

## Covid-19 - An Overview

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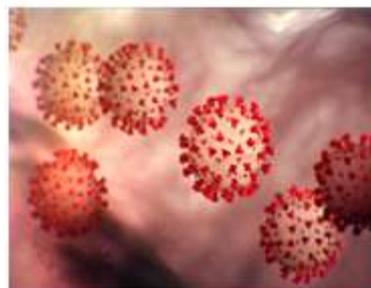
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**ABSTRACT:** The outburst of novel corona virus (SARS CoV-2) in 2019, which has led to a pandemic with high rate of mortality. Researches are ongoing around the world to invent vaccine and treatment to minimize the rate of disease incidence and mortality. The important part was the development of diagnostic techniques that was successful by the early stages of pandemic. The country had already taken some important measures to overcome the pandemic by social distancing, wearing mask, regular hand sanitising, lockdown etc. Now, the education system is completely via the e-learning techniques. Due to the lockdown, nature also bounces by reducing pollution and improved the quality of air. In India, by January reported cases are 1,92,308 and cured cases are 1,52,869 Total death cases reported are 1,52,869. A number of vaccines and treatment regime are under progress to eradicate the disease at the earliest. This project is a study about various aspects of coronavirus, pathophysiology, treatment pattern, vaccines already available for the disease and the impact of COVID-19 especially on health and educational system and detail overview of vaccine under progression.

### I. INTRODUCTION

Coronaviruses are a large family of zoonotic viruses that cause illness ranging from the common cold to severe respiratory diseases. Zoonotic means these viruses are able to be transmitted from animals to humans. Coronaviruses are positive sense, single stranded RNA viruses. The coronaviruses were originally grouped into the family Coronaviridae on the basis of the crown or halo-like appearance given by the glycoprotein-studded envelope on electron microscopy. Coronavirus virions are spherical to pleomorphic enveloped particles. Human coronavirus OC43 also possesses a hemagglutinin.



### TYPES OF CORONAVIRUS

Coronaviruses are named for the crown-like spikes on their surface. There are four main subgroupings of coronaviruses, known as alpha, beta, gamma, and delta. ALPHA -Comprises virus 229E ,NL63 ;BETA - Contains virus OC43, Bovine CoV, HCoV-HKU1, SARS-CoV, MERS-CoV ,SARCoV-2;GAMMA - Includes avian infectious bronchitis virus (IBV) and a number of related avian viruses.;DELTA -Coronavirus HKU15

### HISTORY OF CORONAVIRUS

History of coronavirus started from 1960s.

### SEVERE ACUTE RESPIRATORY SYNDROME (SARS)

Emerged in 2002–2003 as a coronavirus from southern China and spread throughout the world with quantifiable speed. Transmitted from bat to civet to human. The virus isolated from the civets revealed that virus contained a 29-nucleotide sequence not found in most human isolates. In the animal viruses, this nucleotide sequence maintains the integrity of the 10th open reading frame (ORF); whereas in the human strains this was absence

Beta coronavirus

Total number of cases:8,439 Total number of deaths:812

### MIDDLE EAST RESPIRATORY SYNDROME (MERS)

In June 13, 2012, the first reported case of MERS-CoV occurred in Jeddah, Saudi Arabia and quickly spread to several countries.

Beta coronavirus

Total number of cases:2,519 Total number of deaths:866

### SEVERE ACUTE RESPIRATORY SYNDROME-CORONAVIRUS -2 (COVID-19)

On 31 December 2019, a novel coronavirus was eventually identified in Wuhan, China. World Health Organisation announce COVID-19 as a Global Health Crisis On March. On February 11, 2020 WHO named "COVID -19". On January 30, First case of COVID-19 in Kerala. Its also Beta coronavirus. Like other coronavirus, it also cause respiratory and gastrointestinal infection. From the epidemiological studies, it was found that coronavirus mainly associated with a variety of respiratory illness mainly, upper respiratory infection with occasional cases of pneumonia in infants and young adults. These viruses were also able to produce asthma in children as well as chronic bronchitis in adults and the elderly.

