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A REVIEW ON COVID 19 AND CHALLENGES OF PHARMA PROFESSION DURING PANDEMIC CONDITIONS

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Abstract: COVID-19 is a highly transmittable and pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which emerged in Wuhan, China and spread around the world. The intermediate source of origin and transfer to humans is not known, however, the rapid human to human transfer has been confirmed widely. There is no clinically approved antiviral drug or vaccine available to be used against COVID-19 till now. However, few broad-spectrum antiviral drugs have been evaluated against COVID-19 in clinical trials, resulted in clinical recovery. In the present review, we summarize available information regarding COVID 19 virus, its origin, epidemiology, mode of transmission, diagnosis, available treatment options, prognosis of disease, and challenges posed by the pandemic. we also discussed about the structure of coronavirus and coronavirus protein. Also, we highlighted about challenges and strategies of Pharma profession during COVID19 pandemic.

Keywords: COVID-19,Coronavirus, antiviral, Pandemic, Pharma Profession

INTRODUCTION:

COVID-19 is an infectious disease caused by a newly discovered coronavirus. The coronavirus pandemic known as COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This is a highly pathogenic human coronavirus (CoV) first reported in Wuhan, China, where a pneumonia of unknown cause was detected in December 2019. This novel CoV belongs to the *Coronaviridae* family, along with SARS-CoV and the Middle East respiratory syndrome coronavirus (MERS-CoV). The three of them are zoonotic viruses and have in common their ability to cause severe infection in humans, in contrast to other human CoVs (HCoV-NL63, HCoV-229E, HCoV-OC43, and HCoVHKU1), which are responsible for mild respiratory tract infections

Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people, and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

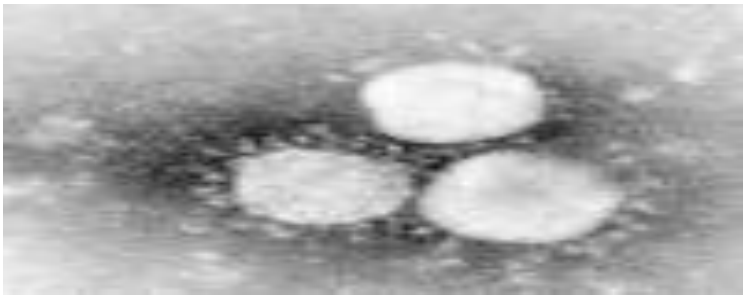
The best way to prevent and slow down transmission is be well informed about the COVID-19 virus, the disease it causes and how it spreads. Protect yourself and others from infection by washing your hands or using an alcohol based rub frequently and not touching your face.

The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's important that you also practice respiratory etiquette (for example, by coughing into a flexed elbow).

During this pandemic situation, like other health care workers, Pharmacists plays a key role to face this situation.

STRUCTURE OF CORONA VIRUS

Coronavirus virions are spherical to pleomorphic enveloped particles. The envelope is studded with projecting glycoproteins, and surrounds a core consisting of matrix protein enclosed within which is a single strand of positive-sense RNA (Mr 6×10^6) associated with nucleoprotein. The envelope glycoproteins are responsible for attachment to the host cell and also carry the main antigenic epitopes, particularly the epitopes recognized by neutralizing antibodies. OC43 also possesses a haemagglutin.



Electron micrograph showing human coronavirus 229E. Bar, 100 mn

Structure of corona virus structural protein: The coronavirus structural proteins that form the viral particle are the spike (S) glycoprotein, envelope (E) protein, membrane (M) protein, and the nucleocapsid (N) protein. These proteins are less conserved than nsps, playing important functions in the viral life cycle. Spike (S) protein has an important role in virus pathogenesis and organ tropism, being responsible for the viral entry through receptor recognition and membrane fusion. The envelope (E) protein is the smallest of the structural proteins but has a crucial role in assembly, budding, envelope formation, and virulence. The main function of the membrane (M) protein is to promote viral assembly due to its membrane-bending properties. The nucleocapsid (N) protein is a multifunctional protein that packages the viral RNA genome into a ribonucleoprotein complex called nucleocapsid to protect the genome

