

A review on corona virus disease (COVID-19) and prevention

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Abstract

COVID-19 is related to the family *Coronaviridae* which is a kind of corona virus sickness. It believes that probably it comes from bats and was extends to people through an unidentified medium in Wuhan, China. The situation was spread by inhaling the infected droplets which is present in environment that has an incubation period between two and fourteen days. Fever, cough, sneezing, sore throat, complication in tiredness and breathing are the most common indications for the disease. Preventive measures include the sanitation of hands, isolation of the infected persons, proper aeration. This review discusses mechanism of spread of disease and preventive vaccines of Coronavirus.

Keywords: COVID 19; Preventive measures; Isolation; Mechanism of Spread; Vaccination

1. Introduction

Coronavirus disease is an infectious disease caused by a recently discovered corona virus, currently known as Severe Acute Respiratory Syndrome, which is rapidly spreading around the world. COVID-19 outbreak a pandemic in March 2020 was labeled by World Health Organization. The pandemic has wreaked effect on economic and social growth, as well as on worldwide health systems. The disease was initially discovered in Wuhan in December 2019 and has since spread throughout the world, resulting in the continuing coronavirus pandemic of 2019-20. The pathogen's crown-like projection on its surface refers to the term "coronavirus". In Latin, "corona" signifies "halo" or "crown" [1]. Coronaviruses are responsible for diseases like Middle East Respiratory Syndrome (MERS) and SARS, as well as more frequent illnesses like the common cold. Corona viruses belong to the family *Coronaviridae* and these are the single-stranded positive sense RNA viruses. On the basis of genomic assembly and phylogenetic communication corona virus grouped into four genera in the *coronavirinae* subfamily. Four types of corona virus includes Alpha coronavirus, Beta coronavirus, Gamma coronavirus, and Delta coronavirus [2]. Because of its high similarity (80%) to SARS-CoV, which caused acute respiratory distress syndrome (ARDS) and high mortality in 2002-2003, the novel coronavirus was dubbed severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2, 2019-nCoV) [3].

From the zoonotic communication with seafood market in Wuhan, China the outbreak of SARS-CoV-2 was thought to have begun. Later, it was discovered subsequent outbreak was a major factor from human- to- human transmission. COVID-19 infected a huge number of people all across the world, with reports from around 200 countries and zones. Other organ systems are also affected by SARS COV2 but it primarily affects the respiratory system. Symptoms linked with a lower respiratory tract infection Included fever, dry cough, and dyspnea reported in the first case series from Wuhan, China. Vomiting, headache, dizziness, widespread weakness and diarrhea are the common other symptoms. Lopinavir, Ritonavir, Remdesivir, hydroxychloroquine, and azithromycin are the medicines that are utilized before the creation of vaccine for Corona [4].

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Viruses are given names based on their genetic structure with the help of development of diagnostic tests, medications and vaccines. The World Health Organization named this new disease "COVID-19" on February 11, 2020 [5].

1.1. Epidemiology

The WHO designated the 2019-nCoV after its genetic agreement, which was reported to the World health organization in January 2020 and was determined to be a β COV of group 2B with at least 70% genetic series similarity to SARS-CoV [6]. The World Health Organization labeled the outbreak a Public Health Emergency of International Concern on January 2020 and on March it was recognized as a pandemic. As of May 2020, this has evolved into a Pandemic affecting 187 countries/regions with about 1,484,811 cases all around the world. It became a global health after that it hit hard various countries with huge no of deaths [7].

This condition takes only 83 days to reach the first million instances around the world, and just 14 days to reach the second and third million. As this is an emerging Pandemic, these statistics will diverge immediately. The mortality rate from one country to the next have influenced by amount of people tested, healthcare delivery, population demographics, and descriptive reporting [8]. As of May 2020, these According to previous studies, people aged >65 years account for about 31% of cases, hospitalizations, 53% of ICU admissions, with the highest percentage of occurring between those aged >85 years . COVID-19 can cause severe dominant disorder leading to hospitalisation, ICU admission, and mortality in humans of any age. COVID-19 disease appears to be milder in people aged 19 and up [9].

1.2. Mechanisms of SARS-COV-2

1.2.1. Attack on the host cells

According to reported literature two functional subunits are required for the composition of spikes: For the attachment to the host cell receptor S1 is required, and for membrane fusion between the viral and cellular membranes is S2. SARS-CoV has been found to have a functional receptor called angiotensin converting enzyme 2 (ACE2). The spike for SARS-CoV-2, which is also linked to ACE2, was manufactured using structural and functional analyses. In heart, ileum lungs, kidneys, and bladder the expression of ACE2 was found to be high. On lung epithelial cells, ACE2 was strongly expressed [10].

