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CORONA VIRUS DISEASE-2019 (COVID-19) PANDEMIC: A REVIEW OF THE CURRENT EVIDENCE

Vimal Kumar Yadav[1], Vijay Kumar Yadav[2], Pushpendra Kumar*[3], Ajeet Singh[4] and Mayank Kumar[5] and Uma Devi[6]

[1]Principal, Department of Pharmacy, SRDM, Mauranipur, Jhansi, Uttar Pradesh, India. (284204).
[2]Assistant Prof. Department of Pharmacy, Bhimrao Ambedkar University, Agra, Uttar Pradesh, India. (282004).
[3]Assistant Prof., Pharmacy College, Uttar Pradesh University of Medical Science Saifai Etawah, Uttar Pradesh, India. (206301).
[4]Principal, Department of Pharmaceutical Sciences, J.S. University, Shikohabad, Firozabad, Uttar Pradesh, India. (283135).
[5]Assistant Prof. Department of Pharmacognosy, Shri RLT Institute of Pharmaceutical Science and Technology, Ekdil, Etawah, Uttar Pradesh, India. (206126).
[6]Research Scholar, School of Pharmaceutical Sciences, IFTM University, Moradabad, Uttar Pradesh, India. (244102).

***Corresponding Author: Pushpendra Kumar**
Assistant Prof., Pharmacy College, Uttar Pradesh University of Medical Science Saifai Etawah, Uttar Pradesh, India. (206301).

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ABSTRACT
There is a new public health crises threatening the world with the emergence and spread of 2019 novel corona virus (2019-nCoV) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2). The virus originated in bats and was transmitted to humans through yet unknown intermediary animals in Wuhan, Hubei province, China in December 2019. There have been around 12,762,414 reported cases of corona virus disease 2019 (COVID-2019) and 5,66,596 reported deaths to date (13/07/2020) globally. The disease is transmitted by inhalation or contact with infected droplets and the incubation period ranges from 2 to 14 d. COVID-19 has been labelled as a public health emergency of international concern (PHEIC), and the epidemic curves are still on the rise. Here, we summarize the clinical and public health aspects of COVID-19 and SARS-CoV-2.

KEYWORDS: SARS-CoV-2, COVID-19, Quarantine, Severe acute respiratory syndrome.

INTRODUCTION
The 2019 novel corona virus (2019-nCoV) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) as it is now called, is rapidly spreading from its origin in Wuhan City of Hubei Province of China to the rest of the World.[1] But the future course of this virus is unknown. Since knowledge about this virus is rapidly evolving, readers are urged to update themselves regularly. Key areas have been identified in which research needs to be conducted to generate critical intelligence for advising prevention and control efforts. The emergence of SARS-CoV-2 has once again exposed the weaknesses of global health systems preparedness, ability to respond to an infectious threat, the rapidity of transmission of infections across international borders and the ineffectiveness of kneejerk policy responses to emerging/re-emerging infectious disease threats. The review concludes with the key learning points from the ongoing efforts to prevent and contain COVID-19 and identifies the need to invest in health systems, community-led response mechanisms and the need for preparedness and global health security.

History and Origin
In December 2019, adults in Wuhan, capital city of Hubei province and a major transportation hub of China started presenting to local hospitals with severe pneumonia of unknown cause. Many of the initial cases had a common exposure to the Huanan wholesale seafood market that also traded live animals.[2]

First case of corona virus was notified as cold in 1960. According to the Canadian study 2001, approximately 500 patients were identified as Flu-like system. 17-18 cases of them were confirmed as infected with corona virus strain by polymerase chain reaction. Corona was treated as simple non fatal virus till 2002. In 2003, various reports published with the proofs of spreading the corona to many countries such as United States America, Hong Kong, Singapore, Thailand, Vietnam and in Taiwan. Several case of severe acute respiratory syndrome caused by corona and their mortally more than 1000 patient was reported in 2003. This was the black year for microbiologist. When microbiologist was started focus to understand these problems.[3-5] After a deep

exercise they conclude and understand the pathogenesis of disease and discovered as corona virus. But till total 8096 patient was confirmed as infected with corona virus.

Characteristics

According to a report published on 24 Jan 2020, corona virus infected patient have many common features such as fever, cough, and fatigue while diarrhea and dyspnea were found to be as uncommon feature. Many of them patient reported bilateral abnormalities. Corona virus was isolated from bronchoalvelor lavage fluid in china in 2020. It is also detected in blood samples. Till now, corona virus was not confirmed in feaces and urine sample of patent.[6-8]

Mode of Spreading

Peoples can get the infection through close contact with a person who has symptoms from the virus includes cough and sneezing. Generally corona virus was spread via air born ezoonotic droplets. Virus was replicated in ciliated epithelium that caused cellular damage and infection at infection site. According to a study published in 2019, An-giotensin converting enzyme 2 (ACE.2), a membrane exopeptidase in the receptor used by corona virus in entry to human cells.[9–12] Virus transmission routes were represented in **figure 1**.