### MORPHOLOGY AND LIFE CYCLE OF CORONAVIRUS

Coronaviruses are large pleomorphic spherical particles with bulbous surface projections. The average diameter of the virus particles is around 120 nm (.12  $\mu$ m). The diameter of the envelope is ~80 nm (.08  $\mu$ m) and the spikes are ~20 nm (.02  $\mu$ m) long. The envelope of the virus in electron micrographs appears as a distinct pair of electron dense shells. The viral envelope consists of a lipid bilayer where the membrane (M), envelope (E) and spike (S) structural proteins are anchored. Beta coronavirus subgroup A also have a shorter spike-like surface protein called hemagglutinin esterase (HE). Inside the envelope, there is the nucleocapsid, which is formed from multiple copies of the nucleocapsid (N) protein, which are bound to the positive sense single-stranded RNA genome in a continuous beads-on-a-string type conformation.

### LIFECYCLE

Infection begins when the viral spike (S) glycoprotein attaches to its complementary host cell receptor. After attachment, a protease of the host cell cleaves and activates the receptor attached spike protein. Depending on the host cell protease available, cleavage and activation allows the virus

to enter the host cell by endocytosis or direct fusion of the viral envelop with the host membrane. On entry into the host cell, the virus particle is uncoated, and its genome enters the cell cytoplasm. The host ribosome translates the initial overlapping open reading frame of the virus genome and forms a long polyprotein. The polyprotein has its own proteases which cleave the polyprotein into multiple nonstructural proteins. After uncoding 1<sup>st</sup> the genomic RNA of corona virus act as mRNA for the translation of replication of poly protein. RNA dependent RNA polymerase and helicase localize to double membrane vesicles and drive the production of sub genomic RNA from where the structural and accessory protein are produced in the next phase of translation. RNA dependent RNA polymerase is a target of investigational drugs such as Remdesivir and famipir. Preliminary research as shown that both of these agents inhibit RNA dependent RNA polymerase and thus might be useful for in treatment of early stages of corona virus. RNA translation occurs inside the endoplasmic reticulum. The viral structural proteins S, E, and M move along the secretory pathway into the Golgi intermediate compartment. There, the M proteins direct most protein interactions required for assembly of viruses following its binding to the nucleocapsid. Progeny viruses are then released from the host cell by exocytosis through secretory vesicles.

### PATHOGENESIS

Initially, SARS-CoV-2 virus affect the respiratory tract. Based on the cells that are likely infected, COVID-19 can be divided into three phases that correspond to different clinical stages of the disease.

Stage 1: Asymptomatic state (initial 1-2 days of infection)

Stage 2: Upper air way and conducting airway response (next few days)

Stage 3: Hypoxia, ground glass infiltrates and progression to ARDS

### TRANSMISSION

The disease spreads from person to person through small droplets from the nose or mouth which are spread when a person with COVID-19 coughs or exhales. So it is important to stay more than 1 meter (3 feet) away from a person who is sick.

## MUTATED STRAIN OF CORONA VIRUS MORE CONTAGIOUS

A tiny mutation was found in dominant corona virus variant. SARS-CoV-2 has a series characteristic spikes surrounding its core. These spikes are what allow the virus to attach to human cells make virus transmissible by binding with receptor (ACE 2) in respiratory epithelium. A mutation affecting the virus 's spike protein changed amino acid 614 from "D" (aspartic acid) to "G" (glycine). This small change which affects three identical amino acid chains. Particular mutant is called D614G. Due to these, there are two possibility. Firstly, effect on the spike receptor binding domain interaction with human ACE 2 protein. Secondly, by loose of Asp forming hydrogen bond with threonine residues which disappear in glycine mutant form, this facilitate viral entry. If molecular conformation is changed it is able to bind with receptors more efficiently which make more transmissible. Droplet which carry viral particles. Once it enters inside body, it contacts with lung cell /throat cells. Bind with receptor which facilitate the entry of virus inside the cell by forming a membrane sac around. Virus itself have genetic material (ribosome) which produce vireo protein (S protein). Where mutation occur. Mutated form has no apparent effect on severity but its maybe more transmissible. As epidemiological data suggesting that SG614 is more stable than SD614 i.e, SG614 transmit more efficiently.

