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NOVEL COVID 19: A GLOBAL PANDEMIC

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ABSTRACT

The term "Epidemic" means "a sudden outbreak of infectious disease that spreads rapidly through the population, affecting a large proportion of people". Similarly "Pandemic" is a technical word used to indicate "an epidemic so widely spread that vast number of people globally more than 200 countries are affected". These two words cause panic among the common citizen, cause extra ordinary alertness in the administration and raise brain storming situation among the researchers and scientists. In such situations the health workers have to stand as the soldiers to fight for the administration. They have to forget food, rest and sleep. Public co-operation is must to overcome such situations successfully. "COVID-19" the situation caused by the dreadful virus "CORONA" is now standing as the great challenge for the human society. Life of the citizen is in danger irrespective of age, sex, religion, caste , financial condition and profession. Starting from China it has already caused havoc in the developed countries and now affecting India. A novel coronavirus disease (COVID-19), triggered by infection with SARS-CoV-2, has flounced across 31 provinces in China and more than 200 countries worldwide globally. The transition from first symptoms to acute respiratory distress syndrome (ARDS) is extremely probable to be due to unrestrained cytokine release. There is a crucial need to classify safe and active drugs for action. Chloroquine (CQ) exhibitions an inhibitory effect. However, the clinical use of CQ can cause severe side effects. Moreover, hydroxyl-chloroquine (HCQ) also exhibits an antiviral effect highly similar to that of CQ, inhibiting the cytokine storm by suppressing T-cell activation. Coronavirus vaccine will be carry after clinical trials ahead in markets.

KEYWORDS: Novel Coronavirus19, Endemic, Pandemic, Disease 2019, Transmission, Diagnosis, Treatment Strategies, Vaccine, Preventive Measures, World Health Organisation.

INTRODUCTION

The Coronaviruses (CoV) originate their name from the element that under electron microscopic investigation, every virion is bounded by the corona. Coronaviruses (CoV) are a huge family of viruses that cause infection. ranging from the communal cold to new severe infections such as Severe Acute Respiratory Syndrome (SARS -CoV) and Middle East Respiratory Syndrome (MERS - CoV). So far, seven types of coronavirus are infecting people. Novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. This "novel" coronavirus is now officially called as Coronavirus Disease 2019 (COVID-19). COVID-19 belongs to the similar big family. Development analysis displays that they are under dissimilar subgroup branches with dissimilar genetic sequences.

Coronavirus disease (COVID-19) is an infectious disease caused by a novel discovered first case in Wuhan, China, in December 2019. Numerous people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Elderly and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

However, there are many ongoing clinical trials evaluating potential treatments.

The COVID-19 virus affects different people in different ways. COVID-19 is a respiratory disease and most infected people will develop mild to moderate symptoms and recover without requiring special treatment. People who have underlying medical conditions and those over 60 years old have a higher risk of developing severe

disease and death. Statistically, **coronavirus** COVID-19 is affecting more than 200 **countries and territories** around the globe, confirmed case more than 40,15,107 with casualty 23,51,361 while recovered 13,87,478 cases and deaths 2,76,268 **(Last updated: May 09, 2020, 12:35 GMT)**.

Novel coronavirus related information: MERS-CoV NEWMERS-CoV infection Novel Coronavirus 2012 (NCoV) Corona virus Human corona virus Corona virus symptoms Novel coronavirus infection New SARS-like Virus Coronavirus treatment SARS corona virus Spike protein Nucleo capsid Coronavirus replication Coronavirus hku1HCoV-EMC.

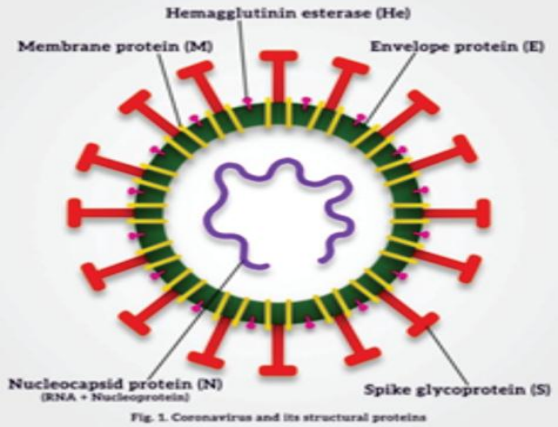

Fig. 1: COVID-19.

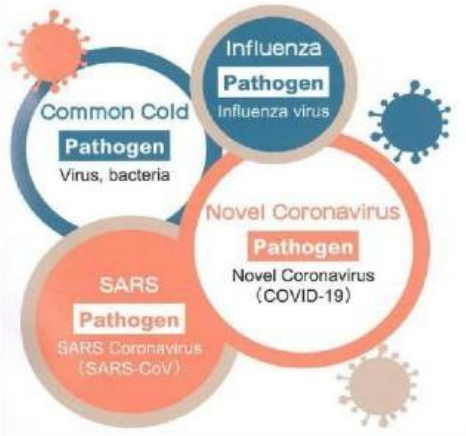

Fig. 2: Development of Novel Coronavirus analysis displays that they are under dissimilar subgroup branches with dissimilar genetic sequences

Mode of Transmission: Person-to-Person, COVID-19 is the source of respiratory disease and is generally transmitted in person-to-person. It can come about in the subsequent circumstances.

It is transmitted among the people who are in close contact with each other (approximately about 6 feet) through respiratory droplets created when diseased person coughs or sneezes, these droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. 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).

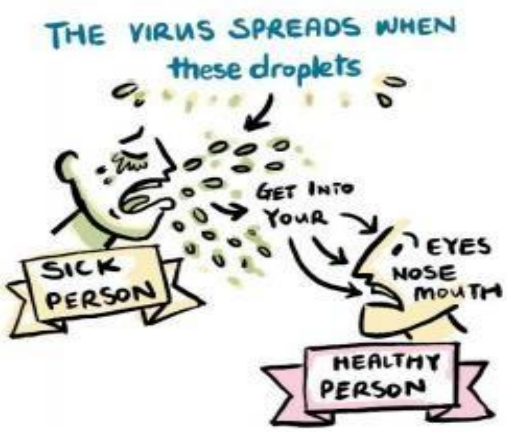

Fig. 3: Person-to-Person transmitted.