Microbiology

Corona virus is spherical or pleomorphic, single stranded, enveloped RNA and covered with club shaped glycoprotein. Corona viruses are four sub types such as alpha, beta, gamma and delta corona virus. Each of sub type corona viruses has many serotypes. Some of them were affect human of other affected animals such as pigs, birds, cats, mice and dogs.[13–15]

Corona virus Genome Structure and Life Cycle

COVID-19 is a spherical or pleomorphic enveloped particles containing single-stranded (positive-sense) RNA associated with a nucleoprotein within a capsid comprised of matrix protein. The envelope bears club-shaped glycoprotein projections.[29] Some corona viruses also contain a hem agglutinin-esterase protein were described in **figure 2**.

Corona viruses possess the largest genomes (26.4e31.7 kb) among all known RNA viruses, with G þ C contents varying from 32% to 43%. Variable numbers of small ORFs are present between the various conserved genes (ORF1ab, spike, envelope, membrane and nucleocapsid) and, downstream to the nucleocapsid gene in different corona virus lineages. The viral genome contains distinctive features, including a unique N-terminal fragment within the spike protein. Genes for the major structural proteins in all corona viruses occur in the 50e30 order as S, E, M, and N5. A typical CoV contains at least six ORFs in its genome.

Except for gamma corona virus that lakes nsp1, the first ORFs (ORF1a/b), about two-thirds of the whole genome length, encode 16 nsps (nsp1-16). ORF1a and ORF1b contain a frame shift in between which produces two polypeptides: pp1a and pp1ab. These polypeptides are processed by virally encoded chymotrypsin-like protease (3CLpro) or main protease (Mpro) and one or two papain-like protease into 16 nsps. All the structural and accessory proteins are translated from the sgRNAs of CoVs. Four main structural proteins contain spike (S), membrane (M), envelope (E), and nucleocapsid (N) proteins are encoded by ORFs 10, 11 on the one-third of the genome near the 30-terminus. Besides these four main structural proteins, different CoVs encode special structural and accessory proteins, such as HE protein, 3a/b protein, and 4a/b protein. These mature proteins are responsible for several important functions in genome maintenance and virus replication.[30]

There are three or four viral proteins in the corona virus membrane. The most abundant structural protein is the membrane (M) glycoprotein; it spans the membrane bilayer three times, leaving a short NH2-terminal domain outside the virus and a long COOH terminus (cytoplasmic domain) inside the virion. The spike protein (S) as a type I membrane glycoprotein constitutes the peplomers. In fact, the main inducer of neutralizing antibodies is S protein. Between the envelope proteins with exist a molecular interaction that probably determines the formation and composition of the corona viral membrane.[31] M plays a predominant role in the intracellular formation of virus particles without requiring S. In the presence of tunicamycin corona virus grows and produces spikeless, noninfectious virions that contain M but devoid of S. The entire mechanism of pathogenicity of SARS-CoV-2, from attachment to replication is well mentioned in **figure 3**.

Clinical Features

The clinical features of COVID-19 are varied, ranging from asymptomatic state to acute respiratory distress syndrome and multi organ dysfunction. The common clinical features include fever (not in all), cough, sore throat, headache, fatigue, headache, myalgia and breathlessness. Conjunctivitis has also been described.[16-18] Thus, they are indistinguishable from other respiratory infections. In a subset of patients, by the end of the first week the disease can progress to pneumonia, respiratory failure and death.

Phases of a Pandemic

The actual differentiation of staging of an epidemic is based on the pathogenesis of disease and several other epidemiological factors. In 1999, the World Health Organization (WHO) released the very first influenza pandemic awareness plan in which it summarized the suitable response based on six clearly defined phases. The objective of the plan is to manage the global response by providing countries an outline from which they could illustrate their own national strategies based

on available resource.[19] The same fundamental model can be applied with few or more deviations to other epidemics, such as tuberculosis and malaria. The first three phases are intended to help public health officials to understand that it is time to build up the gear and action plans to respond to an approaching threat. Phases 4, 5, and 6 denotes the time when action plans are executed in synchronization with the WHO. The revision of the phases was done by the World Health Organization in 2009 to better make a distinction between attentiveness and action execution phase. The plan was exclusively proposed to deal with influenza pandemics given their high mutation rate and the ability of the virus to cause zoonotic diseases that pass from animal to human being.[20]

Former WHO Stages of a Flu Pandemic

Phase 1: The period during which no animal viruses are reported to cause infection in humans.

Phase 2: The first level of threat wherein a virus is confirmed to have transmitted from an animal to humans.

Phase 3: When sporadic, intermittent cases or small clusters of the disease are confirmed, but transmission from a human to another human has either not occurred or is not considered to continue to an outbreak.

Phase 4: It is the point where either human to human transmission or a human to the animal virus has caused an outbreak widely among a community.

Phase 5: It is when human to human transmission of the virus has caused the spread of disease to at least two countries.