### PEOPLE AT HIGH RISK TO COVID-19

- Over 70s, regardless of any medical condition.
- Under-70s who have an underlying health condition in other words, adults who are advised to have the flu year on medical grounds. This group includes people who have:
- Long-term respiratory or lung disease, like asthma or chronic obstructive pulmonary disease (COPD).
- Long-term heart disease like heart failure.
- Long-term liver disease, like hepatitis.
- Long-term kidney disease.
- Diabetes
- Long-term neurological conditions, like Parkinson's disease, motor neuron disease, multiple sclerosis (MS).
- A weakened immune system, either as a result of a medical condition like HIV or AIDS, or as

a result of medications like corticosteroids or chemotherapy.

- A body mass index (BMI) of 40 or above (being severely obese).
- Pregnant women
- People with complex health problems-this group includes people who:

### CLINICAL MANIFESTATION

Signs and symptoms of COVID-19 may appear two to 14 days after exposure and can include:

Most common:

- Fever, Dry cough ,Tiredness, Dysentery, Vomiting

Less common

- Aches and pain, Runny nose, Sore throat, Loss of taste or smell, Rash on skin or discoloration of fingers

Serious symptoms:

- Difficulty breathing, Chest pain, Loss of speech

Some people may have no symptoms at all. The incubation period of COVID 19 (time between getting the infection and showing symptoms) is 1to14days Some people with the infection, but without any serious symptoms can also spread the disease.

### DETECTION AND TREATMENT

#### ANTIBODY TEST

Antibody tests are similar to a blood test, using a few drops of blood from a finger prick to determine whether the human body has antibodies for coronavirus.Two types: Rapid antibody - POC and does not require lab ,Laboratory based test-Require lab, Ideal for mass testing

Rapid antibody Test : is a lateral flow immunoassay used to qualitatively detect IgG and IgM antibodies of the novel coronavirus in human serum, plasma or whole blood in vitro.Result within 10min.

ELISA based Antibody Test: used to qualitatively and quantitatively detect the (IgG) and (IgM) antibodies via colorimetric assay. Requires a laboratory setting.

#### ANTIGEN TEST

Rapid Antigen Test (RAT) : is a rapid nasopharyngeal swab test that directly detects the presence or absence of coronavirus antigen in the patient's body.Designed to detect specific proteins

or glycan (antigens) like nucleocapsid or spike proteins present on its surface. Generates results within 30 minutes. Relatively cheap. More suitable for testing in a community and in remote regions.

#### MOLECULAR BASED TEST

Real-time reverse transcription polymerase chain reaction (rRT-PCR) :

The test can be done on respiratory samples, including nasopharyngeal swab or sputum sample. Primarily based on Polymerase Chain Reaction. Here, the RNA a single-strand molecule is converted into a two-strand DNA using an enzyme. This is known as reverse transcription. Create copies and amplifies specific areas in the genome using the PCR process – amplicons. Using primers that are designed only to bind to the selected DNA sequence of the SARS-CoV-2's viral genome and a fluorescent dye as a probe, together left in PCR machine. A fluorescent signal marks the presence of virus. Generate results within 8 hours to 2 days. It is complex test and requires costly equipment. Other tests that are based on PCR are TRUENAT, CBNAAT etc. Newly developed technique in India is RT-LAMP. This is a one-step nucleic acid amplification method.