The spread of the COVID-19 pandemic across large number of nations is an unprecedented situation in recent times. To slow the spread of the disease and mitigate its impacts, travel advisories have been issued by many jurisdictions including India. However, shipping services are required to continue to be operational so that vital goods and essential commodities like fuel, medical supplies, food grains etc., are delivered and to ensure that the economic activity of the nation is not disrupted. It is, therefore, important that the flow of goods by sea should not be needlessly disrupted without compromising the safety of life and protection of the environment. In view of the same, it has been decided that for the continued operation of vessels and ports, the following shall be complied with by all stakeholders till further orders. The master of a vessel, before arrival at its first port of call in India, shall ascertain the state of health of each person on board the vessel and submit the Maritime Declaration of Health to the concerned health authorities of the port and to the port authorities. The format of the Maritime Declaration of Health shall be as per Annex 8 of the International Health Regulations 2005, issued by World Health Organisation which has also been adopted by International Maritime Organization by the FAL Convention at section A Copy of the model Maritime Declaration of Health is enclosed.

The Maritime Declaration of Health shall be forwarded at least 72 hours prior arrival of the vessel at the port. If the voyage duration from last port of departure is less

than 72hours, the Maritime Declaration of Health shall be informed to the port immediately on departure from the port. In addition, the information required by the local health authorities of the port like temperature chart, individual health declaration etc. shall also be provided by the master as per the directives of the local health authorities of the port. If the master of the vessel ascertains that a person on board the vessel is exhibiting symptoms of COVID-19, the same shall be explicitly mentioned in the Maritime Declarationof Health being forwarded to the health authorities and to the port. If the maritime declaration of health given by the master is found to be incorrect andnot reflecting the factual conditions of health of persons on board the vessel, the master is liable to be prosecuted as per applicable laws. All agents of the vessel shall ensure that this information regarding possible prosecution for incorrect declaration is clearly informed to the vessel before its arrival at Indian ports. In case of any suspected person on board the vessel, the master shall ensure that the suspected person is isolated in the ship's hospital, or other suitable location on the vessel. All other persons who may have come in contact with the suspected person shall also be isolated at appropriate locations as decided by the master. The master shall also ensure that all instructions issued by the Ministry of Health and Family Welfare, Govt. of India, as well as the guidance issued on dealing with COVID-19 matters by World Health Organization (WHO), International Maritime Organization (IMO) and other applicable trade bodies are complied with at all times. Vessels having persons suspected of COVID-19 will necessarily be required to be monitored by the health authorities and put in quarantine, if necessary. Samples from the suspected person will be taken and tested as per the instructions of the health authorities. If the samples are tested positive, the vessel will remain in quarantine and the infected person(s)will be dealt with as per the procedures laid down by MoHFW, Govt. of India. Vessels with infected person shall also be sanitized as per the extant protocols for dealing with COVID-19 pandemic. In case of medical emergency, the health authorities shall supervise transport of the patient to the designated hospital as per the procedures laid down by MoHFW, Govt. of India. In the unfortunate incident for a vessel to deal with deceased person suspected of having COVID-19, the guidelines on dead body management issued by MoHFW, Govt. of India will apply. Vessels arriving from ports of infected countries identified for mandatory quarantine and travel ban by MoHFW, Govt. of India before 14 days of departure from the infected port, or having seafarers embarked on the vessel who have been in infected regions within 14 days of arrival at any Indian port shall need to comply with additional measures. The updated list of infected countries may be obtained from the website of MoHFW, Govt. of India. Vessels arriving from any port in China to have the necessary quarantine periods of 14days.Stoppages of a vessel at any port of infected countries only for bunkering purposes shall not be counted for the calculation of 14 days from port of departure. Vessels that have arrived at Indian port after 14 days of departure from an infected port need not comply with the additional requirements which are not able not comply with the additional requirements shall not allow the vessels to berth for vessels which have arrived within 14 days from the infected countries. Pilot shall normally not be assigned to any vessel unless pratique is granted to the vessel. Prior boarding the vessel, the master of the vessel shall reconfirm to the pilot that all persons on board the vessel are healthy and there are no suspected cases of persons infected by COVID-19 on board the vessel. The master of the vessel shall also ensure that all the areas through which the pilot is likely to pass are appropriately disinfected and sanitized as per the required protocol and shall further confirm about the same to the pilot before the pilot boards the vessel. All ships personnel who are likely to interact with the pilot should be wearing appropriate Personal Protective Equipment (PPE). In addition, the bridge team shall be wearing appropriate PPE at all times while the pilot is on the vessel. Pilot shall also be wearing appropriate Personal Protection Equipment (PPE). Merging and reemerging pathogens are global challenges for public health.1 Coronaviruses are enveloped RNA viruses that are distributed broadly among humans, other mammals, and birds and that cause respiratory, enteric, hepatic, and neurologic diseases.2,3 Six coronavirus species are known to cause human disease.4 Four viruses — 229E, OC43, NL63, and HKU1— are prevalent and typically cause common cold symptoms in immunocompetent individuals.4 The two other strains — severe acute respiratory syndrome coronavirus (SARS- CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) — are zoonotic in origin and have been linked to sometimes fatal illness.5 SARS-CoV was the causal agent of the severe acute respiratory syndrome outbreaks in 2002 and 2003 in Guangdong Province, China.6- 8 MERS-CoV was the pathogen responsible for severe respiratory disease outbreaks in 2012 in the Middle East.9 Given the high prevalence and wide distribution of coronaviruses, the large genetic diversity and frequent recombination of their genomes, and increasing human–animal interface activities, novel coronaviruses are likely to emerge periodically in humans owing to frequent cross-species infections and occasional spillover events.5,10In late December 2019, several local health facilities reported clusters of patients with pneumonia of unknown cause that were epidemiologically linked to a seafood and wet animal wholesale market in Wuhan, Hubei Province, China.11 On December 31, 2019, the Chinese Center for Disease Control and Prevention (China CDC) dispatched a rapid response team to accompany Hubei provincial and Wuhan city health authorities and to conduct an epidemiologic and etiologic investigation. We report the results of this investigation, identifying the source of the pneumonia clusters, and describe a novel coronavirus detected in patients with pneumonia whose specimens were tested by the China CDC at an early stage of the outbreak. We also describe clinical features of the pneumonia in two of these patients. 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.