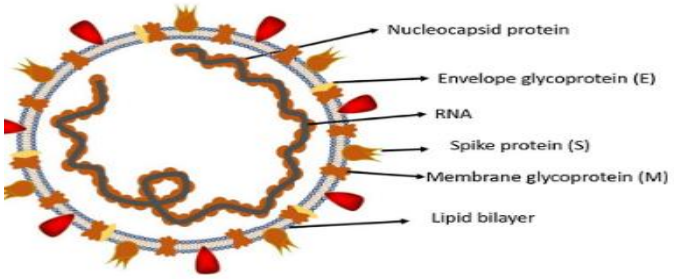
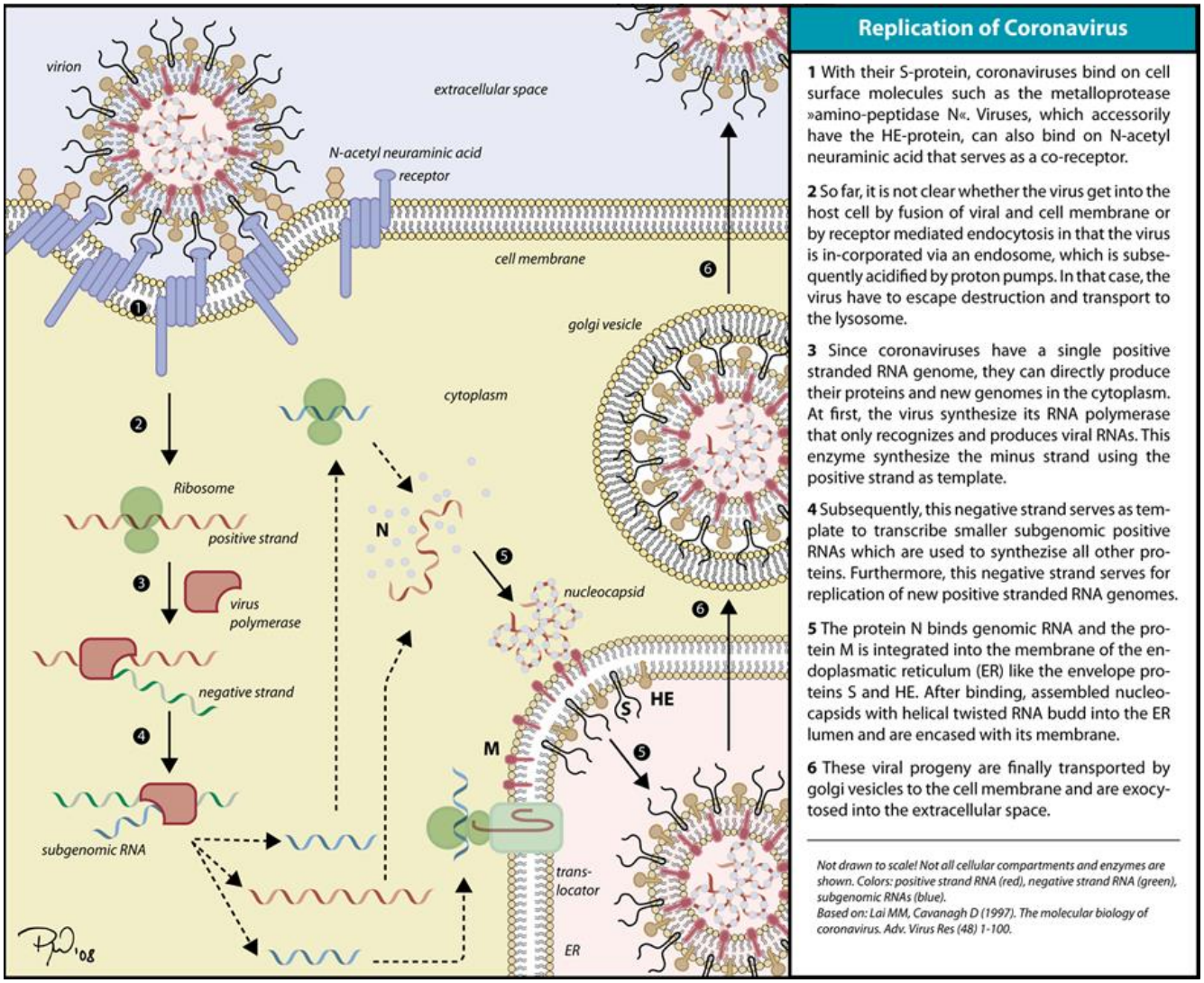


Fig. 1. Structure of respiratory syndrome causing human coronavirus.

