



COMPARE AND CONTRAST CORONAVIRUS VARIANTS AND VACCINATION

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ABSTRACT

COVID-19 is a type of Coronavirus disease, was declared as a Global pandemic and spread throughout the world. Initially, this disease originated from bats in Wuhan, China in 2019. Ideally, the condition is spread by a mouthful of air or close interactions with infected globules that has an incubation time between two and fourteen days and extends among the human beings. Today there are millions of infections, viruses and death that have been caused by this disease. In the beginning, the symptoms of this disease include high fever, cold, cough, throat infection, breathing problems and weakness etc. After the first phase, the symptoms are increased as eye infection, headache, vomiting, lungs infection, stomach infection etc and also at the end there are no symptoms but still human beings organs are damaged due to high infection. Around the world, various researchers study the variants of coronavirus and successfully developed vaccines in a couple of years. After developing the vaccine, it was tried and tested on human beings who generate positive and negative impacts. Still, there is no precise treatment for the ailment. This review article not only provides in-depth information on corona virus, its effects but also a comparative information about various mutants of COVID-19 along with possible drugs used worldwide.

Keywords: 2019-nCoV, SARS-CoV, MERS-CoV, Viruses, Vaccines.

INTRODUCTION

A novel CoV appeared a few months ago and wreaked widespread devastation around the world. Several cases of 'viral pneumonia' were recorded in Wuhan, People's Republic of China, in the last two months of 2019 (Wang *et al.*, 2020; Pagliusi *et al.*, 2020). A natural virus of animal origin with the potential for spill over infection was discovered as the source of this infectious disease (Andersen *et al.*, 2020). It is rapidly spreading from its origin to the world. There have been around 96,000 cases reported and more than 3300 deaths till date (Tanu, 2020).

The virus's geographical origins was determined to be

Huanan South China Seafood Market, however the animal source of this CoV was unknown. This virus is now assumed to have originated in bats, then moved via one or more intermediate hosts, probably including pangolins, before infecting humans (Meo *et al.*, 2020).

Because of its genetic similarities to the CoV responsible for the 2003 outbreak, the International Committee on Taxonomy of Viruses (ICTV) named the new virus as severe acute respiratory syndrome coronavirus 2 (SARS-CoV2) on February 11, 2020. It belongs to a large group of enveloped, single-stranded, positive-sense RNA virus which has capability of affecting animals, human beings,

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birds, rodents and other mammals. Later, the virus was spread rapidly due to which WHO (world health organisation) dubbed the disease "COVID-19" and declared it a global pandemic on March 11, 2020, based on guiding principles previously agreed with the World Organization for Animal Health (OIE) and the United Nations Food and Agriculture Organization (FAO).

The Covid-19 disease is transmitted by contact with an infected person or inhalation (Kumari and Shukla, 2020). Its incubation period is between 2 to 14 days. When the patients were diagnosed, it was observed that few patients were asymptomatic and some had mild symptoms like respiratory discomfort, fever, cold, cough etc. It exerted both positive and negative impacts on environment and society including biodiversity and economy (Verma and Prakash, 2020; Roy and Chaube, 2021). A systemic approach and social medicine have been proved very useful during Covid-19 pandemic (Roy *et al.*, 2020; Balwan *et al.*, 2021).

1. TYPES OF VIRUSES

Coronaviruses are members of the Coronavirinae subfamily of the Coronaviridae family. The severity of the disease caused by different varieties of human coronaviruses varies, as does the extent to which they can spread. There are now six varieties of coronavirus that can infect people, according to doctors.

1. 229E (Alpha coronavirus) - It is one of the first human coronavirus strains being described. Its common symptoms are cold and cough in healthy adults. Young generation and old aged people considered weak to develop lower respiratory infections.

2. NL63 (Alpha coronavirus) - Initially it was found in young children having severe lower respiratory problems admitted to hospital. The comorbidity of this virus with respiratory infections. A study of NL63 patients symptoms are croup, bronchitis and pneumonia etc.

3. OC43 (Beta coronavirus) It is a member of Beta coronavirus1 family, which affects human and cattle's. The common symptoms are fever, dry cough and tiredness. But less common symptoms are aches and pain, sore throat, loss of taste and smell and headache etc.

4. HKU1 (Beta coronavirus) The common symptoms are rhinorrhea (100%), cough (67%), fever (67%) and abnormal breath sounds on auscultation (44%).

The below two variants are majorly communicable, contagious and stern in its hit through the second wave.

5. K417N (Delta Corona virus) This variant is considered tremendous due to severity of symptoms, it causes. It

includes high lung involvement, severe respiratory infections and gastrointestinal problems even in mild or moderate cases.

6.L452R and P871R (Delta+ Corona virus)-This variant is more severe in nature which carries more features than Delta variant and Beta variant. The symptoms are similar to delta variant but still required some concerns and more attentions. The symptoms are early- stage lung involvement, appetite loss and nausea, dryness and watery eyes, longer lasting fever and persistent cough etc.

SYMPTOMS

Cold, Cough and Fever like mild symptoms usually set in 2-4 days and it may vary from person to person. But some forms of virus can be fatal. The Common symptom includes:

- Asthma problem
- Sore throat
- Fever
- Sneezing
- Running Nose
- Cough
- Diarrhoea, etc.