Viral diagnostic methods: Four lower respiratory tract samples, including bronchoalveolar-lavage fluid, were collected from patients with pneumonia of unknown cause who were identified in Wuhan on December 21, 2019, or later and who had been present at the Huanan Seafood Market close to the time of their clinical presentation. Seven bronchoalveolar- lavage fluid specimens were collected from patients in Beijing hospitals with pneumonia of known cause to serve as control samples. Extraction of nucleic acids from clinical samples (including uninfected cultures that served as negative controls) was performed with a High Pure Viral Nucleic Acid Kit, as described by the manufacturer (Roche). Extracted nucleic acid samples were tested for viruses and bacteria by polymerase chain reaction (PCR), using the RespiFinderSmart22kit (PathoFinder BV) and the Light Cycler 480 real-time PCR system, in accordance with manufacturer instructions.12 Samples were analyzed for 22 pathogens (18 viruses and 4 bacteria) as detailed in the Supplementary Appendix. In addition, unbiased, high-throughput sequencing, described previously, 13 was used to discover microbial sequences not identifiable by the means described above. A real-time reverse transcription PCR (RT-PCR) assay was used to detect viral RNA by targeting a consensus RdRp region of pan β-CoV, as described in the Supplementary.

Isolation of virus: Bronchoalveolar-lavage fluid samples were collected in sterile cups to which virus transport medium was added. Samples were then centrifuged to remove cellular debris. The supernatant was inoculated on human airway epithelial cells, 13 which had been obtained from airway specimens resected from patients undergoing surgery for lung cancer and were confirmed to be special-pathogen-free by NGS. 14 Human airway epithelial cells were expanded on plastic substrate to generate passage-1 cells and were subsequently plated at a density of 2.5×105 cells per well on permeable Transwell-COL (12-mm diameter) supports. Human airway epithelial cell cultures were generated in an air–liquid interface for 4 to 6 weeks to form well-differentiated, polarized cultures resembling in vivo pseudo stratified mucociliary epithelium.

Prior to infection, apical surfaces of the human airway epithelial cells were washed three times with phosphate-buffered saline; 150 µl of supernatant from bronchoalveolar-lavage fluid samples was inoculated onto the apical surface of the cell cultures. After a 2-hour incubation at 37°C, unbound virus was removed by washing with 500 µl of phosphate-buffered saline for 10 minutes; human airway epithelial cells were maintained in an air–liquid interface incubated at 37°C with 5% carbon dioxide. Every 48 hours, 150 µl of phosphate-buffered saline was applied to the apical surfaces of the human airway epithelial cells, and after 10 minutes of incubation at 37°C the samples were harvested. Pseudostratified mucociliary epithelium cells were maintained in this environment; apical samples were passaged in a 1:3 diluted vial stock to new cells. The cells were monitored daily with light microscopy, for cytopathic effects, and with RT-PCR, for the presence of viral nucleic acid in the supernatant. After three passages, apical samples and human airway epithelial cells were prepared for transmission electron microscopy.

Transmission electron Microscopy: Supernatant from human airway epithelial cell cultures that showed cytopathic effects was collected, inactivated with 2% paraformaldehyde for at least 2 hours, and ultracentrifuged to sediment virus particles. The enriched supernatant was negatively stained on film- coated grids for examination. Human airway epithelial cells showing cytopathic effects were collected and fixed with 2% paraformaldehyde– 2.5% glutaraldehyde and were then fixed with 1% osmium tetroxide dehydrated with grade ethanol embedded with PON812 resin. Sections (80 nm) were cut from resin block and stained with uranyl acetate and lead citrate, separately. The negative stained grids and ultrathin sections were observed under transmission electron microscopy.

Viral Genome Sequencing: RNA extracted from bronchoalveolar-lavage fluid and culture supernatants was used as a template to clone and sequence the genome. We used a combination of Illumina sequencing and nanopore sequencing to characterize the virus genome. Sequence reads were assembled into contig maps (a set of overlapping DNA segments) with the use of CLC Genomics software, version 4.6.1 (CLC Bio). Specific primers were subsequently designed for PCR, and 5′- or 3′-RACE (rapid amplification of cDNA ends) was used to fill genome gaps from conventional Sanger sequencing. These PCR products were purified from gels and sequenced with a BigDye Terminator v3.1 Cycle Sequencing Kit and a 3130XL Genetic Analyzer, in accordance with the manufacturers' instructions. Multiple-sequence alignment of the 2019-nCoV and reference sequences was performed with the use of Muscle. Phylogenetic analysis of the complete genomes was performed with RAxML (13) with 1000 bootstrap replicates and a general time-reversible model used as the nucleotide substitution model.

Detection and isolation of a novel coronavirus: Three bronchoalveolar-lavage samples were collected from Wuhan Jinyintan Hospital on December 30, 2019. No specific pathogens (including HCoV-229E, HCoV-NL63, HCoV-OC43, and HCoV-HKU1) were detected in clinical specimens from these patients by the RespiFinderSmart22kit. RNA extracted from bronchoalveolar-lavage fluid from the patients was used

as a template to clone and sequence a genome using a combination of Illumina sequencing and nanopore sequencing. More than 20,000 viral reads from individual specimens were obtained, and most contigs matched to the genome from lineage B of the genus betacoronavirus — showing more than 85% identity with a bat SARS-like CoV (bat-SL- CoVZC45, MG772933.1) genome published previously. Positive results were also obtained with use of a real-time RT-PCR assay for RNA targeting to a consensus RdRp region of pan β- CoV (although the cycle threshold value was higher than 34 for detected samples). Virus isolation from the clinical specimens was performed with human airway epithelial cells and Vero E6 and Huh-7 cell lines. The isolated virus was named 2019-nCoV.

