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All about Corona Virus Disease (COVID – 19)

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Background - COVID-19, a global epidemic that has recently swept the globe, has prompted considerable concern. Due to the lack of data on the virus's dynamics and effective therapy choices, the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has had a significant impact in terms of morbidity and death.

AIMS - The goal of this article is to examine or review the data about the origin of virus, it's transmission, epidemiology, virus strain, symptoms, different treatment options available to prevent the disease. Furthermore, this article emphasizes the importance of vaccines and it's effectiveness to the human body.

Methods - We conducted a thorough search and evaluation of vaccines which are used in COVID-19 treatment. Over the period when the delta variation first began circulating, we utilised a test-negative case–control strategy to evaluate the efficacy of immunisation against symptomatic illness caused by the delta variant or the prevalent strain (B.1.1.7, or alpha variant). Sequencing and the spike (S) gene status were used to identify variants. The percentage of cases with either variation depending to the patients' immunisation status was estimated using data from all symptomatic sequencing Covid-19 cases in England.

Result - The delta variant's effectiveness after one dose of vaccine (BNT162b2 or ChAdOx1 nCoV-19) was significantly lower (30.7 percent; 95 percent confidence interval [CI], 25.2 to 35.7) than the alpha variant's (48.7 percent; 95 percent confidence interval [CI], 45.5 to 51.7); the results were similar for both vaccines. The efficacy of two doses of the BNT162b2 vaccination was 93.7 percent (95 percent CI, 91.6 to 95.3) in people with the alpha variation and 88.0 percent (95 percent CI, 85.3 to 90.1) in people with the delta variant. The efficacy of two doses of the ChAdOx1 nCoV-19 vaccine was 74.5 percent (95 percent CI, 68.4 to 79.4) in people with the alpha variation and 67.0 percent (95 percent CI, 61.3 to 71.8) in people with the delta variant.

Conclusion - We are in the midst of one of the world's worst pandemics. Despite having a lower mortality rate than SARS-CoV and MERS-CoV, SARS-CoV-2 is a far more severe threat because to its higher infectivity rate**.** After receiving two vaccination doses, very minor variations in vaccine efficacy were seen between the delta and alpha variants. After the first dosage, absolute disparities in vaccination efficacy were more noticeable. This finding would encourage attempts to increase vaccination uptake among vulnerable groups by administering two doses.

Abstract

More than a million people have died as a result of the pandemic corona virus disease 2019 (Covid-19), which is caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). The new SARS-CoV-2 structure, surface proteins, asymptomatic and symptomatic transmission, genotype and phenotype of SARS-CoV-2, genetic strains, difference and similarities between SARS, MERS, and SARS-CoV-2 are all discussed in this study. Therapeutic methods such as inhibiting the endocytic route and decreasing RNA polymerase activity with metal ions are discussed, both of which might be very helpful in regulating COVID-19. Here we have also discussed interpretive immunological responses of SARSCoV2 infection while discussing vaccine options. There are a number of vaccine candidates in the preclinical and clinical stages, but only 42 vaccines are currently being tested in clinical trials. For mass-scale vaccine development, more corporate cooperation and financial backing for COVID19 research are required. SARSCoV2's genetic similarity to other coronaviruses is being investigated in order to build efficient vaccine platforms, which might lead to faster testing of previously produced SARSCoV vaccines.

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I. INTRODUCTION

Corona Virus Disease 2019 is abbreviated as COVID-19. Corona viruses (CoV) are members of the Coronaviridae family of viruses, which may cause everything from a normal cold to more serious respiratory illnesses like Middle East respiratory syndrome (MERS)-CoV and severe acute respiratory syndrome (SARS)-CoV. [01]

Coronaviridae virus family

- These are the largest known single stranded RNA viruses, with genomes ranging from 25 to 32 kb and virions of 118–140 nm in diameter.
- The Coronavirinae and Torovirinae are the two subfamilies of Coronaviridae virus family . (Toroviruses feature distinctive doughnut-shaped nucleocapsids, which can be used to recognise them.)
- The alpha-, beta-, gamma-, and delta coronaviruses are the four genera that make up the Coronavirinae subfamily. All members of the family use the same mRNA synthesis method, in which the polymerase complex jumps or travels from one area of the template to another. The rapid rate of RNA recombination that happens during genome replication might be explained by the necessity for the polymerase unit to separate from the template. Coronaviruses and toroviruses are both intestinal and respiratory infections that generally cause relatively little illness (and inapparent infection).