Researchers cannot easily nurture human coronavirus in their laboratory. This makes it difficult to measure the impact of coronavirus on the world economy and human health. There is no specific treatment, only self-care and over the offset it requires medication. Public can take several steps as:

- Drink plenty of water
- Avoid drinking alcohol and smoking
- Using a cool mist vaporizer
- Avoid overexertion, take more rest
- For common colds and fever take doctor's consultation
- Testing for the virus can be done by taking the sample of respiratory droplets, such as mucus from the nose and blood.

Regularly washing hands, wearing masks, etc. are recommended. Avoid close contact with anyone who shows symptoms of coughing and sneezing.

CATEGORIES OF VACCINE

There are several types of vaccines. Each category is designed for your immune system, how to fight against different kinds of germs and bacteria. When the scientist creates vaccines, their research based on various parameters as:

The comparative study on various types of vaccines on the basis of different criteria are listed below in Table 1.

Table 1: A comparison of various types of vaccines.

Criteria/ Vaccines	Pfizer	Moderna	Janssen	Astrazeneca	Novavax	Sputnik-V
No of doses	2,21 days apart	2,28 days apart	1	2,4-12 weeks apart	2,21days apart	2,21 days apart
No of doses	2,21 days apart	18+ years above				
No of doses	100%					
No of doses	YES					
Type of vaccine	mRNA	Viral vector	Recombinant protein/adjuvant		adenovirus viral vector	
Side Effects	Fatigue, headache, chills, muscle pain					
Test on children	Yes, ages 12-15	Yes, ages 12-17	Testing under process, declared soon			
Who can't vaccinate?	Allergic reactions to first dose	Allergic reactions	Declared soon			Allergic reactions
Effectiveness against in US clinical trials	Overall 95%, 86% in 65+ age	Overall 94.1%, 86% in 65+ age	Overall 72%, 86% against severe disease	Overall 70%, 100% for severe 0disease	95.6% (UK trials)	91.6%

- How the immune system responds if they take vaccine.
- Who needs to get vaccinated against germs
- What is the best approach to create vaccine?

Based on the above factors they have created various categories of vaccine as follows:

4.1. Inactivated Vaccine: It is called as killed vaccines. It uses the specific bacteria (pathogens) or virus particles, which have been killed through chemical processes and heat. The dead pathogen introduced in the human body. It also helps the body immune system how to fight with the new versions of the pathogens e.g. polio.

4.2. Live, Attenuated Vaccine: It is Live vaccine where the pathogen is remains active, is modified in such a way that the pathogen is not able to cause disease itself but can produce full-bodied immune response. Live, attenuated vaccines do not cause serious disease in people with healthy immune systems. These vaccines lead to a stronger and healthy immune system e.g. Chickenpox, measles, mumps

and rubella vaccines.

4.3. DNA/RNA or Genetic Vaccine: A small part of the pathogen's genetic information to cause an immune response without causing disease or harm. In this vaccine, one booster dose is needed to get protection against disease e.g. HIV, Hepatitis B, whooping cough.

4.4. Vector Vaccine: It works by giving instructions to genetic cells to produce antigens. It takes a "harmless" non-infecting virus, or made one in the lab, and "infuses" it with a potential target protein to create a "vector" virus. Injecting this vector virus into the human body tricks the immune system into thinking that it is facing a real infection and causes an immune response to be generated and stored for future reference.

5. COVID-19 VACCINES

There are a number of drugs that have been proposed for the treatment of Covid-19. Along with traditional therapeutics, monoclonal antibodies, convalescent blood plasma,

peptide-based and oligonucleotide medicines and interferon therapies (inhaled interferon beta) have been used for treatment. As more than 80% of the Covid-19 patients suffer mild symptoms, so they need not a special medical treatment and drugs. The best way for them is to isolate themselves from others along with a healthy diet. Mostly, old- aged people and patients with severe conditions are required to be admitted to the hospitals because sometimes they may need special attention i.e oxygen and ventilator. So, there are different types of Covid-19 vaccines available all over the world.

- **Pfizer:** Pfizer Inc. is an American multinational pharmaceutical and biotechnology corporation headquartered on 42nd Street in Manhattan, New York City. This vaccine is reported to be approximately 95% effective at preventing COVID-19.
- **Moderna:** Moderna is an American pharmaceutical and biotechnology company based in Cambridge, Massachusetts. Early results indicate it is safe and produces high levels of antibodies to the SARS-CoV-2 virus. This vaccine is also reported to be approximately 95% effective.
- **Johnson & Johnson (Janssen):** Johnson & Johnson COVID-19 Vaccine Authorized by U.S. FDA For Emergency Use - First Single-Shot Vaccine in Fight Against Global Pandemic
- **Astra Zeneca:** Astra Zeneca has partnered with **Serum Institute of India (SII)**, the world's largest vaccine manufacturer, for the supply of the vaccine to the Indian Government but also to a large number of low and middle-income countries.
- **Novavax:** Novavax, Inc., is an American biotechnology company based in Gaithersburg. Serum Institute of India has started the production of the first batch of Novavax (known as Covovax in India) covid vaccine.
- **Sputnik V:** Moscow Mayor Sergei Sobyenin announced that the newly opened Moscow-based "R-Pharm" will become a leading manufacturer of Russia's Sputnik V coronavirus vaccine.

CONCLUSION

Different vaccine techniques are expected to be used in the future to combat new variations as they emerge. Changing the vaccine dose, adding booster doses, combining vaccines, or altering the vaccines themselves to target variations are all possibilities.

To obtain the best protection, scientists are already developing "next generation" vaccinations and techniques. Researchers are working hard to foresee changes and plan

for future issues as our understanding about the COVID-19 virus enhances; including how it spreads, how it mutates, and the impact of variants.

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