#### TREATMENT OF COVID -19 INVESTIGATIONAL THERAPIES

At present, use of these drugs are based on a limited information.

##### REMEDSIVIR

It is a broad-spectrum antiviral drug. Recommended for use in hospitalized patient requiring oxygen delivery. These mechanisms are linked to Remdesivir's ability to metabolize into an active form known as GS-441524 which is an adenosine nucleotide analog. The GS-441524 interferes with the action of viral RNA-dependent RNA polymerase and evades proofreading by viral exoribonuclease (Exon). This decreases viral RNA production

##### HYDROXYCHLOROQUINE AND CHLOROQUINE

An Experimental drug treatment for COVID 19. Viral entry, replication and activation of endosomal proteases - highly dependent on acidic pH environment endosomes. Chloroquine and analogs-diprotic weak bases-reach acidic endosomes-increase pH inhibiting fusion of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and the host cell membranes. Chloroquine inhibits glycosylation of the cellular angiotensin-

converting enzyme 2 receptor, which may interfere with binding of severe acute respiratory syndrome-associated coronavirus (SARS-CoV) to the cell receptor.

##### AZITHROMYCIN

A broad-spectrum antibiotic - immunomodulatory profile. To treat or prevent co infection with SARS-COV2 Azithromycin (AZM) appears to decrease the virus entry into cells. In addition, it can enhance the immune response against viruses by several actions. Azithromycin up-regulates the production of type I and III interferons. AZM shows an interesting immunomodulatory profile by inhibiting several cytokines involved in COVID-19 severe respiratory syndrome. Azithromycin (AZM) and Hydroxychloroquine (HCQ) both decrease the production of major inflammatory cytokines such as IL-1 and IL-6.

##### KALETRA

KALETRA is a co-formulation of lopinavir and ritonavir. This product is used with other HIV medications to help control HIV infection. Lopinavir is an inhibitor of the HIV-1 protease. As co-formulated in KALETRA, ritonavir inhibits the CYP3A-mediated metabolism of lopinavir, thereby providing increased plasma levels of lopinavir.

##### SYMPTOMATIC THERAPY

##### PARACETAMOL

Paracetamol, also known as acetaminophen, is a medication commonly used for mild to moderate pain and aches relief, and fever reduction. Since some people infected with COVID-19 experience fever, body aches and headaches, this drug has been prescribed to relieve those symptoms. Paracetamol can provide some relief for patients with these symptoms, but it is not a cure against COVID-19.

##### IMMUNE BASED THERAPY PLASMA THERPY

Whenever a person is infected with a virus or bacteria, the body's immune system develops an antibody. These antibodies give either a lifelong immune system or short-term immunity against that particular microorganism. Patients who recover from the coronavirus develop these antibodies which are the ones used for passive immunization. Technique uses plasma from the recovered COVID-19 patients. Recovered patients

had developed antibodies against virus (plasma donors). Plasma donors are recovered patients after 21-28 days of illness. Used for passive immunization of other active COVID patients. 200ml antibody rich plasma given in 2 consecutive days. Therapy shows improvement in severely ill patients.

#### ADJUVANT THERAPIES

##### HYDROGEN

2% inhalation of molecular hydrogen reduce cytokine storm and oxidative stress in lung tissues – over activity of immune system. By inhibiting the activity of NF-Kappa B and MPO. Superoxide dismutase – an antioxidant defense system of body. After hydrogen treatment will increase activity of SOD and reduce oxidative stress and multiple organ failure.

**VITAMIN C:**-Hyper inflammatory response produce ROS and cytokine storm-leads to oxidative stress-multiple organ failure. High dose of vitamin C ameliorates inflammation and vascular injury.