MERS is a viral respiratory illness caused by a new corona virus that was originally discovered in Saudi Arabia in 2012. A SARS-associated corona virus causes severe acute respiratory syndrome (SARS), which is a viral respiratory illness. It was initially discovered at the end of February 2003, during a Chinese epidemic that spread to four other nations. [02]

On the 31st of December 2019, the WHO was notified of instances of pneumonia with an unknown etiology in Wuhan City. On the 7th of January, 2020, Chinese authorities discovered a new corona virus as the culprit. Between the 31st of December 2019 and the 3rd of January 2020, a total of 44 patients with pneumonia of unclear cause or origin were found in Wuhan. [03]

The causal cause of pneumonia was not discovered till recently. However, authorities in China eventually discovered the new corona virus on the packaging of imported frozen fish from Dalian's port. They can't explain where it came from, though. [04]

The International Committee on Virus Taxonomy (ICTV) has named the new virus "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" after it was discovered on February 11, 2020. [05]

The virus was given this name because it is genetically linked to the coronavirus that caused the SARS pandemic in 2003. The two viruses are related, but they are not the same. The first instance of COVID -19 infection in India was discovered in Kerala. A 20-year-old lady was admitted to the emergency department of Thrissur General Hospital in Kerala on January 27, 2020. For one day, she experienced a dry cough and a painful throat. There is no history of fever, rhinitis, shortness of breath, or any other respiratory issues in the patient. She claimed that she returned to Kerala on January 23, 2020 from Wuhan, China, due to the COVID-19 epidemic there. Between January 23 and January 26, she had no symptoms. On the morning of the 27th, she felt a slight sore throat and a dry cough. She did not provide a history of contact with people who are suspected or confirmed to be infected with COVID-19. [06]

Coronavirus infection is a highly infectious illness (spread readily). As a result, it spread across the country in a matter of weeks, infecting individuals of all ages. This virus is spread through direct contact with an infected person's respiratory droplet (generated through coughing and sneezing). Individuals can become infected by contacting virus-infested surfaces and then touching their faces (e.g., eyes, nose, and mouth). According to current data, the virus transmits mostly amongst persons who are in close proximity to one another, generally within 1 meter (short range). [07]

When a person is infected with the virus, it takes an average of 5-6 days for symptoms to develop, but it can take up to 14 days. COVID's long-term effects – 19 symptoms might linger for months at a time. The virus has the ability to damage the lungs, heart, and brain, perhaps leading to long-term health problems. COVID – 19 has a wide range of affects on different people. Because the virus penetrates host cells through a receptor

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for the enzyme Angiotensin Converting Enzyme 2 (ACE2), which is most often found on the surface of type 2 alveolar cells in the lungs, the virus mostly affects the lungs in COVID – 19.

➢ **CORONA VIRUS STRAIN –**

A strain is a genetic variant, a subtype or a culture within a biological species. Strains are often seen as inherently artificial concepts, characterized by a specific intent for genetic isolation. [08] Mainly 3 types of corona virus strains are found. These are –

1) SARS-CoV –

The coronavirus family gets its name from the enormous spike protein molecules found on the virus surface, which give the virions their crown-like appearance; coronavirus genomes are the biggest among RNA viruses. [09]

Three main genera have been identified in this family alpha, beta, and gamma. SARS-CoV is a positive-stranded RNA virus that belongs to the Coronaviridae family. [10]

Virus Name	Genus
NL63 and 229E	alpha genus
OC43, HKU1, SARS-CoV, MERS-CoV, and SARS-CoV-2	beta genus

2) MERS-CoV –

MERS-CoV was the first betacoronavirus lineage C member identified as a "new coronavirus" with a genomic size of 30,119 nucleotides, while belonging to the same family, order, and genus as SARS-CoV. MERS-CoV has ten proteins encoded in its genome. Two replicase polyproteins (ORF1ab and ORF1a), four structural proteins (E, N, S, and M), and four nonstructural proteins make up the ten proteins (ORFs 3, 4a, 4b, and 5). [11]

There are accessory protein genes scattered between the structural protein genes that may interfere with the host innate immune response in infected animals, in addition to the rep and structural genes. [12]

3) SARS-CoV-2

Despite the fact that SARS-CoV-2 belongs to the same family and genus as SARS-CoV and MERS-CoV, genomic research indicated that SARS-CoV-2 and SARS-CoV are more similar. As a result, researchers identified it as a lineage B member (from the International Committee on Taxonomy of Viruses). This virus was first identified as a sister clade to the prototype human and bat severe acute respiratory syndrome coronaviruses (SARS-CoVs) of the species Severe acute respiratory syndrome-related coronavirus by the Coronaviridae Study Group of the International Committee on Taxonomy of Viruses. It was later dubbed SARS-CoV-2. [13]

SARS-CoV-2 has an RNA genome that is 30,000 bases long. This virus differs from other betacoronaviruses in that it has a unique mix of polybasic cleavage sites, a characteristic that has been shown to improve pathogenicity and transmissibility in other viruses. [14]