Phase 6: It is the point at which the disease has declared a pandemic that has spread to at least one other country.[21-24]

Diagnosis

A suspect case is defined as one with fever, sore throat and cough who has history of travel to China or other areas of persistent local transmission or contact with patients with similar travel history or those with confirmed COVID-19 infection. However cases may be asymptomatic or even without fever. A confirmed case is a suspect case with a positive molecular test. Patients who satisfy clinical case definition and are epidemiologically linked to a history of travel from the city of Wuhan in the last 14 days, or have come in contact with a reverse transcription (RT)-PCR confirmed case or with a patient who is under investigation for SARS-COV-2 within the same period, are considered to be suffering from COVID-1950.

Treatment

Treatment is essentially supportive and symptomatic. The first step 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 counseling about danger signs. The usual principles are maintaining hydration and nutrition and controlling fever and cough.

Prevention strategies

Since at this time there are no approved treatments for this infection, prevention is crucial. Several properties of this virus make prevention difficult namely, non-specific features of the disease, the infectivity even before onset of symptoms in the incubation period, transmission from asymptomatic people, long incubation period, tropism for mucosal surfaces such as the conjunctiva, prolonged duration of the illness and transmission even after clinical recovery.

Isolation of confirmed or suspected cases with mild illness at home is recommended. The ventilation at home should be good with sunlight to allow for destruction of virus. Patients should be asked to wear a simple surgical mask and practice cough hygiene. Caregivers should be asked to wear a surgical mask when in the same room as patient and use hand hygiene every 15-20 min. At the community level, people should be asked to avoid crowded areas and postpone non-essential travel to places with ongoing transmission. They should be asked to practice cough hygiene by coughing in sleeve/ tissue rather than hands and practice hand hygiene frequently every 15-20 min. Patients with respiratory symptoms should be asked to use surgical masks.

Appropriate measures should be adopted throughout the diagnosis and during the clinical care of an infected patient. Droplet contact and airborne safety measures must be taken up during specimen collection, and sputum induction should be avoided. Healthcare workers attending for infected persons should take care of contact and airborne infection by utilizing Personal protective equipment, "PPE" such as N95 or FFP3 masks, eye protection, gowns, and gloves to minimize exposure to contamination and to prevent transmission of the pathogen.

The World Health Organization and other countries government organizations have released the following general recommendations:

- ✓ Close contact with patients suffering from acute respiratory infections must be avoided.
- ✓ Wash your hands repeatedly every 15-20 min for at least 1 min, especially after contact with infected people.
- ✓ Avoid contact with farm or wild animals.
- ✓ Individuals having low immunity should avoid public gatherings.
- ✓ Person with symptoms of acute airway infection should keep the distance, cover coughs or sneezes with disposable tissues or clothes, and wash their hands.

Case Definitions

Case definitions being used currently are based on the WHO's interim guidance documents. SARI - An acute respiratory infection with a history of fever or measured temperature >38°C, and cough, onset within 10 days and requiring hospitalization.

Patient with acute respiratory illness and at least one of the following:

(i) Close contact with a confirmed or probable case of SARS-CoV-2 in the 14 days before illness onset; and

(ii) (Worked or attended a health care facility in the 14 days before onset of symptoms where patients with hospital-associated SARS-CoV-2 infections were reported.

A sensitive and specific definition for community-based surveillance remains elusive. The indicators for referral and their outcome impact are yet to be ascertained systematically. Questions around the need to quarantine children, minimum period of quarantine and its mental and socio-economic costs, relative to the current outbreak, remain poorly explored.

Quarantine

According to WHO, "The International Health Regulations (IHR) are an international legal instrument that is binding on 194 countries across the globe, including all the Member States of WHO. Their aim is to help the international community prevent and respond to acute public health risks that have the potential to cross borders and threaten people worldwide". The IHR defines "the rights and obligations of countries to report public health events and establish a number of procedures that WHO must follow in its work to uphold global public health security". In line with the principles outlined in IHR, the Ministry of Health and Family Welfare, Government of India, has issued travel advisories from time to time, considering the surge in cases of COVID-19 in China. The travel advisory states, "Indian travellers are hereby advised to refrain from travelling to China. Existing visas (including eVisa already issued) are no longer valid for any foreign national travelling from China.

The medium- and long term impact of such travel bans remain to be seen, but modelling studies suggest that in the short-term, these are unlikely to have meaningful impact on global transmission of SARS-CoV-2, unless sustained 90 per cent travel restrictions are implemented in combination with more than 50 per cent reduction in local transmission. Such bans may only provide a symbolic shield unless the ongoing outbreak is staunched. Ethical concerns of imposing such travel bans have also been questioned.

Coronavirus Diversity, Phylogeny and Interspecies Jumping

The SARS epidemic has boosted interest in research on corona virus biodiversity and genomics. Before 2003, there were only 10 corona viruses with complete genomes available. After the SARS epidemic, up to December 2008, there was an addition of 16 corona viruses with complete genomes sequenced. The diversity of corona viruses is a result of the infidelity of RNA-dependent RNA polymerase, high frequency of homologous RNA recombination, and the large genomes of corona viruses. Among all hosts, the diversity of corona viruses is most evidenced in bats and birds, which may be a result of their species diversity, ability to fly, environmental pressures, and habits of roosting and flocking. The present evidence supports that bat corona viruses are the gene pools of group 1 and 2 corona viruses, whereas bird corona viruses are the gene pools of group 3 corona viruses. With the increasing number of corona viruses, more and more closely related corona viruses from distantly related animals have been observed, which were results of recent interspecies jumping and may be the cause of disastrous outbreaks of zoonotic diseases.[25-27] Some identified examples of bats and birds were discovered **figure. 4** & **5**.