**VITAMIN D:**-Have potential to modulate innate and adaptive immune responses . Increase T regulatory cell activity. In randomized clinical trials, protect against acute respiratory tract infections. Dose recommended: 10mcg of vitamin D each day

#### LIFESTYLE MODIFICATIONS

Apart from the therapy, initially we should boost the immunity by a healthy lifestyle. Doctors recommend a healthy eating including immunity boosting foods . They are Blueberries, Spinach, Turmeric, Sweetpotato, Broccoli, Darkchocolate, Oilyfish, Ginger

#### HEALTHY LIFESTYLE STRATEGY

Avoiding smoking and alcohol, Exercising regularly , Maintaining a healthy weight , practicing correct hand-washing and oral hygiene

#### MEASURES TAKEN TO CONTROL COVID 19

**PERSONAL PROTECTIVE EQUIPMENT (PPE):** Personal Protective Equipment's (PPEs) are protective gears designed to safeguard the health of workers by minimizing the exposure to a biological agent.

##### Components of PPE

Face shield and goggles: - Hence protection of the mucous membranes of the eyes/nose/mouth by using face shields/ goggles is

an integral part of standard and contact precautions. The flexible frame of goggles should provide good seal with the skin of the face, covering the eyes and the surrounding areas and even accommodating for prescription glasses

**Masks:**-Masks are of different types. The type of mask to be used is related to particular risk profile of the category of personnel and his/her work. There are two types of masks which are recommended for various categories of personnel working in hospital or community settings, depending upon the work environment:

1. Triple layer medical mask
2. N-95 Respirator mask

**Gloves:** -When a person touches an object/surface contaminated by COVID-19 infected person, and then touches his own eyes, nose, or mouth, he may get exposed to the virus. Although this is not thought to be a predominant mode of transmission, care should be exercised while handling objects/surface potentially contaminated by suspect/confirmed cases of COVID-19. Nitrile gloves are preferred over latex gloves because they resist chemicals, including certain disinfectants such as chlorine. There is a high rate of allergies to latex and contact allergic dermatitis among health workers

**Coverall/Gowns:** Coverall/gowns are designed to protect torso of healthcare providers from exposure to virus. Although coveralls typically provide 360-degree protection because they are designed to cover the whole body, including back and lower legs and sometimes head and feet as well, the design of medical/isolation gowns do not provide continuous whole-body protection (e.g., possible openings in the back, coverage to the mid-calf only).

**Shoe covers:** -Shoe covers should be made up of impermeable fabric to be used over shoes to facilitate personal protection and decontamination.

**Head covers:** -Coveralls usually cover the head. Those using gowns, should use a head cover that covers the head and neck while providing clinical care for patients.

#### SANITIZATION

Sanitization is a process that can be rather effective in curbing the harmful influence of viruses. This could be sanitization of hands or sanitization of surface tops around us that we touch throughout the day. It is one of the most effective steps against viruses and can help to control their spread. Chlorine based cleaners, iodine sanitizers, quaternary ammonium , alcohol-based cleaners

,formaldehyde, hydrogen peroxide and phenolic are commonly used sanitizers.WHO –prefer Alcohol based hand sanitizers as a first-line measures for infection prevention.

In non-health care settings, sodium hypochlorite (bleach / chlorine) may be used at a recommended concentration of 0.1% or 1,000ppm (1 part of 5% strength household bleach to 49 parts of water). Alcohol at 70-90% can also be used for surface disinfection. Surfaces must be cleaned with water and soap or a detergent first to remove dirt, followed by disinfection. Cleaning should always start from the least soiled (cleanest) area to the most soiled (dirtiest) area in order to not spread the dirty to areas that are less soiled.

**PHYSICAL DISTANCE/SOCIAL DISTANCING**  
 Help to limit the spread of COVID 19- this means keep a distance of at least 1meter from each other and avoiding spreading in groups.