➢ **EPIDIMIOLOGY**

The sickness has spread swiftly since the first report from China, and the number of cases has exploded. The first incidence outside of mainland China was reported on January 11 in Thailand. [15]

With the exception of Antarctica, the disease spread quickly over all continents. On January 30, 2020, India reported its first case of COVID-19. By February 3, 2020, there were three cases. In February 2020, no new cases were recorded. However, by mid-March, the number of infected cases had begun to rise, with numerous cases recorded across India. In India, the first death linked to COVID-19 occurred. [16, 17]

➢ **TRANSMISSION**

SARS-CoV2 is thought to spread mainly person-to-person by:

- Direct contact, that is, within 6 feet of an infected person by large respiratory droplets (> 5 microns)
- Indirect contact (more than 6 feet of an infected patient) via aerosolized small respiratory particles (< 5 microns), called droplet nuclei, containing virus or via contaminated fomites. [18,19]

❖ **Airborne Transmission (Large Droplet and Aerosol)** - When coughing, sneezing, exercising, talking, singing, sneezing, or simply silently breathing, people release respiratory fluid particles of various sizes that transmit virus over a variable distance. Larger heavier particles (> 5 microns) settle out quickly within 6 feet, while tiny lighter particles (5 microns) in the form of aerosols can float in the air for minutes to hours and be

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transported by air currents a long distance from the infectious source. Under laboratory circumstances, the SARS-CoV-2 virus was found to survive for at least three hours in aerosols. [20]
Increasing evidence suggests that transmission of SARS-CoV-2 commonly occurs via aerosolized droplets especially in super spreading events, when a single index case is able to infect a large number of secondary cases more than six feet from the index case.

❖ **Fomites -** SARS-CoV-2 may contaminate and persist on environmental surfaces for varying amounts of time, depending on the surface properties. SARS-CoV-2 may survive for up to 72 hours on plastic or steel, 4 hours on copper, and 24 hours on cardboard under laboratory settings. [20]
When hands that have been soiled by touching virus-contaminated surfaces come into contact with mucous membranes on the face, the virus is transferred (called fomites) (nose, mouth, eyes). Elevator buttons, door knobs, and TV remote controls are just a few of the often handled surfaces in public spaces that might be dangerous. Cleaning (with soap or detergent) and disinfection (with a substance or method designed to kill SARS-CoV-2) can both help to minimise the risk of fomite transmission. The risk of fomite transmission is considered to be low compared with risks from large droplet transmission or aerosol-borne transmission. [21]

➢ **Symptoms of COVID -19 –**

COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms:

- fever
- cough
- tiredness
- Loss of taste or smell.

Less common symptoms:

- sore throat
- headache
- aches and pains
- diarrhea
- a rash on skin, or discoloration of fingers or toes
- Red or irritated eyes.

Serious symptoms:

- difficulty breathing or shortness of breath
- loss of speech or mobility, or confusion
- Chest pain. [22]

➢ **Risk Factor for COVID-19 patients**

Persons who are older, as well as people of any age who have other significant health issues, such as heart or lung disease, weaker immune systems, obesity, or diabetes, may be at a higher risk of developing hazardous COVID-19 symptoms. This is comparable to how other respiratory diseases, such as influenza, manifest themselves.

While any of these variables can raise the likelihood of severe COVID-19 symptoms, persons with multiple of these other health issues are at an even greater risk.

- **Old Age People** - COVID-19 can infect people of any age, including children. However, it is more frequent in middle-aged and older individuals. The chance of getting hazardous symptoms rises with age, with people aged 85 and above having the highest risk of developing significant symptoms. In the United States, persons aged 65 and up account for around 80% of the disease's fatalities. When people are older and have other health problems, the risks are considerably higher.

- **Patients with Lung problems, including asthma -**

COVID-19 targets the lungs, so you're more likely to develop severe symptoms if you already have lung problems, such as:

1) Chronic obstructive pulmonary disease (COPD)
2) Lung cancer
3) Cystic fibrosis
4) Pulmonary fibrosis
5) Moderate to severe asthma

While certain drugs for these illnesses might impair the immune system, it's critical to stick to your maintenance meds in order to keep your symptoms under control.

- **Heart disease -**

Many types of heart disease can make you more likely to develop severe COVID-19 symptoms. These include:

a) Cardiomyopathy
b) Pulmonary hypertension
c) Congenital heart disease

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d) Heart failure
e) Coronary artery disease

- **Diabetes and obesity-**

COVID-19 symptoms might be exacerbated if you have type 1 or type 2 diabetes. This risk is also increased by having a BMI that is overweight, obese, or extremely obese. Obesity and diabetes both impair the immune system's effectiveness. Infections are more common in people with diabetes. This risk can be decreased by maintaining blood sugar control and continuing to take your diabetic medicines and insulin as prescribed. If you're overweight or obese, consume a balanced diet and exercise regularly to reduce weight.