1.2.2. Inside the host the life cycle of virus consist of following steps

Literature revealed the mechanism as discussed below

STEP1: Steps in the process are Attachment, penetration, biosynthesis, maturity, and release. By endocytosis and membrane fusion after binding to host receptors (attachment), (penetration) viruses enter into the host cells

STEP2: The viral contents are released into the host cells, when Viral RNA penetrates the nucleus for replication. mRNA from viruses is utilised to make viral proteins (biosynthesis). Then, additional virus particles are created and discharged after maturation.

STEP3: In Corona viruses four structural proteins are found Spike (S), membrane (M), envelop (E), and nucleocapsid (N). Spike is a trans membrane trimetricglyco protein that stick outfrom the viral surface and is responsible for corona virus diversification and osttropism [11].

1.3. Prevention

Thebest methodto prevent infection from COVID-19 is to keep away fromsubmission to the virus. From person to person via direct contact (within about 2 Gaz) the virus is transmitted primarily. By coughing, Sneezing or talks of infected person the respiratory droplets are created and the COVID-19' can be transmitted to others if the persons inhale these droplets. COVID-19 also spreads by asymptomatic peoples doorknobs or tables on which infected [12].

The Preventive measures according to WHO guidelines are

1.3.1. Personal hygiene

- Secure a physical distance of minimum 2gaz or 6 feet to decreasethe spread
- Make sure the mask covers your nose and mouth, and to avoid any gaps between your face and the mask ties it securely

- Hand hygiene: According to the WHO guidelines on hand hygiene in healthcare, the cleanliness of hands is the more eligible measure for infection prevention. Practice repeated hand washing (for at least 40-60 seconds) and apply alcohol-based hand sanitizers (for at least 20 seconds) even when hands are obviously clean
- Respiratory hygiene: Respiratory hygiene is defined as a person's efforts to keep respiratory secretions contained and to prevent illness transmission to others. To reduce the spread of bacteria that cause respiratory diseases into the environment, Good respiratory hygiene/ cough etiquette can help [13].
- There are different treatments available in market on the basis of traditional and modern medicine. Ayurveda, Allopathic and chemical drug medicine play an important role in treatment of disease until Vaccine developed. Many home remedies proven successful help to boost our immune system.
- Allopathic Measures- In allopathic terms, the treatment included intravenous fluid infusions and oxygen therapy, which protects against the symptoms of viruses such as flu, fever, and shortness of breath. The FDA (Food and Drug Administration) recommends antiviral drugs such as chloroquine, lopinavir, ritonavir, and remdesivir for corona virus treatment.
- Ayurvedic Medicines- Many home remedies are available such as kadha, natural herbs (giloy, tulsi, ginger) strengthens the immune system and defend against many additional infections
- Immunity boosters of Natural herbs like Tulsi, Ginger etc.
- Drink hot water.
- KADHA: Whenever their extract is not liberated, the tulsi leaves, cinnamon, ginger, turmeric, giloy, liquorice root, black pepper, and other great herbs and spices are cooked in water. These herbs work to improve the immune system and so defend against many different infections that are caused by the corona virus if combined together [14].

2. Vaccines

A vaccination is a weakened, non-dangerous portion of an organism that contains antigen components. For triggering an immune response within the body the vaccines contain weakened or inactive parts of antigen; vaccines are created from the antigen itself or a blueprint so that the body can produce the antigen; If the person receives the vaccine this weakened genre will not cause disease, but it will encourage the immune system to respond greatly like it would have otherwise. When confronted with an effective disease, the body's first reaction is to attack it [15].

2.1. Types of vaccines

2.1.1. Virus vaccine

These vaccinations utilize a reduced or inactivated version of the virus. This is how vaccines for measles and polio (oral) are manufactured. Virus vaccines against coronavirus are being developed in two forms: weakened virus and inactivated virus vaccines.

Example: Covaxin

2.1.2. Viral vector vaccine

In this, virus (such as adenovirus or measles) is genetically altered to create corona virus proteins in the body in the development of these vaccines, but the virus cannot cause disease and is less reactive. Replicating viral vectors (which may reproduce within cells) and non-replicating viral vectors are the two types of viral-vector vaccines currently being developed (cannot replicate within cells).

Example: Covishield, Sputnik V

2.1.3. Nucleic acid vaccine

In these vaccinations, Nucleic acid (DNA or RNA) is injected into human cells. An immunological response is resulted, when virus protein is then replicated in these human cells. DNA vaccines and RNA vaccines are the two forms of nucleic-acid vaccinations now being developed.

Example: Pfizer

2.1.4. Protein based vaccine

With these vaccinations, Virus protein fragments or protein shells are delivered directly into the body. To combat the coronavirus two forms of protein-based vaccines being researched i.e; Protein subunit vaccines and virus-like particle vaccines.