LIFE CYCLE OF CORONAVIRUS

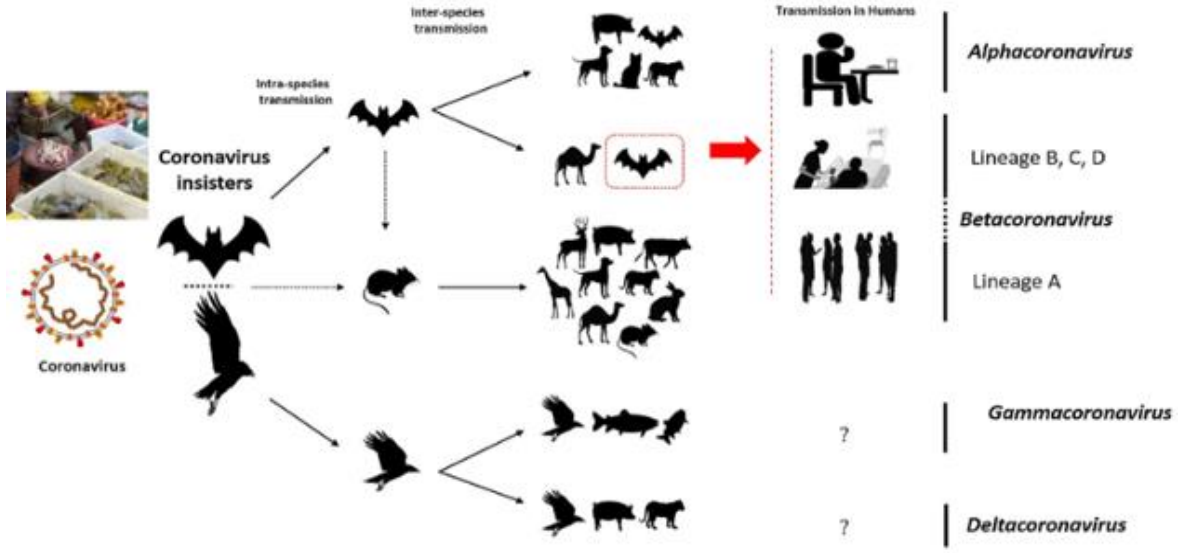


MODE OF TRANSMISSION

Infected carriers are able to shed viruses into the environment. The interaction of the coronavirus spike protein with its complementary cell receptor is central in determining the tissue tropism, infectivity, and species range of the released virus.