- **Cancer and certain blood disorders –**

COVID-19 puts people with cancer at a greater risk of getting a more serious disease. This risk varies based on the type of cancer and the sort of therapy you're getting. Another disease that raises the likelihood of severe COVID-19 symptoms is sickle cell anaemia. Your red blood cells become stiff, sticky, and formed like the letter "C" as a result of this hereditary disease. Because these malformed red blood cells die early, oxygen cannot be delivered as efficiently throughout your body. It also creates obstructions in tiny blood arteries, which are unpleasant. Another hereditary blood condition known as thalassemia may increase your chances of developing significant COVID-19 symptoms.

- **Weakened immune system –**

A strong immune system battles disease-causing bacteria. However, patient's immune system can be weakened by a variety of diseases and therapies including –

1. Organ transplants
2. Cancer treatments
3. Bone marrow transplant
4. HIV/AIDS
5. Long-term use of prednisone or similar drugs that weaken your immune system

- **Chronic kidney or liver disease –**

Chronic renal or liver illness might compromise your immune system, raising your chances of being critically ill from COVID-19. Furthermore, experiencing severe COVID-19 symptoms and taking medicines to treat the condition might harm the liver.

- **Down syndrome –**

COVID-19 is especially dangerous for people with Down syndrome since they are more likely to get lung infections in general. They're also more likely to already have heart disease, sleep apnea, obesity, and diabetes, all of which have been related to severe COVID-19 symptoms. Down syndrome also often affects intellectual abilities.

➢ **Methods of testing COVID – 19**

1) Molecular (RT-PCR) tests –

The Molecular test, also known as the RT-PCR test, is a type of test that detects the presence of a virus in a sample directly. The RNA, or genetic material, of the virus is detected by this test. The reverse transcriptase enzyme is used to convert this RNA to DNA. This DNA is then found via PCR testing. The term "reverse transcription polymerase chain reaction" (RT-PCR) was used to describe this process The diagnostic test and the nucleic acid amplification test are other terms for the same thing (NAAT). In this process a nasal or throat swab sample is taken. This tests is the most accurate. This test has a high sensitivity and specificity. These tests help diagnose the active coronavirus infection. If the virus is present in the sample, the test is positive but a negative test doesn't necessarily mean that you cannot be infected, you might have taken the test in the early days. Results are given the same day or within 2-3 days.

Dis advantage of this test - It fails to show if you ever had COVID-19 in the past. [23]

2) COVID-19 Antigen Tests –

Any foreign materials or a viral protein in the body that causes an immune response is referred to as a COVID-19 antigen. The antigens associated with the COVID-19 virus are identified with this test. Antigen testing, often known as quick antigen testing, is a type of rapid diagnostic test that produces findings much faster than molecular testing. Antigen tests, on the other hand, have a larger probability of missing a current infection. Usually,anasal or throat swab sample is taken. Main advantage of this test is since it is a rapid test, results are delivered within 1 hour or less.These tests help diagnose active coronavirus in the sample.

Disadvantage of this test -

The Antigen test might miss an active coronavirus infection in comparison to RT-PCR tests. [23]

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3) COVID-19 Antibody Tests –

COVID-19 Antibody tests, sometimes known as a Serology test, a Serological test, or a Serology blood test, are blood tests that look for COVID-19 antibodies. It determines whether you have been infected with the virus that causes COVID-19. The antibody test does not look for the active virus; instead, it examines how your immune system has handled the infection.

The sample is collected by taking a blood sample.

Results are delivered either the same day or in 1-3 days.

This test helps to find out if you were infected with the virus causing COVID-19 in the past and now have antibodies against it.

Disadvantage of this test - A COVID-19 antibody test may not show if you have an active virus in your body causing COVID-19 infection. [23]

➢ **Treatment options**

1) **Modern Allopathic Treatment –** Remdesivir, Ribavirin, Ivermectin, Immunoglobulin as a antibodies therapy , Lopinavir or ritonavir, Chloroquine (CQ) / Hydroxychloroquine (HCQ), Corticosteroids , , Interferon, Tocilizumab, Vitamin C with zinc sulphate supplements , Antibiotics like Azithromycin and Tetracycline.