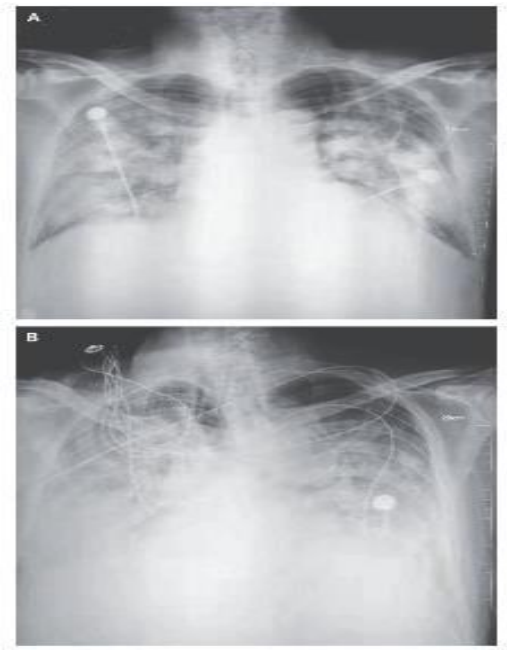

Fig. 4: Chest Radiographs.

Indirect transmission: A person can possibly get COVID-19 by touching a surface or an object (e.g. doorknobs and table) that has the virus on it and then touching his own mouth, nose, or eyes.

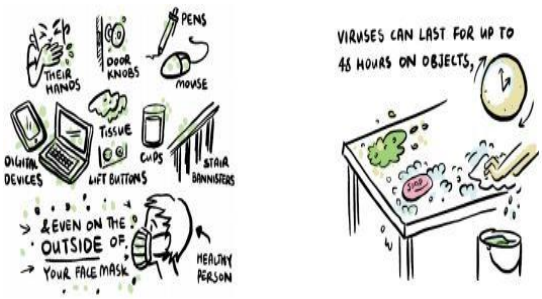

Fig. 5: Contact with Infected Surfaces or Objects.

Physical Signs & Symptoms for COVID-19: Reported illnesses have ranged from mild symptoms to severe illness and death for confirmed coronavirus disease 2019 (COVID-19) cases. The following symptoms may appear 2-14 days after exposure: The main symptoms include: Fever, Coughing, Shortness of breath, Fatigue, Chills, sometimes with shaking, Body aches, Headache, Sore throat, Loss of smell or taste, Nausea, Diarrhea.

Fig. 6: Physical Signs & Symptoms for COVID- 19.

The virus can lead to pneumonia, respiratory failure, septic shock, and death. Many COVID-19 complications may be caused by a condition known as cytokine release syndrome or a cytokine storm. This is when an infection triggers your immune system to flood your bloodstream with inflammatory proteins called cytokines. They can kill tissue and damage your organs. If you notice the following severe symptoms in yourself or a loved one, get medical help right away, Trouble breathing or shortness of breath, Ongoing chest pain or pressure, New confusion, Can't wake up fully, Bluish lips or face.

Strokes have also been reported in some people who have COVID-19. Remember FAST:

- **Face.** Is one side of the person's face numb or drooping? Is their smile lopsided?
- **Arms.** Is one arm weak or numb? If they try to raise both arms, does one arm sag?
- **Speech.** Can they speak clearly? Ask them to repeat a sentence.
- **Time.** Every minute counts when someone shows signs of a stroke. Call 911 right away.

If you're infected, symptoms can show up in as few as 2 days or as many as 14. It varies from person to person. According to researchers in China, these were the most common symptoms among people who had COVID-19: Fever 99%, Fatigue 70%, Cough 59%, Lack of appetite 40%, Body aches 35%, Shortness of breath 31%, Mucus/phlegm 27%. Some people who are hospitalized for COVID-19 have also have dangerous blood clots, including in their legs, lungs, and arteries.

Vulnerability

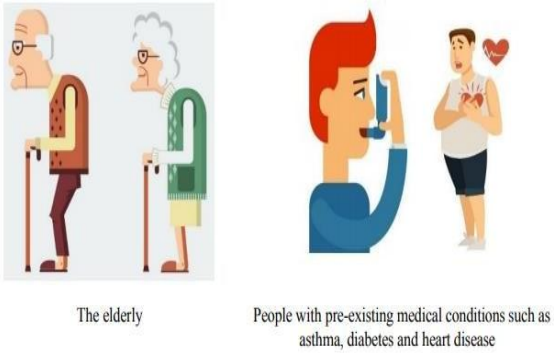

Fig. 7: People of all ages can be infected.

People at High Risk: Anyone can get COVID-19, and most infections are usually mild, especially in children and young adults. But if you aren't in an area where COVID-19 is spreading, haven't traveled from an area where it's spreading, and haven't been in contact with someone who has it, your risk of infection is low. People over 65 years are most likely to get a serious illness, as are those who live in nursing homes or long-term care facilities, who have weakened immune systems, or who have medical conditions including, High blood pressure, Heart disease, Lung disease, Asthma, Kidney disease that needs dialysis, Obesity, Diabetes, Cancer treatment, especially chemotherapy, Liver disease, Cigarette smoking. Close contact is a person who, for example, has stayed in the same cabin, participated in common activities, dined together, a cabin steward, or someone who has a contact within 1 meter or was in the closed environment with the suspect/ confirmed COVID-19.

Incubation Period: Transmission may occur during the incubation period before a person shows signs of sickness. The incubation period of the virus is the time between the exposure and the display of symptoms. Current information suggests that the incubation period ranges from 1 to 12.5 days (with median estimates of 5 to 6 days), but can be as long as 14 days.

Coronavirus Diagnosis: You've been exposed and have symptoms like: Fever of 100 F or higher, Cough, Trouble breathing. In most states, decisions about who gets tested for COVID-19 are made at the state or local level. A swab test looks for signs of the virus in your upper respiratory tract. The person giving the test puts a swab up your nose to get a sample from the back of your nose and throat. That sample usually goes to a lab that looks for viral material, but some areas may have rapid tests that give results in as little as 15 minutes. If there are signs of the virus, the test is positive. A negative test could mean there is no virus or there wasn't enough to measure. That can happen early in an infection. It usually takes 24 hours to get results, but the tests must be collected, stored, shipped to a lab, and processed. The FDA is working with laboratories nationwide to develop more tests.