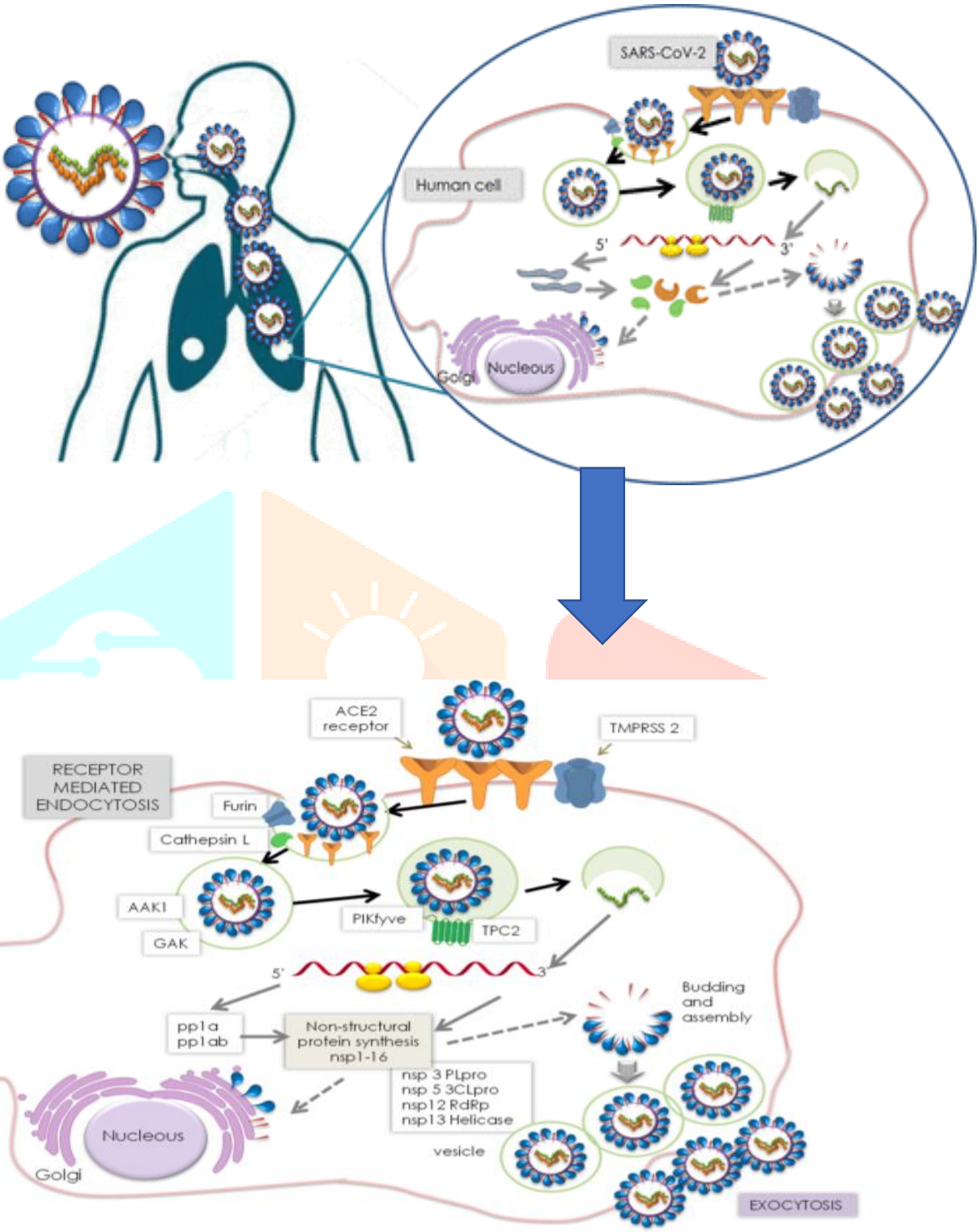
Coronaviruses mainly target epithelial cells. They are transmitted from one host to another host, depending on the coronavirus species, by either an aerosol, fomite, or fecal-oral route.

Human coronaviruses infect the epithelial cells of the respiratory tract, while animal coronaviruses generally infect the epithelial cells of the digestive tract. SARS coronavirus, for example, infects via an aerosol route, the human epithelial cells of the lungs by binding to the angiotensin-converting enzyme 2 (ACE2) receptor. Transmissible gastroenteritis coronavirus (TGEV) infects, via a fecal-oral route, the pig epithelial cells of the digestive tract by binding to the alanine aminopeptidase (APN) receptor.



The key reservoirs and mode of transmission of coronaviruses (suspected reservoirs of SARS-CoV-2 are red encircled); only a and b coronaviruses have the ability to infect humans, the consumption of infected animal as a source of food is the major cause of animal to human transmission of the virus and due to close contact with an infected person, the virus is further transmitted to healthy persons. Dotted black arrow shows the possibility of viral transfer from bat whereas the solid black arrow represent the confirmed transfer.

SARS-CoV-2 infection cycle.



SYMPTOMS

Practice physical distancing by avoiding unnecessary travel and staying away from large groups of people. 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, Dry cough, tiredness

Less common symptoms: aches and pains, sore throat, diarrhoea, conjunctivitis, headache, loss of taste or smell, a rash on skin, discoloration of fingers or toes

Serious symptoms: difficulty breathing or shortness of breath, chest pain or pressure, loss of speech or movement, chest pain or pressure, loss of speech or movement.

Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility. People with mild symptoms who are otherwise healthy should manage their symptoms at home. On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

TESTING AND TREATMENT:

To test for the COVID-19 virus, a health care provider uses a long swab to take a sample from the nose or throat. The samples are then sent to a lab for testing. If you're coughing up sputum, that may be sent for testing. The U.S. Food & Drug Administration (FDA) has authorized at-home tests for the COVID-19 virus. These are available only with a doctor's prescription.