**QUARANTINE**

**IMPACT OF COVID -19**

❖ POSITIVE IMPACT	❖ NEGATIVE IMPACT
➤ Reduce fossil fuel consumption	➤ Increase medical waste,hazardous waste
➤ Reduce resource consumption and waste disposal	➤ Haphazard disposal of PPE plastic waste
➤ Reduce transport and industrial activities	Lessens recycling activities
Reduce noise pollution	➤ Increase municipal waste

**IMPACT ON PHARMA MARKET**

After growing by almost 9 per cent in March when consumers stocked chronic medication out of panic, the domestic pharmaceutical market declined by 11.2 per cent year-on-year in April. The prime drag on the market was the drop in sales of acute therapy medicines like antibiotics, apart from dermatology and gynecological drugs that witnessed a sharp fall [50]. According data from the market research firm AIOCD AWACS, the sale of anti-infectives (which comprise 11 per cent of the domestic pharma market) fell by 21.5 per cent, while gynecological drugs (around 5 per cent of the market) dropped by 23 per cent and dermatology segment (6 per cent of the market) fell by 22.5 per cent. That with people

staying indoors they did not contract much of infections, and this resulted in the fall of antibiotic sales. Segments like dermatology, gynecology, vaccines etc. depend on fresh prescriptions. With the lockdown in effect for the entire month of April, there was hardly any fresh prescription from doctors. The firm is now actively pursuing doctors through webinars and is helping doctors to on-board several telemedicine platforms to generate prescriptions. While most firms have reported a decline in sales growth, Mumbai-based JB Chemicals, the makers of Metrogyl, saw a 5 per cent YoY growth in April riding on the cardiac segment. While panic buying had boosted sales of cardiac and anti-diabetic segments in March, these did not fare too badly in April either -posting 5.9 per cent and 6.4 per cent YoY growth respectively.

**VACCINATION**

Vaccine is a substance used to stimulate the production of antibodies and provide immunity against one or several disease. Vaccines usually take a minimum 6 months to 1 year develop.Vaccination is being considered as the only way the coronavirus pandemic can be controlled, although a highly effective vaccine is not expected to be available in less than a year. More than 280 COVID-19 vaccines are in various phases of development across the world, according to Global Data like mRNA vaccines, inactivated virus vaccines, adenoviral vector vaccines.

**DEVELOPING COVID-19 VACCINES**

Scientists and pharmaceutical companies are following different approaches to developing vaccines against coronavirus. The vaccine being developed by Oxford University is an adenovirus vaccine vector designed to generate an immune response. The Serum Institute of India (SII), which has partnered with British-Swedish pharma company AstraZeneca for manufacturing the University of Oxford vaccine candidate for COVID-19, has sought permission from the Drugs Controller General of India (DCGI) for conducting “phase 3 human clinical trials” in India. “COVAXIN”, which has been developed by Bharat Biotech International Limited (BBIL) in collaboration with ICMR (Indian Council of Medical Research) and NIV (National Institute of Virology), Pune. COVAXIN has been modelled using an inactive version of the virus after isolating a strain of the deadly pathogen from an asymptomatic individual. They commenced the first part of Phase-1 trials of COVAXIN on July on

50 volunteers. Another leading vaccine being developed by Johnson & Johnson/Janssen Pharmaceuticals is also an adenovirus vaccine vector, while those being developed by Merck, Sharpe & Dohme/International AIDS Vaccine Initiative are based on recombinant vesicular stomatitis virus. Moderna and BioNTech/Fusan Pharma/Pfizer are developing mRNA vaccines. Russia which is based on serotypes of human adenovirus. Phase I human trials started on June 17 among 76 volunteers, with most being recruited from the military. Half were injected with a vaccine in liquid form and the other half with a vaccine that came as soluble powder. The phase-II trials were started on July 13. On August 3, Russian reported that Gamaleya Institute had completed clinical trials. WHO and other Organizations are also a little concerned about the inclusion because a vaccine usually takes a minimum of six months to a year to develop. But here clinical trial takes only short times So far, Russia has only made public the results of phase-I of the clinical trials, which they claimed were successful and produced the desired immune response. Vaccination is inevitable for the cure of the future hurdles which we might face in the field of medicines. India-made coronavirus vaccine Covaxin at AIIMS in New Delhi As part of the trial application, a dose of 0.5 ml would be given on day 0 and on day 28, the report added. To boost efficacy, developer of vaccine Sputnik V has suggested that the experimental shot should be combined with AstraZeneca's vaccine. The Russian vaccine is 92% effective while AstraZeneca's vaccine is 70% effective in protecting people from coronavirus.