The agency is also granting emergency use authorizations to let doctors use tests it has yet to approve. These include tests that check your blood for things called antibodies. Your immune system makes antibodies in response to an infection. A swab test can only tell whether you have the virus in your body at that moment. But an antibody test can show whether you've ever been exposed to the virus, even if you didn't have symptoms. This is important in officials' efforts to learn how widespread COVID-19 is. In time, it might also help them figure out who's immune to the virus.

Patients: Three adult patients presented with severe pneumonia and were admitted to a hospital in Wuhan on December 27, 2019. Patient 1 was a 49-year-old woman, Patient 2 was a 61-year-old man, and Patient 3 was a 32-year-old man. Clinical profiles were available for Patients 1 and 2. Patient 1 reported having no underlying chronic medical conditions but reported fever (temperature, 37°C to 38°C) and cough with chest discomfort on December 23, 2019. Four days after the onset of illness, her cough and chest discomfort worsened, but the fever was reduced; a diagnosis of pneumonia was based on computed tomographic (CT) scan. Her occupation was retailer in the seafood wholesale market. Patient 2 initially reported fever and cough on December 20, 2019; respiratory distress developed 7 days after the onset of illness and worsened over the next 2 days (see chest radiographs, Figure 4), at which time mechanical ventilation was started. He had been a frequent visitor to the seafood wholesale market. Patients 1 and 3 recovered and were discharged from the hospital on January 16, 2020. Patient 2 died on January 9, 2020. No biopsy specimens were obtained.

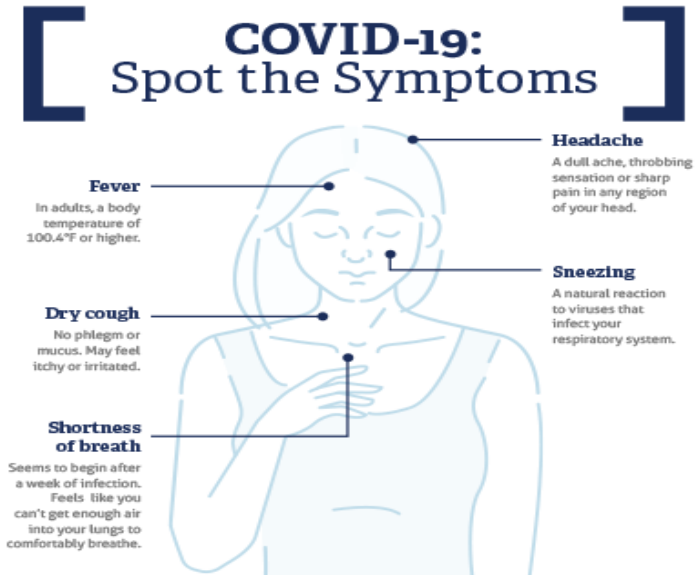

Fig. 8: Covid- 19 symptoms.

Coronavirus Treatment: There's no specific treatment for COVID-19. People who get a mild case need care to ease their symptoms, like rest, fluids, and fever control. Take over-the-counter medicine for a sore throat, body aches, and fever. But don't give aspirin to children or teens younger than 19. You might have heard that you shouldn't take ibuprofen to treat COVID-19 symptoms. But the National Institutes of Health says people who have the virus can use nonsteroidal anti-inflammatory drugs (NSAIDs) or acetaminophen as usual. Antibiotics won't help because they treat bacteria, not viruses. If you hear about people with COVID-19 getting antibiotics, it's for an infection that came along with the disease. People with severe symptoms need to be cared for in the hospital.Many clinical trials are under way to explore treatments used for other conditions that could fight COVID-19 and to develop new ones.Several studies are focused on an antiviral medication called remdesivir, which was created to fight Ebola. An emergency FDA ruling lets doctors use it for people hospitalized with COVID-19 and in clinical trials. Researchers in the U.S. say remdesivir helped patients in one study recover from the disease 31% faster. The FDA also issued an emergency use ruling for hydroxychloroquine and chloroquine. These medications are approved to treat malaria and autoimmune conditions like rheumatoid arthritis and lupus. Studies on their use against COVID-19 have had mixed results, and research is ongoing. Clinical trials are also under way for tocilizumab, another medication used to treat autoimmune conditions. And the FDA is also allowing clinical trials and hospital use of blood plasma from people who've had COVID-19 and recovered to help others build immunity. You'll hear this called convalescent plasma.

Chloroquine and hydroxychloroquine Fight against COVID-19: Chloroquine is a quinine analogue medication used to prevent and to treat malaria in areas where malaria is known to be sensitive to its effects. Certain types of malaria, resistant strains, and complicated cases typically require different or additional medication. So, Chloroquine and Hydroxy-chloroquine have been available as weapons to fight against COVID-19. Repositioning of drugs for use as antiviral treatments is a critical need. It is commonly very badly perceived by virologists, as we experienced when reporting the effectiveness of azithromycin for Zika virus. A response has come from China to the respiratory disease caused by the new coronavirus (SARS- CoV-2) that emerged in December 2019 in this country. Indeed, following the very recent publication of results showing the *in vitro* activity of chloroquine against SARS-CoV-2, data have been reported on the efficacy of this drug in patients with SARS-CoV-2-related pneumonia (named COVID-19) at different levels of severity. Indeed, following the *in vitro* results, 20 clinical studies were launched in several Chinese hospitals. The first results obtained from more than 100 patients showed the superiority of chloroquine compared with treatment of the control group in terms of reduction of exacerbation of pneumonia, duration of symptoms and delay of viral clearance, all in the absence of severe side effects. This has led in China to include chloroquine in the recommendations regarding the prevention and treatment of COVID-19 pneumonia. This a literary study aimed to search whether there is any concept of disease that can be co-related with infectious disease/ epidemic disease/pandemic disease . If such concept is there then what opinion is given by the experts about the eatiological factors, signs -symptoms, treatment and preventive measures.