The first step in the treatment is to ensure adequate isolation (discussed later) to prevent transmission to other contacts, patients and healthcare workers. Mild illness should be managed at home with counselling about danger signs. The usual principles are maintaining hydration and nutrition and controlling fever and cough. Routine use of antibiotics and antivirals such as oseltamivir should be avoided in confirmed cases. In hypoxic patients, provision of oxygen through nasal prongs, face mask, high flow nasal cannula (HFNC) or non-invasive ventilation is indicated. Mechanical ventilation and even extra corporeal membrane oxygen support may be needed. Renal replacement therapy may be needed in some. Antibiotics and antifungals are required if co-infections are suspected or proven.

Currently, no medication is recommended to treat COVID-19, and no cure is available. Antibiotics aren't effective against viral infections such as COVID-19. Researchers are testing a variety of possible treatments.

The FDA has granted emergency use authorization for the antiviral drug Remdesivir to treat severe COVID-19. The U.S. National Institutes of Health recently recommended the corticosteroid dexamethasone for people with severe COVID-19 who require supplemental oxygen or mechanical ventilation. Also Hydroxychloroquine, an antimalarial drug is used as a drug of choice in severe cases.

Supportive care is aimed at relieving symptoms and may include: Pain relievers (ibuprofen or acetaminophen), Cough syrup or medication, Rest, Fluid intake, Vitamin suppliments etc.

In severe conditions like shortness of breath or severe respiratory problems there is need of hospitalization with the supervision of a doctor.

DRUGS CURRENTLY USED IN CLINICAL TRAILS

TRAGET	**ANTI VIRAL TREATMENT**	**USE**
RNA polymerase	Remdesivir favipiravir, ribavirin, oseltamivir, galidesivir, sofosbuvir, umifenovir	Ebola virus Influenza virus, hepatitisC virus, HIV virus
3CL protease	Lopinavir/ritonavir, Ivermectin	HIV
PL protease	Disulfiram	
Protein S	Griffithsin	HIV transmission
Inhibition of TMPRSS2	camostat mesylate, nafamostat, bromhexine, enzatulamide	
Inhibition of endocytosis	Chlorpromazine, Fluphenacine	Other uses
Acidification of endosome	Chloroquine/hydroxy Chloroquine	Malaria
Inhibition of entry	Convalescent plasma	Antibodies
Kinase inhibitors	Imatinib, baricitinib	Antitumor agent
Anti-inflammatory drugs	Corticosteroids Interferons Nitazoxanide, Mycophenolic acid Tocilizumab Cyclosporin/alispovir	Inflammatory response HCV Interferon induction or synergy IL6 antagonist Immune suppressors
Miscellaneous	Resveratrol, losartan Loperamide, telmisartan	Control organ damage

PREVENTION

To prevent the infection and to slowdown the transmission of COVID-19 the following measures should follow according to WHO

- Always wear MASK while going outside
- Wash your hands regularly with soap and water, or clean them with alcohol-based hand sanitizer.
- Maintain at least Six feet distance between you and other people.
- Avoid touching your face.
- Cover your mouth and nose while coughing or sneezing.
- Stay home if you feel unwell.
- Refrain from smoking and other activities that weaken the lungs.

CHALLENGES OF PHARMACISTS DURING COVID-19 PANDEMIC

- In this COVID-19 pandemic situation a DISPENSING PHARMACIST receiving and confirming drug orders, issuing medicines to the patients with clear instructions and counseling, Supplying all kinds of medicines to various patients from mild to critical care without breaking the supply chain.

  They are working as frontline department against COVID-19 pandemic.

- In this COVID-19 pandemic, industrial pharmacist working in a Drug discovery department to get new drug molecule against this coronavirus. Designing a new drug for COVID-19 by using various techniques. In this research, they found that the following drugs showing effectiveness in the treatment of COVID-19 viz; Remdesivir by Gilead Sciences, Galidesivir by Bi-crystpharma's etc. The companies working on Anti viral drugs to combat COVID-19 are ABBVIE, BOCHINGER INGELHEIM, ELILILLY, J &J , GSK,NOVARTIS

They are working continuously even in the lockdown as an important health care department to get quality and safety drug molecule as soon as possible for the treatment of COVID-19.

- In this COVID-19 pandemic, industrial pharmacist, working in clinical trials department to get safety vaccine and safety medicines to combat coronavirus.

