



(REVIEW ARTICLE)



An inclusive review on virology, transmission, and clinical management of COVID-19 resulting from SARS-CoV-2

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Abstract

Severe Acute Respiratory Syndrome Coronavirus-2 is the causative agent of Coronavirus Disease 2019 named by the World Health Organization (WHO) on 11th February 2020 and declared pandemic on March bears mild symptoms like fever, fatigue, dry cough to critical conditions like chronic respiratory disease leads to death. There are many misconceptions and vast internet information manipulating brains of the victimized society, which sow anxiety in people regarding this syndrome, and to provide adequate and accurate information literature reviews are must. This review article intends to deliver the current valuable information regarding the evolution, virology, and mode of transmission and epidemiology of SARS-CoV-2 along with the clinical management describing specific effective treatments, therapeutics, and vaccines through considering the clinical features of COVID-19. Several preventive measures, such as quarantine, self-isolation, and social distancing, are also elaborated. For the administration of this worldwide pandemic, the multifactorial assortment of endorsed examinations on each of these sections of COVID-19 inside this assessment empowers explanation and transparency on the existing eminence.

Keywords: Corona Virus; SARS-CoV-2; Virology; Transmission; Clinical features diagnosis; Vaccination

1. Introduction

By the 31st December 2019, some severe pneumonia cases in Wuhan city in Hubei province have been reported to the World Health Organization (WHO) by China Health Authority. A few days later, it was found that this disease has come from the seafood market in China, where much variety of live or dead and wild animals is auctioned [1, 2]. After examination of throat swab samples of patients, the specialists at the PRC Centres for Disease Control proclaimed that pneumonia, later known as novel coronavirus pneumonia (NCP), was brought about by a novel coronavirus which is designated initially as 2019-nCoV by WHO. Then the disease was named Corona Virus disease and, the virus was renamed as Severe Acute Respiratory Syndrome Coronavirus-2(SARS-CoV-2) by World Health Organization (WHO). About 830 cases had been found in nine nations: China, Nepal, Taiwan, Singapore, Thailand, Vietnam, South Korea, Japan, and the United States till 24th January 2020. Coronaviruses make up a massive group of infections that can occur in birds as well as mammals, including humans, concurring to the world health organization (WHO). In the outer surface of the virus, crown-like spikes are present; thus, it was named as a coronavirus [3,4]. These are minute in size (65-125nm in diameter) and contain a single-stranded RNA as genetic material. The subgroups of coronaviruses family are alpha (α), beta (β), gamma (γ), and delta (δ). These infections have been answerable for a few episodes around the globe, counting the extreme intense respiratory disorder (SARS) the pandemic of 2002-2003 and the Middle East respiratory condition (MERS) episode in Saudi Arabia in 2012. Thus, it was declared as Public Health Emergency of International Concern (PHEIC) by WHO on 30th January 2020[5, 7]. The infection caused by SARS- CoV-2 was found mild than SARS-CoV and MERS-CoV but had high transmissibility and infectivity. That is why the declaration of COVID-19 as a pandemic

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from an epidemic on 11th March 2020. Till today, about 215 countries having 10,834,238 cases are infected with 519,584 deaths, and 6,054,040 recovered [8, 9].

1.1. History of coronavirus

The history of human Coronavirus begins in 1965 when Tyrrell and Bynoe found that they could passage a virus named b 814. It was found in human embryo practical organ cultures of 10 from an adult's respiratory tract with the common cold. The existence of an infectious agent was shown by inoculating the moderate from this civilization in transit in human volunteers; migraines were created at an essential proportion of topics, however Tyrrell and Bynoe not able to grow the representative in tissue culture at that moment. At roughly precisely the same time, it may boost if the virus has abnormal tissue culture properties out of medical students with migraines. The two B814 and Hamre's virus, which she predicted 229E, were ether-sensitive and so presumably needed a lipid-containing jacket for infectivity. Still, these two viruses were not related to any known myxo or paramyxoviruses. While working in Raberd Chanock at the National Institute of Health, McIntosh et al. report the recovery of multiple strains of ether-sensitive agents from the human respiratory tract by using a technique similar to that of Tyrrell and Bynoe. These viruses were grown in organ cultures [9, 10].