2) **Aurvedic Treatment –**

❖ **Immunity Enhancers - Single Drugs:**

- Guduchi Consuming 500 to 1000 mg of aqueous extract of Guduchi (Tinospora cordifolia (Thunb.Miers).
- Amla Consumption of fresh Amla fruit (Indian gooseberry – Embilica officinalis L/ Phyllanthus emblica L) or Amla candy is also advisable.
- Haridra Gargling with warm water added with turmeric powder (Curcuma longa L) and a pinch of salt or Turmeric (Curcuma longa L).
- Tulasi Frequent sipping of water processed with Tulsi (basil leaves – Ocimum tenuiflorum L Merr (synonym Ocimum sanctum L) is advised.
- Ashwagandha root powder 3-5gm twice a day with warm milk or water/ ashwagandha extracts 500mg twice a day with warm water. [24]

❖ **Immunity Enhancers – Formulations:**

- CHYAWANPRASH AVALEHA - 10 - 12 gm / 1 Spoon
- DRAKSHAVALEHA - 10 - 12 gm / 1 Spoon
- INDUKANTAM GRUTHAM - 10 - 12 gm twice daily before food, when hungry
- ARAVINDASAVA - 15 - 20 ml with equal quantity of warm water after food
- BALACHATURBHADRA CHURNA - 1 - 2 gm with honey
- HARIDRA KHANDA - 3 - 5 gm intermittently with honey/ warm water [24]

3) Homiopathic Treatment-

Stage/condition	Clinical Presentation	Medicine	Dosage
Asymptomatic COVID-19 positive individuals / Asymptomatic immediate contacts of infected persons	No symptoms	Arsenicum album30C	4 globules twice daily for seven days.
Mild COVlD19 Positive	Fever, Headache, Malaise, Dry Cough, Sore throat, Nasal Congestion Myalgias Oxygen saturation levels above 94%	Indicated medicine as per totality of symptoms. Commonly indicated medicines according to results of clinical studies are;Aconitumnapellus,Arsenicum album, Belladonna, Bryonia alba, Eupatorium perfoliatum., Ferrumphosphoricum., Gelsemium, Phosphorus, Rhus toxicodendron,etc.	The dose and repetition of the medicine to be determined by the treating physician as per homoeopathic principles.

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➢ **Vaccines -** A vaccination is a biological substance that offers active acquired immunity against a specific infectious illness.[25]

o **How do vaccines work?**

Vaccines train the immune system to recognise a certain virus or bacterium by exposing it to a non-lethal version of the pathogen or a portion of it – similar to giving a bloodhound a rag to smell – so that it can remember it and build a defence if the person becomes sick. They usually achieve this by causing our bodies to produce antibodies, which are proteins that help us fight illness. Other components of our immune system, such as T cells, may be stimulated as a result of this. This is the underlying idea of how all vaccinations function; however, how they do this varies greatly. Some vaccinations entail injecting a full, inactivated (or a whole, live, but shorter) – and therefore safe – form of the germ into the body, whereas others just contain a specific portion of the germ (such as a single protein normally found on the surface of the pathogen). The goal is to acquire particular antibody-generating particles, or antigens, such as a protein present on the pathogen, to cause a robust immune response in all cases. Some modern vaccines contain a portion of genetic information for the antigen rather than the antigen itself.

o **Ingredients of vaccines**

Antigens are active components in vaccines that cause the immune system to respond to viruses, bacteria, and other pathogens. However, in order for them to operate properly, they must also have other critical components that make them safe and effective. Water is the most common component in vaccinations. They also contain emulsifiers and stabilisers to keep the other components suspended in the solution and protect them from temperature fluctuations during transit or storage. An adjuvant, a chemical designed to enhance the immune response to the antigen, may be included in certain vaccinations, while a preservative, added to vaccine vials containing more than one dosage, prevents the growth of dangerous bacteria or fungus, which may be introduced when each dose is withdrawn. Finally, residual trace quantities of ingredients employed during the production process may be present in vaccinations. All of these vaccine components are present in trace levels, with some of them occurring naturally in human circulation. They are stated in the written document that comes with each vaccination container and must pass a stringent review before being included. This assures that the vaccine components are safe in the amounts used, and that procedures are in place to continuously check their safety.

o **Vaccines making Procedure**

Vaccines are constructed consisting of components of a bacteria or virus, usually a protein or sugar. Once in the body, antigens, the vaccine's active components, are what activate an immune response. Most traditional viral vaccines must be produced on biological material, such as chicken eggs for influenza vaccinations, mammalian cells for hepatitis A vaccines, or yeast for hepatitis B vaccines, since vaccines are biological products.

o **Vaccines designed for COVID – 19**

1) Initial Devlopment

New vaccinations are created in laboratories initially. For many years, scientists have been striving to produce vaccines against coronaviruses, such as those that cause SARS and Middle East respiratory disease (MERS) (MERS). The virus that causes COVID-19, SARS-CoV-2, is linked to the other coronaviruses. The expertise gathered from previous coronavirus vaccine studies aided in the early development of the current COVID-19 vaccines.

2) Clinical Trial

Vaccines go through three steps of clinical testing after initial research to ensure that they are safe and effective. The three steps of clinical trials are carried out one at a time for various vaccinations commonly used in the United States. These phases overlapped during the development of COVID-19 vaccinations to speed up the process so that the vaccines might be employed as soon as feasible to stop the pandemic. There have been no trial stages skipped.