**DEVELOPED VACCINES**

Covid vaccine was formally launched and first phase of vaccination was start on January 16,2021 with priority given to an estimated three crore healthcare workers and the frontline workers, followed by voluntary vaccination of those above 50 years of age and the under-50 population groups with co-morbidities, numbering around 27 crore.To fight against novel coronavirus, the country earlier granted emergency approval to two vaccines - The Covishield vaccine made by Serum Institute of India, which has partnered with British pharmaceutical company AstraZeneca; and Covaxin , being developed by Bharat Biotech in collaboration with the Indian Council of Medical Research (ICMR).

Covishield is a weakened version of adenovirus spike protein was inserted into ChAdO

x1 virus ,when vaccine is injected body recognise spike protein and develop immunity.

Covaxin uses inactivated coronavirus its genetic material is destroyed to prevent replication,inactivated virus trigger immune response when injected in human body.

Comparative Sheet for different Covid-19 vaccines, under Indian Government supply

Indicator	COVISHIELD	COVAXIN
Type of Vaccine	Recombinant COVID-19 vaccine based on Viral Vector Technology	Whole-Virus inactivated Corona Virus Vaccine
No. of doses in each vial	11	20
Shelf life	6 months	6 months
Expiry date available on vial	Yes	Yes
Vaccine Vial Monitor (VVM)	Not Available	Not Available
Route	Intramuscular (IM) injectable	Intramuscular (IM) injectable
Physical Appearance of Vaccine	Clear to slightly opaque, colourless to slightly brown	White translucent
Dose	0.5 ml each dose	0.5 ml each dose
Course	2-doses	2-doses
Schedule	4-weeks apart	4-weeks apart
Vaccination during Pregnancy	Not recommended	Not recommended
Vaccination < 18 years of age	Not recommended	Not recommended
Vaccination to Lactating mother	Not recommended	Not recommended

**Those people not eligible to be administered the COVID-19 vaccine**

- Those below 18 years of age are not allowed to receive the COVID-19 vaccine
- Pregnant and lactating mothers
- Those with allergic reactions to vaccines, pharmaceutical products, notable food allergies
- Anyone who has had an adverse reaction to a COVID-19 vaccine earlier

**People who are temporarily not eligible to get the vaccine**

- Persons showing active symptoms of SARS-CoV-2 infection.
- COVID-19 patients who have been given anti-SARS-Cov-2 monoclonal antibodies or convalescent plasma.
- Acutely unwell and hospitalised patients (with or without intensive care) due to any illness.
- The vaccine should be given with “caution” to persons with a history of any bleeding or coagulation disorder – platelet disorder, clotting factor deficiency, or coagulopathy.

**General instructions given to states on administering vaccine**

- The vaccines are not interchangeable: the second dose will have to be of the same vaccine that was administered as the first dose.
- The vaccine should be given with “caution” to persons with a history of any bleeding or coagulation disorder – platelet disorder, clotting factor deficiency, or coagulopathy.
- Vaccinators must store both vaccines at +2°C to +8°C; protect them from light; and discard the vaccine if found to be frozen.

#### When should the vial be discarded

If the vaccine in the vial is frozen, it should be discarded before administering.