Chinese horseshoe bat (*Rhinolophus sinicus*) (A), from which bat-SARS-CoV and bat-CoV HKU2 were discovered; Lesser bamboo bat (*Tylonycteris pachypus*) (B), from which bat-CoV HKU4 was discovered; Leschenault's rousette (*Rousettus lechenaulti*) (C), from which bat-CoV HKU9 was discovered; Chinese Bulbul (*Pycnonotus sinensis*) (D) and Red-whiskered Bulbul (*Pycnonotus jocosus*) (E), from which BuCoV HKU11 was discovered; and Blackbird (*Turdus merula*) (F), from which ThCoV HKU12 was discovered.

WHO at the core of global response

WHO and the Global Research Collaboration for Infectious Disease Preparedness hosted a two-day meeting at WHO Headquarters in Geneva on February 11-12, 2020, which brought together major research funders and scientists from across the world "to assess the current level of knowledge about the new COVID-19 disease, identify gaps, and work together to accelerate and fund priority research needed to help stop this outbreak and prepare for any future outbreaks". A Global Surveillance for human infection for COVID-19 has been established by WHO, and globally, 16 laboratories have been identified for confirmatory referral testing. In South-East Asia Region, two laboratories in Thailand - NIH Nonthaburi and Armed Forces Research Institute of Medical Science Bangkok, and one in India - ICMR-NIV, have been identified for referral testing.

What problems do patients experience after leaving the hospital?

There are many. Patients may leave the hospital with scarring, damage or inflammation that still needs to heal in the lungs, heart, kidneys, liver or other organs. This can cause a range of problems, including urinary and metabolism issues.

Some have an intermittent cough that doesn't go away that makes it hard for them to breathe," he said.

Some are even on nasal oxygen at home, but it is not helping them enough.

Some patients who were on ventilators report difficulty swallowing or speaking above a whisper, a usually temporary result of bruising or inflammation from a breathing tube that passes through the vocal cords.

Nerve damage or weakness can also whittle away muscle strength, Needham said. Neurological problems can cause other symptoms, too. Chen said that Mount Sinai's post-COVID centre has referred nearly 40 percent of patients to neurologists for issues like fatigue, confusion and mental fogginess.

Emotional issues may be heightened for COVID-19 patients because of their days spent hospitalised without visits from family and friends, experts say.

"This experience of being extremely sick and extremely alone really amplifies the trauma," said Putrino, adding that many patients were contacting his program to ask for telemedicine psychology services. "They're saying, 'Listen, I'm not really myself and I need to speak with someone.'"

What makes someone more likely to face recovery challenges?

Studies of people hospitalized for respiratory failure from other causes suggest that recovery is more likely to be harder for people who were frail beforehand and for people who needed longer hospitalizations, Ferrante said.

But many other corona virus patients - not just those who are older or who have other medical conditions — are spending weeks on ventilators and weeks more in the hospital after their breathing tubes are removed, making their recovery hills steeper to climb.

Another factor that can extend or hamper recovery is a phenomenon called hospital delirium, a condition that can involve paranoid hallucinations and anxious confusion. It is more likely to occur in patients who undergo prolonged sedation, have limited social interaction and are unable to move around - all common among COVID-19 patients.

What is the trajectory of recovery?

Ups and downs are common.

"It's absolutely not a linear process, and it's very individualized," Needham said.

Perseverance is important.

"What we don't want is for patients to go home and lie in bed all day," Ferrante said. "That will not help with recovery and will probably make things worse."

Patients and their families should realize that fluctuations in progress are normal.

"There are going to be days where everything's going right with your lungs, but your joints are feeling so achy that you can't get up and do your pulmonary rehab and you have a few setbacks," Putrino said. "Or your pulmonary care is going OK, but your cognitive fog is causing you to have anxiety and causing you to spiral, so you need to drop everything and work with your neuropsychologist intensively."

How long do these issues last?

For many people, the lungs are likely to recover, often within months. But other problems can linger and some people may never make a full recovery, experts say.

One bench mark is a 2011 New England Journal of Medicine study of 109 patients in Canada who had been treated for acute respiratory distress syndrome, or ARDS, the kind of lung failure that afflicts many COVID-19 patients. Five years later, most had regained normal or near-normal lung function but still struggled with persistent physical and emotional issues.

The patients in the study had ARDS from a variety of causes, including pneumonia, sepsis, pancreatitis or burns. They had a median stay of 49 days in the hospital, including 26 days in the ICU and 24 days on a ventilator.

Psychological and cognitive symptoms can also linger. About half of the patients in the 2011 Canadian study reported at least one episode of "physician-diagnosed depression, anxiety, or both between two and five years of follow-up." And a study of patients treated in the 2003 outbreak of SARS, another type of corona virus, found that a year later many had "worrying levels of depression, anxiety, and post-traumatic symptoms."