3) Authorization or Approval

The FDA evaluates the results of clinical studies before making vaccinations available to individuals in real-world situations. Initially, they decided that three COVID-19 vaccines passed the FDA's safety and efficacy requirements, and they were approved. Authorizations for Emergency Use (EUAs). The EUAs permitted the vaccinations to be disseminated swiftly while retaining the same high safety criteria that other vaccines must meet. Learn more about EUAs in this video.

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4) Manufacturing and Distribution

The US government has committed significant resources to the development and dissemination of COVID-19 vaccinations. This allowed manufacture to begin while the vaccines were still in the third phase of clinical testing, allowing distribution to begin as soon as each vaccine was approved by the FDA. [26]

- **Early designed vaccines**

Vaccine Brand Name	Who Can Get this Vaccine	How Many Shots You Will Need	When patients Are Fully Vaccinated?
Pfizer-BioNTech	People 12 years and older	2 shots Given 3 weeks (21 days) apart	2 weeks after your second shot
Moderna	People 18 years and older	2 shots Given 4 weeks (28 days) apart	2 weeks after your second shot
Johnson & Johnson's Janssen	People 18 years and older	1 shot	2 weeks after your shot

- **Why are fully vaccinated people still catching COVID – 19 ?**

After the second dosage, the Pfizer/BioNTech and Moderna vaccines were reported to be 94-95 percent effective against all symptomatic COVID-19 illness in clinical studies. This doesn't mean that 5-6 people out of every 100 will get COVID-19, but it does indicate that when vaccinated people are compared to unvaccinated persons, there is a 94-95 percent reduction in new instances of the illness. In clinical testing, the Sinopharm vaccine from China was 78 percent effective, whereas the Oxford/AstraZeneca vaccine was 67 percent effective. COVID-19 protection was much better in terms of avoiding hospitalisation or death. With so many people getting vaccinated, and because nearly all COVID-19 limitations have been abolished in some countries, it is unavoidable that a tiny percentage of completely vaccinated persons may become sick. A far lower percentage will become gravely sick and die. What matters is that people who have been completely vaccinated against COVID-19 have a far reduced chance of a severe result than those who have not gotten any vaccination doses.

➢ **COMPARISION**

1) Pfizer-BioNTech

In August 2021, Pfizer-BioNTech became the first COVID-19 vaccine to be approved by the Food and Drug Administration (FDA) for persons aged 16 and above. It was also the first COVID-19 vaccine to be granted an FDA Emergency Use Authorization (EUA) in December 2020, after the business reported that the vaccination was very successful in avoiding symptomatic sickness. A messenger RNA (mRNA) vaccination is a relatively recent technique that employs messenger RNA (mRNA). It must be kept at freezing temperatures, making it more difficult to deliver than certain other vaccinations.

Recommended for: Children and adults ages 5 and older.

2) Moderna

In December 2020, Moderna's vaccine was approved for emergency use in the United States, roughly a week after Pfizer's vaccine. Moderna employs the same mRNA technology as Pfizer and has similar symptomatic illness prevention effectiveness. It should also be kept at freezing temperatures. The FDA authorised a third dosage of the Moderna vaccine in mid-August for select immunocompromised people, such as solid organ transplant patients and those with disorders that make them equally vulnerable to infections and other ailments.

Recommended for: Adults 18 and older. While the vaccine is not yet available for children, the company says its vaccine provides strong protection for children as young as 12.

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3) Johnson & Johnson

In February, the FDA approved Johnson & Johnson's vaccine, 70 days after Pfizer and Moderna. This is a carrier, or virus vector, vaccine, rather than an mRNA vaccine. It may be stored at room temperature in the refrigerator and is easy to distribute and administer because it only takes one injection.

Status: In the United States, the vaccine is being used in an emergency situation, as well as a booster dose for all individuals 18 and older that must be administered at least two months after the initial shot. (A mix-and-match policy implies that any of the three COVID-19 vaccinations available in the United States can be given as a booster dose, regardless of the original vaccine used.)

Recommended for: Adults 18 and older. While the vaccine is not yet available for children, the company says its vaccine provides strong protection for children as young as 12.

Dosage: Single shot. Fully effective two weeks after vaccination.

4) Oxford-AstraZeneca

This vaccine, which is currently being distributed in the United Kingdom and other countries, differs from some of its competitors in terms of cost—it is less expensive to manufacture per dose, and unlike some of its competitors, it can be stored in normal refrigeration for at least six months, making it easier to distribute.

The effectiveness of a booster shot is now being investigated by Oxford-AstraZeneca.

Status: Not available in the U.S., authorized for emergency use in other countries, including in the European Union (under the name Vaxzevria) and the United Kingdom.