The pharmaceutical industry is facing tremendous challenges while searching for new medication and vaccine against COVID-19

One of the potential vaccines against COVID-19 is also known as ChAdOx1nCoV-19 entered Phase-III clinical trials.

The Moderna vaccine is based on a novel approach. Moderna plans to begin phase-IV clinical trails. The vaccine is easy to manufacture, but could be expensive and supplies will be tightly controlled by US government.

Sinovac is also ahead in the race, as it was previously developing a vaccine against SARS, the 2003 pandemic that also originated in China and is caused by a type of coronavirus. The company had to abandon the development at the phase-1I stage as that outbreak was contained.

At the end of August, around 30 companies have potential medicine in various stages of development with at least six existing medicines now in late phase CLINICAL TRAILS.

In India several companies like Indian immunologics, Bharat biotech and Shanta biotech working on different phases of clinical trials to get safety vaccines as early as possible, even CIPLA, Pfizer, Ranbaxy etc working on different phases of clinical trials to get safety medicines.

- In this COVID-19 pandemic, industrial pharmacist working in a manufacturing and bulk drug industry are working continuously for the supply of drugs without any interruption.

Highly motivated experts are here to accelerate tasks like R&D, processes and documentation, production, and packaging.

In the current situation, the health of all the individuals has the highest priority. So, they are supplying all kinds of drugs to different types of patients without breaking the chain.

The majority of API's for generic drug manufacturing across the globe are sourced from India.

In this current situation depending upon the demand they are supplying paracetamol and hydroxychloroquine for the treatment of coronavirus.

All Pharmaceutical companies are responding to the rapid challenges arising. They are operational and ready to help.

- In this COVID-19 pandemic situation Phyto-Chemist in Ayurvedic department

They have a better knowledge on the herbal formulations and their activities

People working along with Ayurvedic experts preparing potential herbal formulations as per AYUSH guidelines to combat this Corona virus. Ayurveda medicine have been safety, potential efficacy and having broad spectrum applicability.

The following ingredients was given by AYUSH and Govt Of India for boosting immunity

Tulsi (ocicum sanctum)

Dalchini (cinnamomum zeylancicum)

Sunthi(zingiber officinale)

Krishna mirchi(Piper nigrum)

Turmeric (curcuma longa)

The herbal supplements used for boosting the immunity in the low-level immunity individuals due to viral infections, bacterial infections or any other serious elements

They are working continuously as an important health care department to get quality and safety herbal formulations as soon as possible for the treatment of COVID-19.

- Industrial pharmacist working with a microbiologist to get a safety vaccine in the quality control tests to ensure the vaccine meets the safety requirements of clients or customers.

Astra zenaca's research and development teams have also been working expeditiously to identify monoclonal antibodies to progress clinical trials evaluation as a treatment to prevent COVID-19

- In this COVID-19 pandemic, Clinical pharmacist working in health care environments, including hospitals and their affiliated outpatient clinics, emergency departments, community pharmacies, physician's offices, community-based clinics, nursing homes, and managed care organizations. They are Concerned with the science and practice of rational medication**,** involved in taking the medical history of the patient, educate patients by giving the precautions against COVID-19,teaching and training to medical and paramedical staff.

As a frontline department working continuously for your health and safety.

- In this COVID-19 pandemic, community pharmacist are working to promote health care and health care services. As the lockdowns are being observed all over the globe and the national level pharmacy professionals are performing the frontline role. Educating the patients by giving proper information about the dosage of drugs.

For example: high dose of hydroxychloroquine can lead to cardiovascular diseases.

Besides Dispensing pharmacist, community pharmacist advice awareness to public by asking them to follow some preventive measures and precautions to be maintained as follows

- ✓ Cleaning and Disinfecting surfaces, clothing and electronics.
- ✓ Hand hygiene, Use Hand Sanitizer
- ✓ wearing mask
- ✓ maintaining good health
- ✓ consuming healthy diet
- ✓ maintaining personal hygiene
- ✓ maintaining social distance etc.

CONCLUSION

The Novel Coronavirus effected all the sectors and it spreads each and every corner in the world. As all of us aware of preventive measures and all about this outbreak, we have to prepare for future to face these type of outbreaks by strengthening our medical facilities, increasing scientific research and also we should concentrate more on drug discovery process by giving more facilities to health care department, therefore we can combat these Pandemics in the future efficiently.

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