoV lung injury. Lancet, 2020; 395: 473–5.
37. Zhao JP, Hu Y, Du RH, *et al.* Expert consensus on the use of corticosteroid in patients with 2019-nCoV

pneumonia. ZhonghuaJie He He Hu Xi ZaZhi, 2020; 43: E007.
38. WHO. Clinical management of severe acute respiratory infection when novel coronavirus [nCoV] infection is suspected. Available at: https://www.who.int/publications-detail/clinical-managementof-severe-acute-respiratory-infection-when-novelcoronavirus- [ncov]-infection-is-suspected. Accessed 9 Feb 2020.
39. Holshue ML, DeBolt C, Lindquist S, *et al.* First case of 2019 novel coronavirus in the United States. N Engl J Med. 2020. https://doi. org/10.1056/NEJMoa2001191.
40. Zhang L, Liu Y. Potential interventions for novel coronavirus in China: a systemic review. J Med Virol. 2020. https://doi.org/10. 1002/jmv.25707.
41. Multicenter Collaboration Group of Department of Science and Technology of Guangdong Province and Health Commission of Guangdong Province for Chloroquine in the Treatment of Novel Coronavirus Pneumonia. [Expert consensus on chloroquine phosphate for the treatment of novel coronavirus pneumonia]. [Article in Chinese] ZhonghuaJie He He Hu Xi ZaZhi, 2020; 43: E019.
42. World Health Organization. Coronavirus disease [COVID-19] Technical Guidance: Infection Prevention and Control. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus2019/technical-guidance/infection-prevention-and-control. Accessed 20 Feb 2020.
43. Chang D, Xu H, Rebaza A, Sharma L, Dela Cruz CS. Protecting health-care workers from subclinical coronavirus infection. Lancet Respir Med, 2020. https://doi.org/10.1016/S2213-2600(20)30066- 7.
44. Li J, Li J, Xie X, *et al.* Game consumption and the 2019 novel coronavirus. Lancet Infect Dis. 2020. https://doi.org/10.1016/ S1473-3099(20)30063-3.
45. Letko M, Munster V. Functional assessment of cell entry and receptor usage for lineage B β-coronaviruses, including, 2019- nCoV. bioRxiv. 22 January 2020. 915660.
46. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, *et al.* Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet. 24 January 2020.
47. Chan JF-W, Yuan S, Kok K-H, To KK-W, Chu H, Yang J, *et al.* A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. The Lancet. 24 January 2020.
48. Hui DS, I Azhar E, Madani TA, Ntoumi F, Kock R, Dar O, *et al*. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health-The latest 2019 novel coronavirus outbreak in Wuhan, China. Int J Infect Dis, 2020; 91: 264-6.
49. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, *et al*. Genomic characterisation and epidemiology of 2019 novel coronavirus: Implications for virus origins and receptor binding. Lancet, 2020; 395: 565-74.
50. Rothe C, Schunk M, Sothmann P, Bretzel G, Froeschl G, Wallrauch C, *et al*. Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. *N* Engl J Med, 2020; 382: 970-1.
51. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, *et al*. Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus-Infected Pneumonia. *N* Engl J Med, 2020; 382: 1199-207.
52. Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, *et al*. SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. *N* Engl J Med, 2020; 382: 1177-9.
53. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, *et al*. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet, 2020; 395: 507-13.
54. Xu XW, Wu XX, Jiang XG, Xu KJ, Ying LJ, Ma CL, *et al*. Clinical findings in a group of patients infected with the 2019 novel coronavirus (SARS-Cov-2) outside of Wuhan, China: retrospective case series. BMJ, 2020; 368: m606.
55. Huang P, Liu T, Huang L, Liu H, Lei M, Xu W, *et al*. Use of chest CT in combination with negative RT-PCR assay for the 2019 novel coronavirus but high clinical suspicion. Radiology, 2020; 295: 22-3.
56. Li Z, Yi Y, Luo X, Xiong N, Liu Y, Li S, *et al*. development and clinical application of a rapid IgM-IgG combined antibody test for SARS-CoV-2 infection diagnosis. J Med Virol, 2020 Feb 27. doi: 10.1002/jmv.25727.
57. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H, *et al*. First case of 2019 novel coronavirus in the United States. *N* Engl J Med, 2020; 382: 929-36.