Simultaneously, Almeida and Tyrrell performed electron microscopy on fluids out of organ cultures infected with b814 and found particles that found the infectious bronchitis virus of chickens. The particles were medium-sized (80-150nm), pleomorphic, membrane coated and covered with widely spaced club-shaped surface projections. The 229E agent identified by Hamre and Proc know and the previous OC viruses identified by McIntosh, et al. had similar morphology [11, 13].

In the late 1960s, Tyrrell led a group of virologists working with the human strains and several animal viruses. Mouse hepatitis virus and contagious gastroenteritis virus of swine have been demonstrated to be morphologically the same as discovered through electron microscopy. This new set of viruses was called Coronavirus (corona denoting the crown-like overall look of the face projections) and was later formally approved as a new genus of viruses [12, 14]. The seven coronaviruses can infect humans. The one that causes SARS emerged in southern China in 2002 and quickly spread to 28 other countries. More than 8,000 people were infected by July 2003, and 774 died. A small outbreak in 2004 involved only four more cases. This Coronavirus causes fever, headache, and respiratory problems such as cough and shortness of breath.

The MERS started in Saudi Arabia in 2012. Almost all of the nearly 2,500 cases have been in people who live in or travel to the middle-east. The Coronavirus is less contiguous than its SARS cousin but more deadly, killing 858 people. It has the same respiratory symptoms but can also cause kidney failure [14, 16].

1.2. Origin

The primary human instances of COVID-19, the ailment brought about by the novel Coronavirus, SARS-CoV-2, was the first reported officially in Wuhan city, China, in December 2019. The disease COVID-19 isolated from pneumonia patient, a worker in the Wuhan seafood market. The primary hub of China started presenting to local hospitals with pneumonia cases. These all cases had left to the wholesale food market in December 2019 tested positive for COVID-19; after the market in which the city was the source of this outbreak played a role in the initial amplification of the epidemic. The SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) is a Beta coronavirus covering non-segmented positive-sense RNA viruses. Coronavirus is divided into four types, where alpha and beta coronavirus can infect mammals, and gamma and delta tend to affect birds. Another 6 CoVs had been recognized as human a helpless infection among which alpha CoVs HCoV-229E and HCoV-NL63 and beta-CoVs HCoV-HKU1 and HCoV-OC43, cause mild respiratory side effects just like the common virus. It was found that the genomic sequence of SARS-CoV-2 is 96.2 percent identical to bat CoV RaTG13, whereas 79.5 percent equal to SARS-CoV. The SARS-CoV is originated from the host with bat CoV RaTG13 or Guangdong pangolin CoV, which is bat or pangolin [16, 18].

1.3. Virus Structure

Corona viral particles are pleomorphic so that they do not have a defined arrangement. So take a look at the construction of the virus, the left the nucleocapsid that's displayed in the middle in brownish essentially indicates the genome, and it will be a 30 kilobase enormous for the RNA virus giant genome 30 kilobase genome of RNA that's of positive awareness or also sense RNA. This genome is coated with a protein referred to as a nucleocapsid protein, which creates sort of the helical nucleocapsid. In all situations, those lipids are obtained in the host. That is true for coronaviruses where a studded lipid envelope with numerous viral proteins are seen, the most notable of which will be the spike protein.

This is the one which naturally provides coronaviruses; its title to its corona-like possible halo effect was observed during a solar panel, which resembles a crown-like look of these viruses under the electron microscope [19, 20]. As we will discuss in a moment, the spike protein is vital for the viral entry process. Besides, in crimson is a membrane glycoprotein known as the matrix protein. Here is the most abundant protein in the exterior of the viral particle. Its function is primarily to link the membrane into the nucleic acid, so it is possible to see in sort of this inset there is that this is a transmembrane protein. Still, it is a substantial C-terminal domain name, making connections with the nucleoprotein nucleocapsid protein. That is likely important for the morphogenesis stage of the viral life cycle, whenever these virions are shaped. Nevertheless, another small envelope protein known as E is present too. They are also regarded as essential for the creation of the viral particles in the conclusion of the viral life cycle [21, 23]. A tiny bit more on the spike protein subject, there have been released a couple of different research papers demonstrating structural information to the coronavirus two spike protein. The arrangement, a cryo-electron microscopy structure of the coronavirus two spike protein overlaid revealing the sequence conservation of associated spike proteins from different coronaviruses, which are nearly plotted on the SARS-CoV-2 spike arrangement. Moreover, these are subsequently colour-coded dependent on their degree of protection across all these associated viruses [23, 23].