What are the consequences?

Among other things, patients may have trouble going back to their jobs. A team led by Needham found that nearly one-third of 64 ARDS patients they followed for five years never returned to work.

Some tried but found that they couldn't do their jobs and stopped working altogether, Needham said, and others "had to change their occupation, specifically for a job that's less challenging and probably less pay."

"A new disease that's severe or a catastrophic event causes symptoms that last a long time," he said. "This is shaping up to be something that may be worse than both of those."

There may be "hundreds of thousands who are going to be afflicted with these chronic syndromes that may take a long time to heal, and that's going to be a very big health problem and also a big economic problem if we don't take care of them," Chen said.

What are hospitals doing to help patients when they go home?

Recovery programs for COVID-19 patients are cropping up at Mount Sinai, Yale, Johns Hopkins and elsewhere, offering patients telemedicine consultations and sometimes in-person appointments.

Some patients require medication to help with shortness of breath, heart problems or blood clotting. Ferrante said people should check medications with their doctors because some medicines they were given in the hospital may not be appropriate for patients to continue at home.

Physiatrists, doctors who specialise in physical rehabilitation, are likely to be increasingly in demand, experts say. So are neurologists and mental health therapists.

"I think the main take-home here is that post-COVID care is complex," Putrino said. "It's hard enough to rehabilitate someone with a broken leg where one thing is wrong."

"But with post-COVID care," he said, "you're dealing with people with some cognition issues, physical issues, lung issues, heart issues, kidney issues, trauma - and all of these things have to be managed just right."

Vaccine

There is no special vaccine for this yet. Only supportive therapy is the treatment strategy followed by health professionals. Supportive therapy includes administration of antipyretic and analgesic, maintenance of hydration, mechanical ventilation as respiratory support and uses of antibiotic in bacterial infections.

The WHO R&D blue print and its Working Group conveyed an informal consultation on prioritization of vaccine candidates against SARS-CoV-2 in Geneva on June 30, 2020 and identified at least five leading candidate vaccines for SARS-CoV-289.

Still health professionals were not fully satisfied with any therapy so further clinical research needed.

Convalescent Plasma Therapy

Convalescent plasma (kon-vuh-LES-unt PLAZ-muh) therapy is an experimental treatment that some doctors are using for people with severe corona virus disease 2019 (COVID-19).

No drug has been proved to be safe and effective for treating COVID-19.

The U.S. Food and Drug Administration (FDA) hasn't approved any drugs specifically to treat people with COVID-19.

But, people who've recovered from COVID-19 have antibodies - proteins the body uses to fight off infections- to the disease in their blood. The blood from people who've recovered is called convalescent plasma. Plasma is the liquid portion of the blood.

Researchers hope that convalescent plasma can be given to people with severe COVID-19 to boost their ability to fight the virus. It also might help keep people who are moderately ill from becoming more ill and experiencing COVID-19 complications.

If you've had COVID-19 and recovered from it, consider donating blood through the American Red Cross or your local donation center. Either can provide information about the donation process.

Convalescent plasma therapy carries the risk of:

- Allergic reactions
- Lung damage and difficulty breathing
- Transmission of infections, including HIV and hepatitis B and C

The risk of these infections is very low, because donated blood must meet certain requirements outlined by the FDA. Before donated blood can be used, it must be tested for safety. It then goes through a process to separate out blood cells so that all that's left is plasma with antibodies.

Although many people experience no symptoms, others have mild to severe medical complications that lead to death in some people.

What you can expect

Your doctor may consider you a candidate for convalescent plasma therapy if you're seriously ill with COVID-19 in the hospital. Your doctor will decide if it will be beneficial for you and may enroll you in the treatment program. If you or a family member has questions about convalescent plasma therapy, ask your doctor.

Your doctor will order convalescent plasma that is compatible with your blood type from your hospital's local blood supplier.

Before the procedure

Before convalescent plasma therapy, your health care team prepares you for the procedure. A health care team member inserts a sterile single-use needle connected to a tube (intravenous, or IV, line) into a vein in one of your arms.

During the procedure

When the plasma arrives, the sterile plasma bag is attached to the tube and the plasma drips out of the bag and into the tube. It takes about one to two hours to complete the procedure.

After the procedure

Because this investigational therapy hasn't yet been tested, you'll be closely monitored after the convalescent plasma procedure. Your doctor will record your response and reaction to the treatment. He or she may record how long you needed to stay in the hospital or if you needed help with breathing or other therapies following the convalescent plasma procedure.

RESULTS

It's not yet known if convalescent plasma therapy will be an effective treatment for COVID-19. You might not experience any benefit. However, this treatment might improve your ability to recover from the disease.

The collective results from people receiving convalescent plasma therapy can provide information about the effectiveness of the therapy and whether it can become an approved therapy to treat COVID-19. In preliminary treatment, many people have benefited from convalescent plasma therapy. Researchers continue to evaluate the results from people who received the therapy.