Pharmacological treatments with potential clinical benefit: Remdesivir (GS-5734): Remdesivir is an investigational monophosphoramidate prodrug of an adenosine analog that was developed by Gilead Sciences, Inc. in response to the Ebola outbreak in West Africa from 2014-2016. In its active triphosphate nucleoside form, remdesivir binds to RNA-dependent RNA polymerase and acts as an RNA-chain terminator. It displays potent in vitro activity against SARS-CoV-2 with an EC_{50} at 48 hours of 0.77 µM in Vero E6 cells. 3 Similar activities have been demonstrated against other zoonotic coronaviruses with EC50 values of 0.07 µM demonstrated for both SARS-CoV-1 and MERS-CoV. Remdesivir is highly selective for viral polymerases and is therefore expected to have a low propensity to cause human toxicity. Accordingly, Sheahan and colleagues demonstrated a wide therapeutic index for remdesivir in a human airway epithelial cell model.6 The drug also displays a high genetic barrier to resistance in coronaviruses and has a long intracellular half- life that allows for once daily dosing. The dose under investigation for treatment of COVID-19 is 200mg intravenously (IV) on day 1 followed by 100mg IV daily for up to 10 days, infused over 30-60 minutes.

Lopinavir/ritonavir: Lopinavir is a human immunodeficiency virus 1 (HIV-1) protease inhibitor administered in fixed-dose combination with ritonavir (LPV/r), a potent CYP3A4 inhibitor that "boosts" lopinavir concentrations. Lopinavir appears to block the main protease of SARS-CoV-1, inhibiting viral replication. In 2003, Chu and colleagues evaluated a series of antivirals for in vitro activity against SARS-CoV-1. They reported lopinavir at 4 mg/mL and ribavirin at 50 mg/mL inhibited SARS-CoV-1 after 48 hours of incubation and that the agents were synergistic when used together. de Wilde and colleagues later described the antiviral activity of lopinavirus against SARS-CoV-1 and demonstrated an EC50 17.1 ± 1 in Vero E6 cells which is near the upper range of LPV plasma concentrations previously measured in patients with HIV infected patients. 24,25 Sheahan and colleagues evaluated the in vitro efficacy of LPV/r in combination with interferon beta (INFb) against MERS-CoV and found the addition of LPV/r did not significantly enhance antiviral activity of INFb alone (EC50 =160 IU/mL vs 175 IU/mL, respectively).5 They also described the EC50 of LPV/r (8.5 µM) and LPV alone (11.6 µM), suggesting similar activity to that described for SARS

CoV-1. Despite in vitro activity against MERS-CoV, therapeutic doses of LPV/r + INFb in mice models failed to reduce virus titer and exacerbated lung disease. This is notable as this was the same study where remdesivir demonstrated both more potent in vitro activity as well as in vivo efficacy. However, the in vivo animal data for MERS- CoV appears equivocal given a nonhuman primate model demonstrated improved clinical and pathological features following LPV/r treatment. A randomized controlled trial of LPV/r and recombinant interferon-β1b versus placebo is currently enrolling for patients with MERS-CoV, which might help clarify the apparent discrepancy between in vitro and animal models.

Plasma therapy: Several countries, including India, are seriously looking at plasma therapy as a potential treatment for Covid-19, the disease caused by the novel coronavirus. Plasma therapy uses blood donated by recovered patients to introduce antibodies in those under treatment. We take a look at what convalescent plasma therapy is, the benefits and risks involved in the potential treatment, what past research says about it, and more. Plasma therapy's potential as treatment for Covid-19 has already been explored in limited trial in China, where the outbreak first emerged. In **one trial**, 10 critically-ill Covid-19 patients were subject to convalescent plasma therapy. The trial showed some improvement in patients' condition. "No severe adverse effects were observed. The convalescent plasma therapy uses antibodies developed within an infected person while he/she is infected with the novel coronavirus. These antibodies are developed in a patient as part of the body's natural immune response to a foreign pathogen or in this case, the novel coronavirus. These antibodies are highly specific to the invading pathogen and so, work to eliminate the novel coronavirus from the patient's body. This study showed CP [convalescent plasma] therapy was well tolerated and could potentially improve the clinical outcomes through neutralizing viremia [the presence of viruses in the blood] in severe Covid-19 cases," the researchers who conducted the trial said. After China and the US, India has given a go ahead for framing a protocol to conduct a clinical trial for convalescent plasma therapy. The therapy has been used experimentally in the past and so has become a ray of hope in the fight against the novel coronavirus pandemic.

Antibody Treatment for corona Virus: JERUSALEM (Reuters) - Israel has isolated a key coronavirus antibody at its main biological research laboratory, calling the step a "significant breakthrough" toward a possible treatment for the COVID-19 pandemic. The "monoclonal neutralising antibody" developed at the Israel Institute for Biological Research (IIBR) "can neutralise it (the disease-causing coronavirus) inside carriers' bodies," The IIBR was briefed "on a significant breakthrough in finding an antidote for the coronavirus". The antibody formula was being patented, after which an international manufacturer would be sought to mass-produce it. The IIBR has been leading Israeli efforts to develop a treatment and vaccine for the coronavirus, including the testing of blood from those who recovered from COVID-19, the respiratory disease caused by the virus. Antibodies in such samples - immune-system proteins that are residues of successfully overcoming the coronavirus - are widely seen as a key to developing a possible cure. The antibody reported as having been isolated at the IIBR is monoclonal, meaning it was derived from a single recovered cell and is thus potentially of more potent value in yielding a treatment. Elsewhere, there have been coronavirus treatments developed from antibodies that are polyclonal, or derived from two or more cells of different ancestry, the magazine Science Direct reported in its May issue. Israel was one of the first countries to close its borders and impose increasingly stringent restrictions on movement to hamper the domestic coronavirus outbreak.

In Refeneces: Israel Institute for Biological Research (IIBR) (2020): The"monoclonal neutralising antibody development (the disease-causing coronavirus).