Figure 1 Corona virus cloning effect

There is this upper tier domain that's the receptor-binding domain name. This is what engages that the host cell receptor, and within this domain, it can be understood there are lots of residues which are coloured in sort of a teal colour, and this indicates they are highly variable. This is a region of viruses which are under extreme evolutionary pressure due to connections with the immune system. The lower portion of the spike protein is the section of the protein which encodes and owns the fusion machinery that's important for the entry process and is far more conserved. That is sort of a traditional finding; the fusion machinery will be relatively conserved. This is a type of lock-and-key mechanism, Where the secret is that the viral glycoprotein and the lock would be that the cellular receptor [23, 26].

Various viruses may use distinct cellular receptors as a means of getting into cells. The receptor we all know the two SARS-CoV and also for CoV-2 will be the same protein. It is a cellular protein known as angiotensin-converting receptor two or ACE2. Furthermore, binding into this protein is essential, but it is not enough. This is performed with a cellular protease called TMPRSS2. There are two cleavage events at two cleavage events known to get SARS coronavirus and likely CoV-2. All these cleavage occasions the first one is occurring is that the receptor-binding domain of the spike protein has been divided by the fusion domain. The second cleavage event, which is not revealed here, is a sparking fusion event that triggers the protein's fusogenic state [24, 25]. That permits then following entrance, which for coronaviruses might happen at right the plasma membrane might happen upon to cytosol or might happen at both websites. That has not been solved. So the spike protein is a timeless type 1 fusion protein plus there are numerous viruses that have fusion proteins of the sort. The best-characterized are flu, the hemagglutinin protein for it. There is Ebola virus fusion protein can also be class1. HIV fusion protein can also be in course 1. Thus, what is summarized here on the base is that the primary phases are proven to purify the fusion mediated by those category one fusion proteins [27, 28].

At the pre-fusion condition, It can be deliberated that this as a virtual sort of like a metastable state for the fusion protein. Moreover, before this proteolytic event that activates the fusion procedure, this receptor binding subunit, which has not yet been cleaved off nonetheless, nearly, it can be imagined as clamping the fusions subunit and maintaining it tucked

off and dormant until the viruses struck the suitable host cell. These proteolytic cleavage events may trigger it. So protease cleavage we spoke about then results in the receptor-binding subunit to manoeuvre from the manner. That unclamps the fusion subunit, so it may subsequently form a pre-hairpin that's inserted into the target membrane of this cell, and this happens via the fusion peptide. Typically, meaning they may be placed into the membrane. This pre-hairpin then begins to fold back, essentially forming a six-helix package and yanking on the cellular and viral membranes with each other to promote fusion [29, 30].

Along with the closing post-fusion conformation in those category one fusion proteins is a trimer of hairpins. Furthermore, from this mechanism, once the fusion has happened, the viral nucleocapsid together with the genome payload could be deposited directly into the cytoplasm of the cell. Some early studies which have emerged out of SARS-CoV-2 imply that there are a few interesting characteristics that are distinct between its spike protein and that of their first SARS-Cov-1 [21, 23].