By studying results of this therapy for COVID-19, doctors are getting closer to finding a treatment. In addition, learning more about the use of convalescent plasma therapy now will help health care workers be better prepared to provide optimal patient care.

Figures

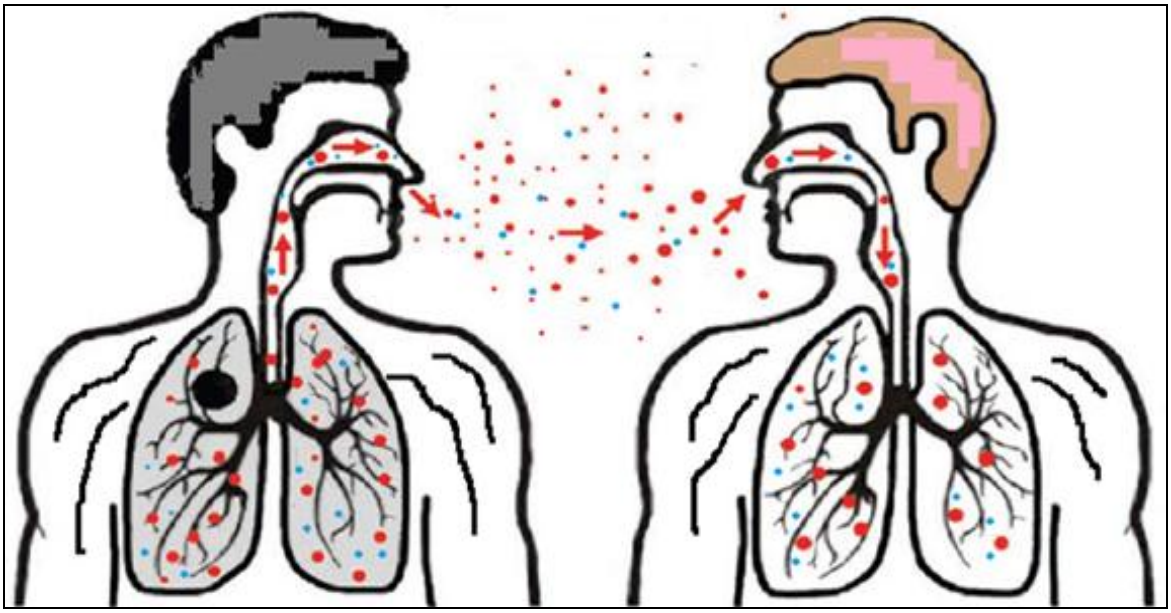

Fig. 1: Transmission of corona virus via airborne droplets.

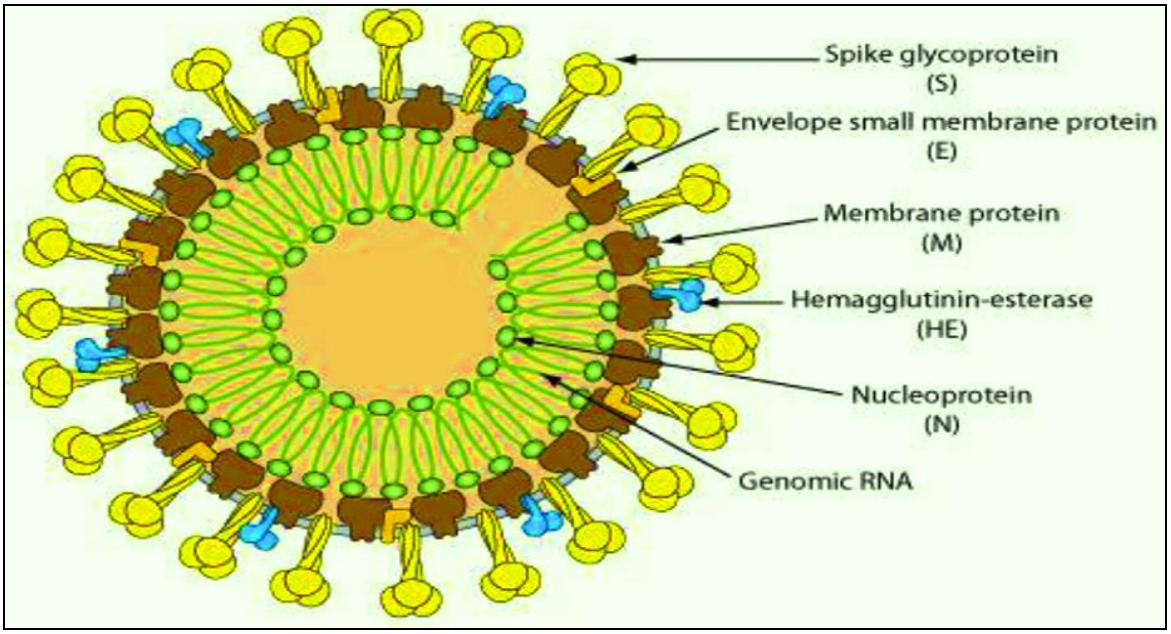

Fig. 2: Schematic of a corona virus this new virus probably looks a lot like this.