Example: Novavax

2.2. Vaccines for corona virus disease

2.2.1. Covaxin

Covaxin was developed in collaboration with the ICMR by Hyderabad-based "BHARAT BIOTECH." Covaxin is a SARCoV-2 vaccination containing Algel-LMD4 that is completely inactivated [16].

Table 1 Drug name, dose and route of administration of Covaxin

Drug name	COVAXIN™ [BBV152]
Dose	1 st dose. 0.5 ml 2 nd dose 0.5 ml [2-4 weeks after 1 st dose)
Route of administration	Intramuscular injection only

Approval

The Bharat Biotech Covid-19 vaccine (COVAXIN) is a vaccine with agreement for controlled use in emergency situation that may prevent COVID-19. The DCGI, Central Standard Control Organization (CDSCO) of the Ministry of Health and Welfare approved COVAXIN's emergency use in India. The central licencing authority has approved the sale or distribution of covaxin for control purposes in an emergency in the public interest [17].

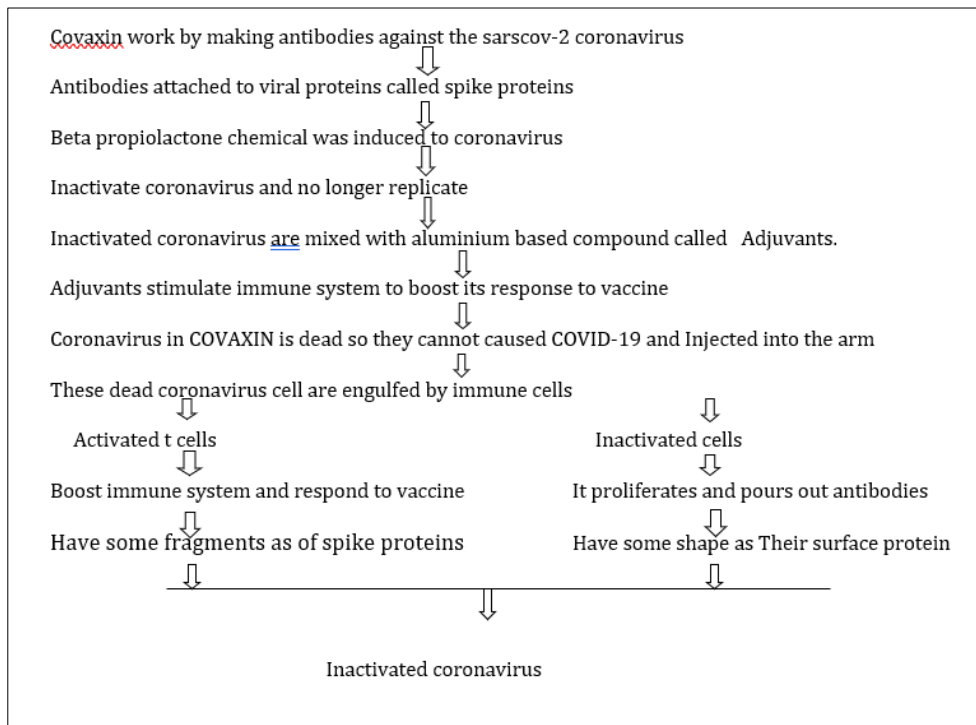


Figure 1 Mechanisms of action of Covaxin [18].

2.2.2. Covishield

Covishield is developed initially at oxford university in collaboration with Astra zeneca. It is being elaborated by serum institute of india ,pune.Covishield is a viral vector vaccine that uses an adenovirus found in chimpanzees [19].

Table 2 Drug name, dose and route of administration of Covishield vaccine

Drug name	COVISHIELD TM or chAdOX1nCoV-19 (AZD1222)
Dose	1 st dose – 0.5 ml 2 nd dose 0.5 ml [between 4 -6 weeks after 1 st dose)
Route of Administration	Intramuscular injection only.

APPROVAL

The Serum Institute of India in Pune has been granted permission by the Drug Controller General of India to conduct phase II+III clinical trials of the Oxford University – Astra Zeneca COVID-19 vaccine (COVISHIELD) [20].