Recommended for: Adults 18 and old

Dosage: Two doses, four to 12 weeks apart

Common side effects : Tenderness, pain, warmth, redness, itching, swelling or bruising at the injection site, all of which generally resolve within a day or two.

5) Novavax

Clinical studies have demonstrated that this vaccination is extremely effective. Novavax is a protein adjuvant vaccination. It's easier to prepare than some other vaccinations, and it can be kept in the fridge, making it easier to distribute. Novovax has successfully tested its vaccine in conjunction with the influenza vaccination.

Status: Not available in the U.S. at this time, but could become available in several other countries toward the end of this year and early next year.

Recommended for: The vaccine is being studied in people ages 12-84.

Dosage: 2 doses, three weeks apart

Common side effects: Injection site tenderness, fatigue, headache, muscle pain. [27]

REFERENCES

[1]. Corona virus disease: What you need to know. [accessed on February 18, 2020]. Available from: https://wwwafrowhoint/news/coronavirus-disease-what-you- need-know,">https://wwwafrowhoint/news/coronavirus-disease-what-you- need-know

[2]. https://www.who.int › Health topics

[3]. World Health Organization. Pneumonia of unknown cause – China. Geneva: WHO; 2020. Jan 5, [accessed on February 18, 2020]. Available from: https://wwwwhoint/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/">https://wwwwhoint/csr/don/05-january-2020-pneumonia-of-unkown-cause-china/en/ [Google Scholar]

[4]. TIMES OF INDIA, Aug 11, 2020, 23:32 IST Read more at: http://timesofindia.indiatimes.com/articleshow/77487253.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

[5]. "Naming the coronavirus disease (COVID-2019) and the virus that causes it". World Health Organization. Archived from the original on 28 February 2020. Retrieved 14 December 2020

[6]. M.A. Andrews,[1,*] Binu Areekal,[2] K.R. Rajesh,[3] Jijith Krishnan,[3] R. Suryakala,[4] Biju Krishnan,[6] C.P. Muraly,[5] and P.V. Santhosh[6] ; First confirmed case of COVID-19 infection in India: A case report;

[7]. https://www.webmd.com/lung/coronavirus-transmission-overview#

[8]. DIJKSHOORN, L.; URSING, B.M.; URSING, J.B. (2000). "Strain, clone and species: comments on three basic concepts of bacteriology". Journal of Medical Microbiology. 49 (5): 397–401. doi:10.1099/0022-1317-49-5-397. PMID 10798550.

[9]. Pellett PE, Mitra S, Holland TC. Chapter 2 - basics of virology. In: Tselis AC, Booss J, editors. Handbook of Clinical Neurology. 123: Michigan City, IN: Elsevier (2014). p. 45–66. Google Scholar

[10]. Torres J, Maheswari U, Parthasarathy K, Ng L, Liu DX, Gong X. Conductance and amantadine binding of a pore formed by a lysine-flanked transmembrane domain of SARS coronavirus envelope protein. Prot Sci. (2007) 16:2065–71. doi: 10.1110/ps.062730007 PubMed Abstract | CrossRef Full Text | Google Scholar

[11]. Chung YS, Kim JM, Man Kim H, Park KR, Lee A, Lee NJ, et al. Genetic characterization of middle east respiratory syndrome coronavirus, South Korea, (2018) Emerg Infect Dis. (2019) 25:958–62. doi: 10.3201/eid2505.181534PubMed Abstract | CrossRef Full Text | Google Scholar

[12]. Zumla A, Hui DS, Perlman S. Middle East respiratory syndrome. Lancet. (2015) 386:995–1007. doi: 10.1016/S0140-6736(15)60454-8 PubMed Abstract | CrossRef Full Text | Google Scholar

[13]. Grifoni A, Weiskopf D, Ramirez SI, Mateus J, Dan JM, Moderbacher CR, et al. Targets of T cell responses to SARS-CoV-2 coronavirus in humans with COVID-19disease and unexposed individuals. Cell. (2020) 181:1489–501.e15. doi: 10.1016/j.cell.2020.05.015 PubMed Abstract | CrossRef Full Text | Google Scholar

[14]. Walls AC, Park YJ, Tortorici MA, Wall A, McGuire AT, Veesler D. Structure, function, and antigenicity of the SARS-CoV-2 spike glycoprotein. Cell. (2020) 181:281–92.e6. doi: 10.1016/j.cell.2020.02.058 PubMed Abstract | CrossRef Full Text | Google Scholar

[15]. WHO statement on novel coronavirus in Thailand. Available at: https://www.who.int/news-room/detail/13-01-2020-who-statement-on-novel-coronavirus-in-thailand. Accessed April 16, 2020

[16]. Manish Kumar Maity, Mamta Naagar, "Autoimmune Neurogenic Dysphagia", International Journal of Science and Research (IJSR), Volume 11 Issue 7, July 2022, pp. 447-463, https://www.ijsr.net/getabstract.php?paperid=SR22630151732.