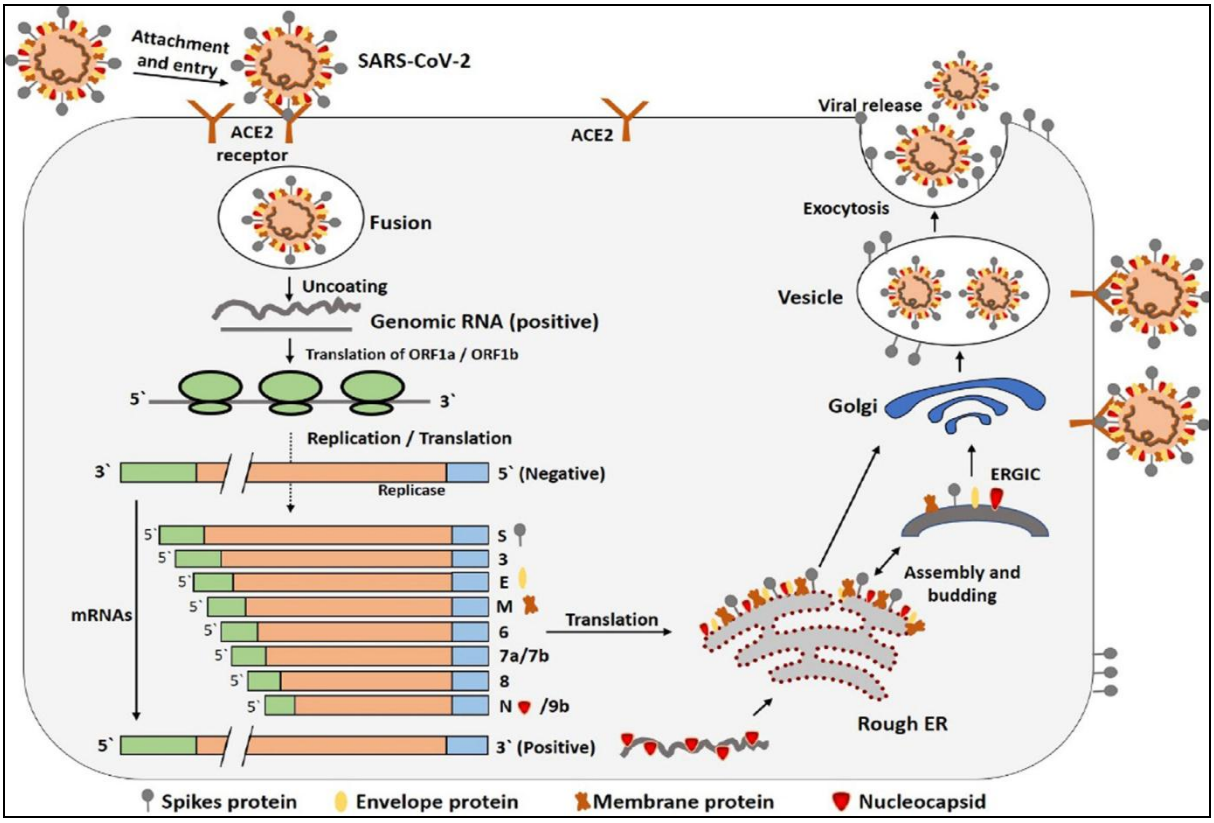

Fig. 3: The life cycle of SARS-CoV-2 in host cells; begins its life cycle when S protein binds to the cellular receptor ACE2. After receptor binding, the conformation change in the S protein facilitates viral envelope fusion with the cell membrane through the endosomal pathway.