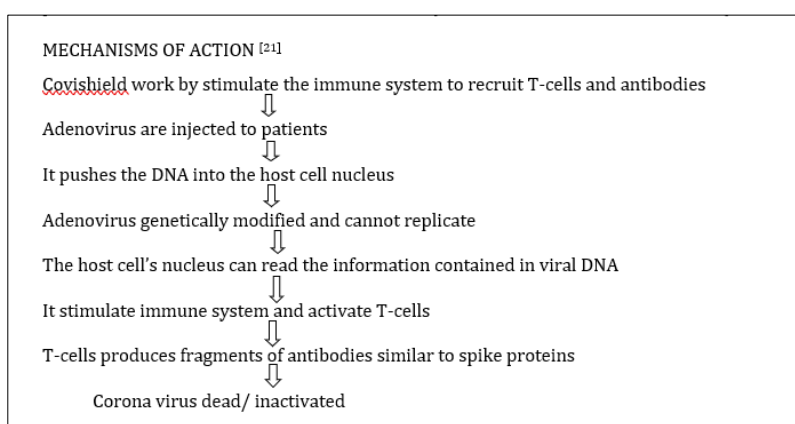


Figure 2 Mechanisms of action of Covishield [21]

2.2.3. SPUTNIK-V

Gameleya Research Institute of Epidemiology and Microbiology produced Sputnik-v, a viral vector vaccine for COVID-19. Sputnik-v is an adenovirus vaccine using a viral vector. The letter 'V' of the English alphabet, not the roman number five, is denoted by the 'V.' It is a two-component vaccination that uses adenovirus serotypes 5 and 26 [22].

Table 3 Drug name, dose and route of administration of Sputnik V vaccine [23]

Drug name	Sputnik – V or Gam-COVID –Vac
Dose	1 st dose -0.5ml 2 nd dose 0.5 ml [after 28 days of 1 st dose)
Route of dministration	Intramuscular injection only

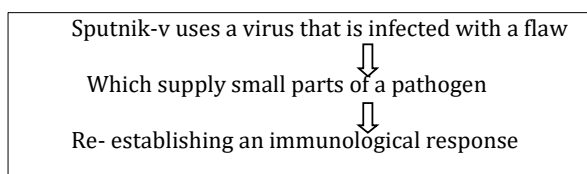


Figure 3 Mechanisms of action of Sputnik-V

The sputnik-v or Gam-COVID-VAC vaccination shortens the time it takes for SARS-CoV-2, the virus that caused the COVID-19 pandemic, to develop protection. .

2.3. Why COVID-19 vaccine is important

- Because it is efficient
- Because the vaccination is more effective than the virus
- Because everyone in your circle will be safer as a result of the vaccine.
- Because we are the only ones who can stop the pandemic
- Because it is completely free [24]

3. Conclusion

A pandemic is not unknown in the history but the COVID 19 affects the population a lot because of its unmatched background. The disease continue to spread over the world even after by following preservative methods. As the number of cases increased day by day because of many reasons like people do not have serious concern about the disease and not follow the precautions properly. The virus has many variant including SARS CoV 2 and corona virus. The structure is changed due to its genetic mutation which varies it with the virus which is already circulating in the population. The new variant are more dangerous and harmful for humans. These variants remain in a region for short period of time but the greatly affect the public health and economy badly

Several vaccines are being developed to prevent the development of the corona virus disease and to boost human immunity. Vaccines, for the most part, provide protection via developing antibodies. When a vaccine is established as a development platform, clinical testing is required. Phase 1 clinical testing can be done concurrently with animal model testing. It is also necessary to investigate the impacts of that treatment on the new impending variation in order to provide quick protection. Vaccine development takes years, but due of the severity of corona virus sickness, vaccines are developed swiftly under COVID-19.

To protect humans from the next wave of corona virus and other illnesses, it is critical to take precautions following immunisation. Because the virus spreads by close contact, keep a safe distance from others, avoid busy situations, and stay at home if feasible. Those going out to work must wear a surgical mask. Everyone should be informed about the present and prospective corona virus waves. Good nutrition is important for the health, especially in the time of corona virus disease .Use fresh fruits and vegetables to build up the immune system strong .Avoid the consumption of fat dairy products prefer homemade meals, also follow some safe food handling procedures. Avoid to eat trans fat, Drink water as much you can and avoid the consumption of high amount of sugar. Foods like tomato, mushroom bell paper; green vegetables are a good source to build the immune system strong. Avoid smoking, alcohol and other addictive substances which decrease the power of immune system. Take some Ayurvedic drinks like kadha, to boost the immunity.

During the corona virus outbreak, the most important task is to develop the most effective vaccine to combat the sickness. It is critical to get vaccinated since it acts as a protective shield against the corona virus and boosts immunity; nevertheless, it is also critical to take precautions following the vaccine. Following immunisation, the body is capable of producing antibodies on its own. People with weakened immune systems may need to take extra precautions to protect themselves, such as raising knowledge about vaccination and post-vaccination precautions, and being vaccinated on time, so that the country is clear of the virus.

Compliance with ethical standards

Disclosure of conflict of interest

Authors have no conflicts of interest to declare.

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