Coronavirus Vaccine: There's no vaccine, but intense research has been underway around the world since scientists shared the virus' genetic makeup in January 2020. Vaccine testing in humans started with record speed in March 2020. More than 100 vaccine projects are in various phases of development. One vaccine candidate that's in human trials, developed in part at Oxford University, uses a weakened version of the common cold virus that's been mixed with part of SARS-CoV-2**.**

The current threat of avian- influenza to the human population, the potential for the reemergence of severe acute respiratory syndrome (SARS)-associated coronavirus, and the identification of multiple novel respiratory viruses underline the necessity for the development of therapeutic and preventive strategies to combat viral infection. Vaccine development is a key component in the prevention of widespread viral infection and in the reduction of morbidity and mortality associated with many viral infections. In this part, coronavirus vaccine, especially SARS- CoV vaccines are mainly discussed. Coronavirus vaccines can be inactivated coronavirus, live attenuated coronavirus, or S protein-based. Besides, there are still vectored vaccines, DNA vaccines, and combination vaccines against coronaviruses. Vaccines targeting several animal CoVs have been developed, and some have been demonstrated to be efficacious in preventing viral infection. However, a phenomenon of enhanced disease following vaccination has been observed in cats upon infection with feline infectious peritonitis virus following previous infection, vaccination, or passive transfer of antibody. The phenomenon is not fully understood but is believed to be a result of enhanced uptake and spread of the virus through binding of virus- antibody immune complexes to Fc receptors on the surfaces of macrophages; low-titer (subneutralizing) antibodies directed against the S

protein are mainly responsible. Although antibody enhancement appears to be limited to feline infectious peritonitis virus among CoVs, similar concerns have been raised with regard to SARS-CoV. Previously infected mice and hamsters are protected from subsequent infection with SARS-CoV in the absence of enhanced disease, and vaccine studies and passive immunoprophylaxis performed with mice and hamsters suggest that previous exposure and the presence of NAbs provide protection.

Inactivated Coronavirus Vaccine: The immunogenicity and efficacy of inactivated SARS-CoV vaccines have been established in experimental animals, and one such vaccine is being evaluated in a clinical trial. However, the development of inactivated vaccines requires the propagation of high titers of infectious virus, which in the case of SARS-CoV requires biosafety level 3-enhanced precautions and is a safety concern for production. Additionally, incomplete inactivation of the vaccine virus presents a potential public health threat. Production workers are at risk for infection during handling of concentrated live SARS- CoV, incomplete virus inactivation may cause SARS outbreaks among the vaccinated populations, and some viral proteins may induce harmful immune or inflammatory responses, even causing SARS-like diseases.

Live Attenuated Coronavirus Vaccine: To date, live attenuated vaccines for SARS-CoV have not been evaluated. However, systems have been developed to generate cDNAs encoding the genomes of CoVs, including SARS-CoV. The panel of cDNAs spanning the entire CoV genome can be systematically and directionally assembled by in vitro ligation into a genome-length cDNA from which recombinant virus can be rescued. This system has been used for genetic analysis of SARS- CoV protein functions and will enable researchers to engineer specific attenuating mutations or modifications into the genome of the virus to develop live attenuated vaccines. While live attenuated vaccines targeting respiratory viruses, including influenza viruses and adenoviruses, have been approved for use in humans, the observation that infectious virus is shed in the feces of SARS-CoV-infected individuals raises concerns that a live attenuated SARS-CoV vaccine strain may also be shed in feces, with potential to spread to unvaccinated individuals. Another concern is the risk of recombination of a live attenuated vaccine virus with wild-type CoV; however, there may be ways to engineer the genome of the vaccine virus to minimize this risk.

S-Protein-based Coronavirus Vaccine: The roles of S protein in receptor binding and membrane fusion indicate that vaccines based on the S protein could induce antibodies to block virus binding and fusion or neutralize virus infection. Among all structural proteins of SARS-CoV, S protein is the main antigenic component that is responsible for inducing host immune responses, neutralizing antibodies and/or protective immunity against virus infection. S protein has therefore been selected as an important target for vaccine and anti-viral development. Although full-length S protein-based SARS vaccines can induce neutralizing antibody responses against SARS-CoV infection, they may also induce harmful immune responses that cause liver damage of the vaccinated animals or enhanced infection after challenge with homologous SARS-CoV, raising concerns about the safety and ultimate protective efficacy of vaccines that contain the full-length SARS-CoV S protein.

Vectored Vaccines against Coronavirus: Several groups have reported preclinical evaluation of vaccines utilizing other viruses as vectors for SARS-CoV proteins, including a chimeric parainfluenza virus, MVA, rabies virus, vesicular stomatitis virus (VSV), and adenovirus. Chimericbovine/human parainfluenza virus 3 (BHPIV3), a live attenuated parainfluenza virus vaccine candidate, was utilized as a vector for the SARS-CoV structural proteins including S, N, matrix (M), and envelope (E), alone or in combination. Studies with vectored vaccines further demonstrate that induction of S protein- specific NAbs is sufficient to confer protection.

DNA Vaccines against Coronavirus: DNA vaccines have demonstrated strong induction of immune responses to viral pathogens in animal models, specifically in mice; however, clinical data on DNA vaccines in human subjects are limited. DNA vaccines encoding the S, N, M, and E proteins of SARS-CoV have been evaluated in mice. Vaccination with S-, M-, and N-encoding DNA vaccines induced both humoral and cellular immune responses, with some variation in the relative levels of induction.

Combination Vaccines against Coronavirus Combination vaccines have also been evaluated for their ability to augment immune responses to SARS-CoV. Administration of two doses of a DNA vaccine encoding the S protein, followed by immunization with inactivated whole virus, was shown to be more immunogenic in mice than either vaccine type alone. The combination vaccine induced both high humoral and cell- mediated immune responses. High NAb titers were also observed in mice vaccinated with a combination of S DNA vaccines and S peptide generated in Escherichia coli. Combination vaccines may enhance the efficacy of DNA vaccine candidates.

The SARS-CoV vaccine strategies reported to date demonstrate that S protein-specific NAbs alone are sufficient to provide protection against viral challenge. While SARS-CoV has not yet reemerged, its unknown reservoir leaves open the possibility that it, or a related virus, will again infect the human population. The development of vaccines targeting this virus will help, in the event of its reemergence, to potentially stop its spread before it wreaks the social and economic havoc caused by the previous outbreak. Furthermore, lessons learned

from the generation of these vaccines may aid in the development of future vaccines against known and newly identified coronaviruses**.**

Preventive Measures: The best way to prevent illness is to avoid being exposed to it. WHO recommends the following actions to prevent the spread of respiratory diseases: Wash hand frequently, Maintain Social Distance of at least 1 meter (3 feet)distance between yourself and anyone who is coughing or sneezing, Avoid touching eyes, nose, and mouth, Practice respiratory hygiene, Seek medical care early if you have a fever, cough, and difficulty breathing, Practice food safety.

Fig. 9: Prevent the spread.