Along with the very first distinction is that scientists understand from study together with the spike protein of SARS-CoV-1, there are nearly six crucial amino acids inside the receptor-binding domain that are essential for interaction with the ACE2 receptor and also interestingly five of the six residues are distinct for SARS-CoV-2 compared to SARS-Cov-1. Nonetheless, CoV-2 remains able to interact with the ACE2 receptor effectively. The next notable difference is that distinctively SARS-CoV-2 appears to obtain a polybasic cleavage site. This polybasic cleavage site is exciting and vital as it is called to allow cleavage by additional cellular proteases past the one we spoke about. It might also enable efficient cleavage from the cellular protease that the TMPRSS two protease referred to as the sort of the canonical one that has been considered with this virus [30, 32]. It is imperative because a portion of a polybasic website in different viruses has been demonstrated to improve transmissibility, especially for pathogenic flu viruses. So it is likely to be most relevant to work out if the same is true for SARS-CoV-2 [31, 32].

2. Transmission

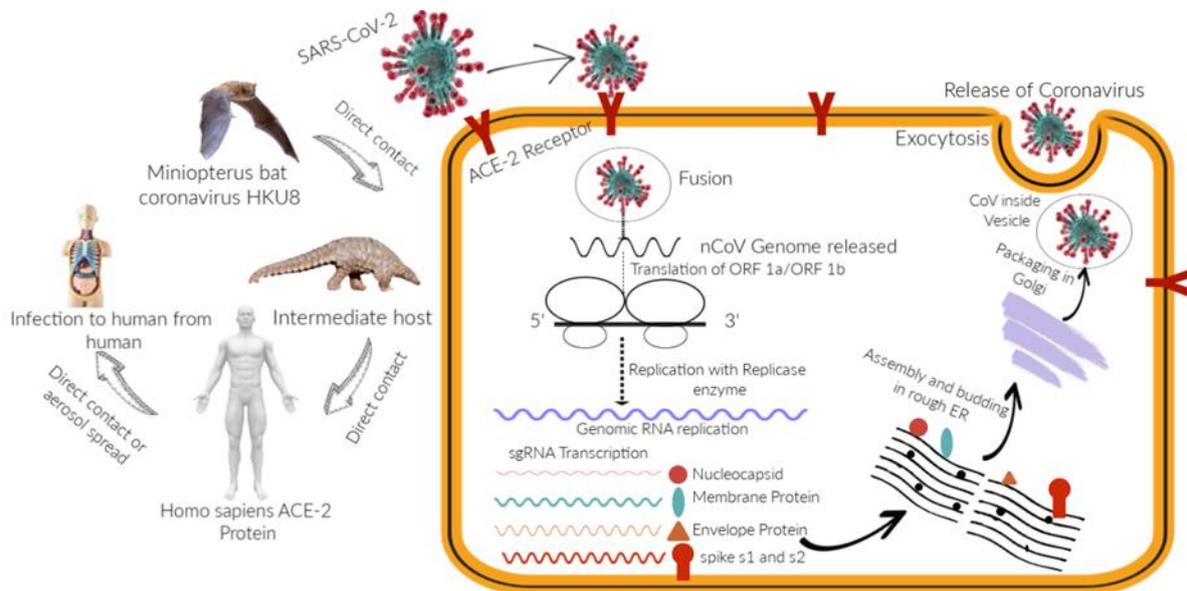


Figure 2 Key features and the entry mechanism of human Coronavirus

The glycoprotein spikes on the Coronavirus's outer surface are responsible for the virus's attachment and entry to host cells. The Receptor-Binding Domain (RBD) is loosely attached among viruses; therefore, it mostly recognizes aminopeptidases or carbohydrates as a critical receptor for entry to humans' cells while SARS-CoV and MERS-CoV recognize Expopeptidases. HCoV-NL63 and SARS-CoV requires angiotensin-converting enzyme-2 (ACE-2) is a crucial receptor. ACE-2, found in the lower respiratory tract of humans, also known as the receptor for SARS-CoV and regulates both cross-species and human to human transmission. It is now clear that SARS-CoV-2 use ACE-2 that same receptor as SARS-CoV-2 to infect humans. The virion S-glycoproteins on the surface of Coronavirus attach to the receptor, ACE-2, on human cells' surface. S-glycoproteins includes two such units, S1 and S2. S1 determines the virus-host range and cellular tropism with the vital function domain RBD, While S2 mediates virus-cell membrane fusion by two tandem domains, heptad repeats 1 (HR1) and heptad repeats 2 (HR2) [31,34].