#### VACCINE SIDE EFFECTS

VACCINE SIDE EFFECTS	
COVISHIELD	COVAXIN
tenderness, pain, warmth, redness, itching, swelling or bruising where the injection is given generally feeling unwell	injection site pain
feeling tired (fatigue)	injection site swelling
chills or feeling feverish	injection site redness
headache	injection site itching
feeling sick (nausea)	stiffness in the upper arm
joint pain or muscle ache	weakness in injection arm
a lump at the injection site	body ache
fever	headache
being sick (vomiting)	fever
flu-like symptoms such as high temperature, sore throat, runny nose, cough and chills	malaise
feeling dizzy, decreased appetite, abdominal pain	weakness
enlarged lymph nodes	rashes
excessive sweating itchy skin or rash	nausea
	vomiting

#### POST PANDEMIC ROLE OF PHARMACIST

Known pandemics:

- Bubonic plague (mid 1300), Spanish flu:1918, Flu pandemic:1957 and 1968,
- H1N1 flu:2009, SARS:2002, MERS:2012, COVID 19:2019/2020

Pharmacist is a healthcare professional licensed to engage in pharmacy with duties including dispensing prescription drugs. Monitoring drug interaction administering vaccine and counselling patient regarding the effect and proper usage of drug and dietary supplements.

#### ROLE OF PHARMACIST

- Toppling down of health infrastructures due to the inability to cope with the current needs
- Increasing burden on the health care professionals
- Restricting the visit of patient to the hospitals.
- In the above cases pharmacist can be a immediate help
- According to government of India pharmacist falls under essential service and hence they are to remain open thought out the entire lockdown.

#### TO PATIENT

Counselling and care, Home delivery, Effect interaction with patient, Online review and advices ,Free services to remote villages, Psychological support

#### DURING PANDEMIC

Following protocol, Educating the customer and patient care, Keep an update on available supply, Ensuring supply across localities, Providing refill, Collaborating with delivery services, Reporting authorities

#### POST PANDEMIC

- Being vigilant, Educating the customer and patient care, Taking tele medicine and tele health services up to notch, Utilizing IT support, Compelling pandemic insights

## II. CONCLUSION

This project is an incomplete overview as it is still continuing. The implications are still predicted. The corona virus disease is continues to spread across the world following a trajectory that is difficult to predict. The humanitarian and socio-economic policies adapted by countries will determine the speed and strength of recovery.

Government are try to accomplish all standards require to fulfill those people need in this crisis.

COVID-19, a new and sometimes leady respiratory illness that is believed to have originated in a live animal market in china, has spread rapidly throughout that country and the world. Of the disease, the second stage expansion started in foreign countries. An integrated interplay between viral genome, host immunity including the dysregulated proinflammatory response, and societal factors are usually responsible for morbidity and mortality due to any epidemic or pandemic outbreak.

In this project the spread of this pandemic how intense is included. Quick identification of suspect cases is the major step to limit the spread of any transmissible virus. The Public Health Emergency of International concern (PHEIC) along with the World Health Organization (WHO) and the (CDC) Centers for Disease Control and prevention is already working on the pandemic cases with set goals to maintain the global public health sustainability. Respiratory hygiene maintained by hand hygiene by washing hands with soap and water or sanitizing, wearing mask, and social distancing is the most effect full public health intercession as a preventive strategy against the spread of respiratory viruses. Also, a forceful home quarantine strategy was launched which is currently being practiced to combat the transmission of covid19.

The pandemic of COVID-19 poses considerable crisis on the health markets, including the pharmaceutical sector; and identification of these effects, may guide policy-makers towards more evidence informed planning to overcome accompanying challenges. The medical inventions employed different antiviral drugs that tried for the development of vaccines; however, no appropriate vaccine has been developed till date to circumvent these respiratory viruses. 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). For the epidemiologists working the densely populated developing or under developed countries, the information regarding especially regarding the viral transmission, the time wave pattern of viral infection, the possible failures in developing the appropriate vaccines and the unfortunate events of neutralizing human immune systems by the viruses could be of great importance for outbreak predictions, pandemic planning and possible public awareness

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