Hand hygiene is the most important measure of reducing the spread of COVID-19. Crew members should perform hand hygiene properly and frequently, especially before touching eyes, nose, and mouth. When hands are visibly soiled or likely contaminated with blood and body fluid or after the contact with infected persons, it is advised to clean hands with liquid soap and water. Follow five easy steps below –

Step 1 – Wet your hands with clean, running water
Step 2 – Lather your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
Step 3 – Scrub your hands for at least 20 seconds.
Step 4 – Rinse your hands well under clean, running water
Step 5 – Dry your hands using a clean towel.

Table 1: Symptoms of Coronavirus family.

	COVID-19	SARS	Influenza	Common Cough
Clinical Manifestations	Excessive Fatigue; coughs; shortness of breaths; coughing up yellow or green mucus; chest X-ray shows scattered opacities in the lungs	Coughs; breathing difficulties; fatigue; headache and diarrhea; fever	Running nose; sneezing; coughs; high temperature; muscle pain; diarrhea; vomiting	Nasal congestion; coughs; sore throat discomfort; sneezing
Incubation Period	7-14 days	2-7 days	1-4 days	1 days
Ways of Transmission	Short distance droplet spread; close contact; contact with animals	Short distance droplets spread; close contact	Coughs; sneezing and droplets spread; contact with secretions of an infected person	Droplet spread; contact with infected nasal secretions
Preventive Measures	Regular and frequent hand washing; check body temperature; use alcohol-based disinfectant; wear a surgical mask; enhance airflow; avoid contacts with animals or eat game meat	Cover mouth and nose when sneezing and coughing; regular and frequent hand washing; do not touch nose and mouth; wear a surgical mask; enhance airflow	Vaccination (flu shot); keep hands clean; wear a surgical mask; improve airflow	Regular hand wash, wear a surgical mask, boost your immune system

Coronavirus Prevention methods

- **Wash your hands often with soap and water or clean them with an alcohol-based sanitizer.** This kills viruses on your hands.
- **Practice social distancing.** Because you can have and spread the virus without knowing it, you should stay home as much as possible. If you do have to go out, stay at least 6 feet away from others.
- **Cover your nose and mouth in public.** If you have COVID-19, you can spread it even if you don't feel sick. Wear a cloth face covering to protect others. This isn't a replacement for social distancing. You still need to keep a 6-foot distance between yourself and those around you. Don't use a face mask meant for health care workers. And don't put a face covering on anyone who is:

1. Under 2 years old
2. Having trouble breathing
3. Unconscious or can't remove the mask on their own for other reasons

- **Don't touch your face.** Coronaviruses can live on surfaces you touch for several hours. If they get on your hands and you touch your eyes, nose, or mouth, they can get into your body.
- **Clean and disinfect.** You can clean first with soap and water, but disinfect surfaces you touch often, like tables, doorknobs, light switches, toilets, faucets, and sinks. Use a mix of household bleach and water (1/3 cup bleach per gallon of water, or 4 teaspoons bleach per quart of water) or a household cleaner that's approved to treat SARS-CoV-2. You can check the Environmental Protection Agency (EPA) website to see if yours made the list. Wear gloves when you clean and throw them away when you're done. There's no proof that herbal therapies and teas can prevent infection.

Guidance for Sanitizing Hands: Hand sanitizer is a liquid generally used to decrease infectious agents on the hands. If hand washing facilities are not available, or when hands are not visibly soiled, perform hand hygiene with 70% to80% alcohol-based hand sanitizer (e.g., isopropyl alcohol and ethyl alcohol). It is an effective alternative to prevent cross-transmission of infectious diseases via hands.

Personal Protective Equipment: The vessel must maintain below Personal Protective Equipment (PPE) when calling infected areas. Disposable surgical masks, Disposable gloves, Eye Protection, Face Shields, Medical Gown, Ray Thermometer.

Disposable Surgical Masks: Face mask provides a physical barrier to fluids and large particle droplets. Surgical mask is a type of face mask commonly used. When used properly, surgical masks can prevent infections transmitted by respiratory droplets. Most surgical masks adopt a three-layer design which includes an outer fluid- repelling layer; a middle layer serves as a barrier to germs, and an inner moisture- absorbing layer. Mask without the above functions is not recommended as it cannot provide adequate protection against infectious diseases transmitted by respiratory droplets. Crew members should wear surgical masks when they have respiratory infection; when taking care of persons with respiratory infection in order to reduce the spread of infection. Please note the following points when wearing a mask. Choose the appropriate mask size Perform hand hygiene before putting on a surgical mask The surgical mask should fit snugly over the face.

Disposable Gloves: Disposable safety gloves are worn to prevent cross contamination between the infected person(s) / object(s) and people who perform cleaning/people who enter the medical care area. Change gloves if they are torn or contaminated. When finished, place used gloves in a biohazard trash bag. Wash your hands immediately after handling the items.

Goggles: Goggles are forms of protective eyewear that usually enclose or protect the area surrounding the eye to prevent particulates, water, or chemicals from striking the eyes. Disinfect used goggles according to the manufacturer's instructions after use. This is required when handling sick persons or cleaning where infected people were residing.

CONCLUSION

In this review, encapsulate all the potential interferences for Novel COVID-19 infection as per previous treatments of SARS and MERS. The general actions are found identical significant to enhance host immune reply against RNA viral infection. The immune response has often been shown to be weakened by inadequate nutrition in many model systems as well as in human studies. However, the nutritional status of the host, until recently, has not been considered as a contributing factor to the emergence of viral infectious diseases. Therefore, the present study propose to verify the nutritional status of COVID-19 infected patients before the administration of general treatments. In addition, also found coronavirus-specific treatments and antiviral treatments were very useful for the treatment of SARS and MERS. They should also be considered as potential treatments for COVID- 19 infection. The other compounds should also be chosen as alternative option for the treatment as well as new drug.

Government of India was taken all necessary steps to face the challenges and threat posed by the growing pandemic of Novel COVID 19. With active support of the public, the government of india have been able to control the spread of the Virus. The most important factor in preventing the spread of the Virus locally is to empower the citizens with the right information and taking precautions as per the advisories being issued by Ministry of Health & Family Welfare. 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.

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