[17]. Manish Kumar Maity, Mamta Naagar, "A Review on Headache: Epidemiology, Pathophysiology, Classifications, Diagnosis, Clinical Management and Treatment Modalities", International Journal of Science and Research (IJSR), Volume 11 Issue 7, July 2022, pp. 506-515, https://www.ijsr.net/getabstract.php?paperid=SR22703111804.

[18]. Md Shamshir Alam , Manish Kumar Maity , Abdul Salam Nazmi , Md Sarfaraz Alam , Md Salahuddin Ansari. Oral Health Issues And Preventive Measures In Geriatric Populations. Journal of Pharmaceutical Negative Results [Internet]. 2022 Dec. 31 [cited 2023 Jun. 24];:2647-55. Available from: https://www.pnrjournal.com/index.php/home/article/view/9175

[19]. Nikita Sharma , Md Shamshir Alam , Anubha Sharma , Sanyam Garg , Manish Kumar Maity. Colorectal Cancer In Young Adults: Epidemiology, Risk Factors, Development, Symptoms, Traditional Herbal Therapy And Prevention. Journal of Pharmaceutical Negative Results [Internet]. 2022 Dec. 31 [cited 2023 Jun. 24];:1370-82. Available from: https://pnrjournal.com/index.php/home/article/view/6991

[20]. Ehteshamul Haque , Faiz Ahmed , Priyanka Chaurasiya , Neha Yadav , Nikita Dhiman , Manish Kumar Maity. A REVIEW ON ANTIDEPRESSANT EFFECT OF HERBAL DRUGS. Journal of Pharmaceutical Negative Results [Internet]. 2023 Feb. 17 [cited 2023 Jun. 24];:2716-23. Available from: https://www.pnrjournal.com/index.php/home/article/view/8841

[21]. Omveer Singh, Shailesh Sharma, Mamta Naagar, Manish Kumar Maity, Eletriptan As Treatment Option For Acute Migraine, International Journal Of Innovations & Research Analysis (Ijira),02, 03(II), September, 2022, Pp 15-24.

[22]. Priyanka Tanwar, Mamta Naagar, and Manish Kumar Maity, "Relationship between Type 2 Diabetes Mellitus and Osteoarthritis,"International Research Journal of Pharmacy and Medical Sciences (IRJPMS), Volume 6, Issue 2, pp. 59-70, 2023 (PDF) Relationship between Type 2 Diabetes Mellitus and Osteoarthritis. Available from: https://www.researchgate.net/publication/369022995_Relationship_between_Type_2_Diabetes_Mellitus_and_Osteoarthritis [accessed Jun 23 2023].

[23]. Omveer Singh, Shailesh Sharma, Mamta Naagar, Manish Kumar Maity, Oral And Parenteral To Minimize The Nasal Delivery By Thermoreversible Mucoadhesive –A Review, International Journal Of Creative Research Thoughts (Ijcrt), 09/2022,10(9) Pp.-356-371.

[24]. Md Shamshir Alam, Garima Malik, Priyanka Tanwar, Mamta Naagar, Tarun Singh, Omveer Singh, Manish Kumar Maity, A Review on Small-Cell Lung Cancer: Epidemiology, Pathophysiology, RiskFactors, Diagnosis, Clinical Management and Treatment Modalities, International Journal of Current Science Research and Review (ijcsrr), 06(01): 129-151.

[25]. Priyanka Tanwar, Mamta Naagar, and Manish Kumar Maity, "Relationship between Diabetes Mellitus and Bone Health – A Review,"International Research Journal of Pharmacy and Medical Sciences (IRJPMS), Volume 6, Issue 2, pp. 46-58, 2023. (PDF) Relationship between Diabetes Mellitus and Bone Health - A Review. Available from: https://www.researchgate.net/publication/369022910_Relationship_between_Diabetes_Mellitus_and_Bone_Health_-_A_Review [accessed Jun 23 2023].

[26]. Manish Kumar Maity. A review on Helicobacter pylori Infection. ijmsdr [Internet]. 2022Sep.17 [cited 2023Jun.23];6(9). Available from: https://www.ijmsdr.com/index.php/ijmsdr/article/view/950

[27]. Md Shamshir Alam , Manish Kumar Maity , Abdul Salam Nazmi , Md Sarfaraz Alam , Md Salahuddin Ansari (2022) "Oral Health Issues And Preventive Measures In Geriatric Populations",Journal of Pharmaceutical Negative Results, pp. 2647–2655. doi: 10.47750/pnr.2022.13.S10.316.