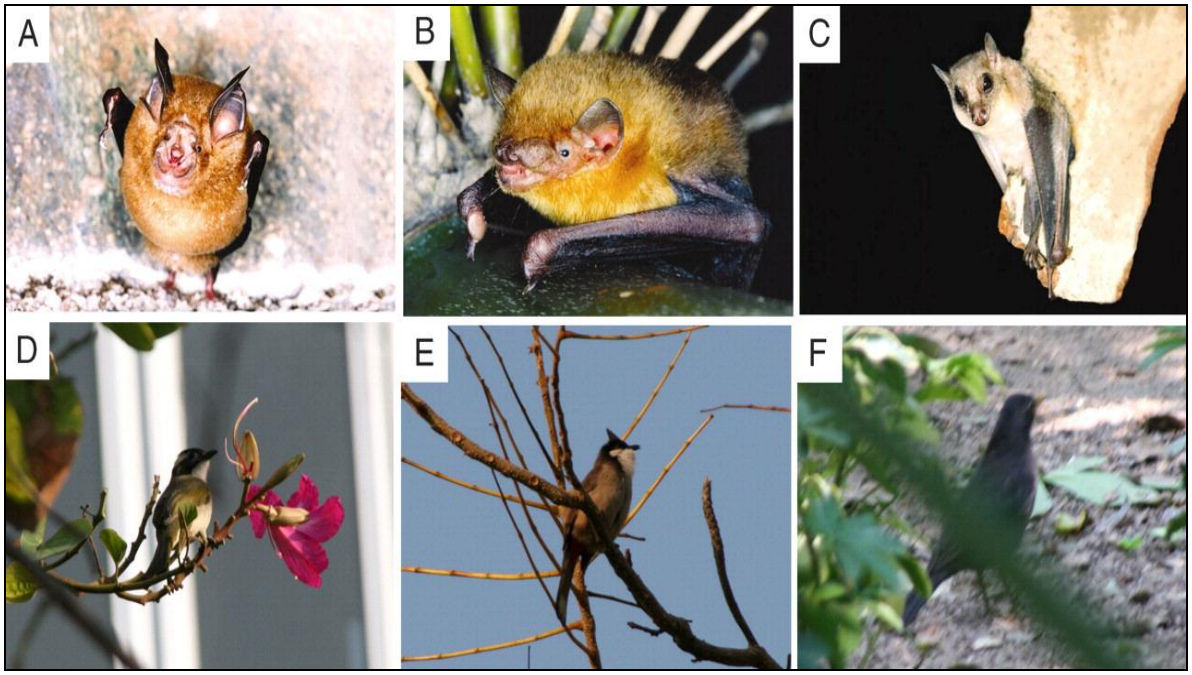

Fig. 4: Examples of bats and birds in Hong Kong from which novel corona viruses were discovered.

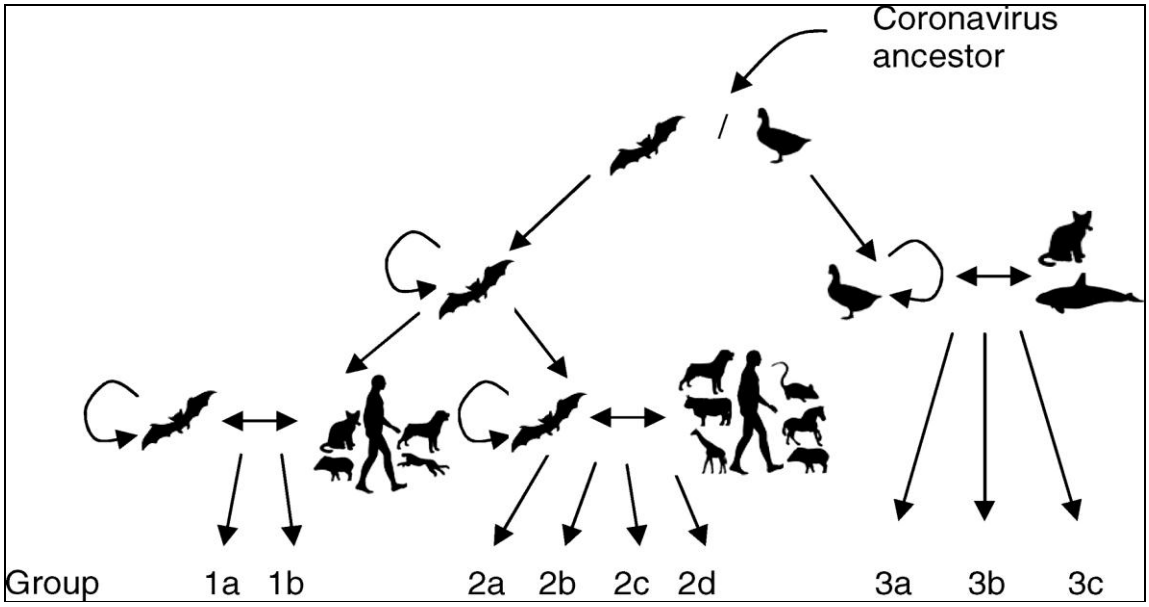

Fig. 5: A model of corona virus evolution. Corona viruses in bats are the hypothesized gene pool of group 1 and group 2 corona viruses and corona viruses in birds are the hypothesized gene pool of group 3 corona viruses.

CONCLUSIONS

Corona virus was spreading human to human to transmission by close contact via airborne droplets generating by coughing, sneezing, kissing and smooching. So avoid these activities with infected partners and family members.

This new virus outbreak has challenged the economic, medical and public health infrastructure of China and to some extent, of other countries especially, its neighbors. Time alone will tell how the virus will impact our lives here in India. More so, future outbreaks of viruses and pathogens of zoonotic origin are likely to continue. Therefore, apart from curbing this outbreak, efforts should be made to devise comprehensive measures to prevent future outbreaks of zoonotic origin.

The original source of the outbreak, the intermediate host, an effective treatment regimen, tools for early diagnosis in asymptomatic patients and tools to predict emergence of novel pathogens all remain elusive. Clinical trials have begun to identify vaccines and effective and safe treatment regimens, but efforts to identify drugs that can be repurposed and used, off-label, remain limited. Further, epidemiologic determinants and reservoirs which are likely responsible for the recent explosive case counts in Italy and Iran are yet to be identified.

The infectious disease threats of our times are far from over, and if these are to be contained with lower magnitudes of loss to human life and economy, we need to invest in building up people-centric health systems, which pre-empt and prevent, rather than work in reactive, feedback loops driven by the burden of human misery.

Conflict of Interest: None declared.

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