After fusion of membrane, the viral genome RNA is released into the cytoplasm. The uncoated RNA translates two polyproteins, pp1a, and pp1ab, which encode non-structural proteins and form Replication Transcription Complex (RTC) in the double-membrane vesicle. Mediating Endoplasmic Reticulum (ER) and Golgi, newly formed genomic RNA, nucleocapsid proteins, and envelope glycoproteins assemble and form viral particle buds. Lastly, the Virions containing vesicles fuse with the plasma membrane to release the virus [34, 36].

2.1. Coronavirus can spread in the following ways

Without covering the mouth, cough and sneeze can disperse droplets into the air. If someone touches or shake hands with a person who has the virus, it can pass between individuals and also making contact with the surface or object that has the virus and then touch nose, eyes, or mouth; the virus enters into the body. The National Institute of Health (NIH) suggests that the three groups, such as age a. young children, b. people are 65 years or older c. women who are pregnant have the highest risk of developing complications due to COVID-19. Cases continued to increase exponentially, and modelling studies reported an epidemic doubling time of 1.8 days. In fact, on 1st March 2020, a total of COVID-19 cases was confirmed, including 2,873 deaths.

These numbers are an underestimate of the infected and dead due to limitations of surveillance and testing. This SARS-CoV-2 originated from bats, the intermediary animals through which it crossed over to humans is unsure. Pangolins and snakes are the current doubts.

2.2. Epidemiology

The WHO documented that the COVID-19 originated, and the first case reported from the seafood market of china, selling meat of wild animals on 31st December 2019. Within a few weeks, it spread throughout china, and then after a few months, it extended in several other countries. Wang et al. reported that till 30th March 2020, COVID-19 had become pandemic throughout the world, affecting 195 countries, infecting 722,389 people and caused 38, 982 worldwide deaths.

All ages are sensitive. Infection is transmitted through large droplets generated due to coughing and sneezing by symptomatic people and before the onset of symptoms. The studies have shown higher viral loads in the nasal cavity than the throat without a difference in viral duty. The Symptoms of COVID-19 infection appear after an incubation period of approximately 5.2 days. The interval from the start of COVID-19 symptoms to death ranged from 6 to 41 days, with a median of 14 days. It is dependent on the age of the patient and the status of the patient's immune system. These infected droplets can spread 1-2 meters and deposited on surfaces. Infection is acquired by inhalation of those droplets or touching the nose, mouth, and eyes. According to present info, Tran's placental transmission from pregnant women to their fetus as described. The incubation period varies from two to 14 days. The COVID-19 has been found to have a higher power of transmissibility and pandemic risk than the SARS-CoV. As the different studies, the introductory reproduction rate or range will be from 2.6 to 4.71. In comparison, the essential reproduction of SARS was 2 and 1.3 for pandemic flu H1N1 2009.

2.3. Clinical Characteristics

A summary and report of 72,314 cases from the Chinese Centre for Disease Control and Prevention, where four groups of patients were found, confirmed cases are those who are symptomatic with favorable nucleic acid test outcomes. Suspected cases have been those with symptoms and verified exposures into an infected indicator case. Clinically diagnosed were those patients having symptoms, vulnerability, and also the presence of lung imaging contains consistent using Coronavirus, pneumonia. Individuals were classified as asymptomatic cases when they were free of symptoms but had a favorable nucleic acid test. Overall, 62 % were confirmed, 22 % were suspected, 15% were clinically diagnosed, and 1 percent were asymptomatic. One could assume that symptoms might need to show up for an individual to be tested, especially when the test kits are scarce. Even just 1 percent of us are positive at a situation where we now have a severe illness outbreak with test kits used and needed for its ailing. This indicates that the actual population of asymptomatic cases might be much more significant. When the serologic testing of this general populace is executed, it is likely to be confirmed. Just 1% were under ten years, 1 percent were to 19 years of age, 8% were 20 to 29 years of age, and 3 percent were 80 decades or older. 81% of the cases were rated mild, 14% severe, and 5% critical. Mild cases have no indications of pneumonia or only mild pneumonia.

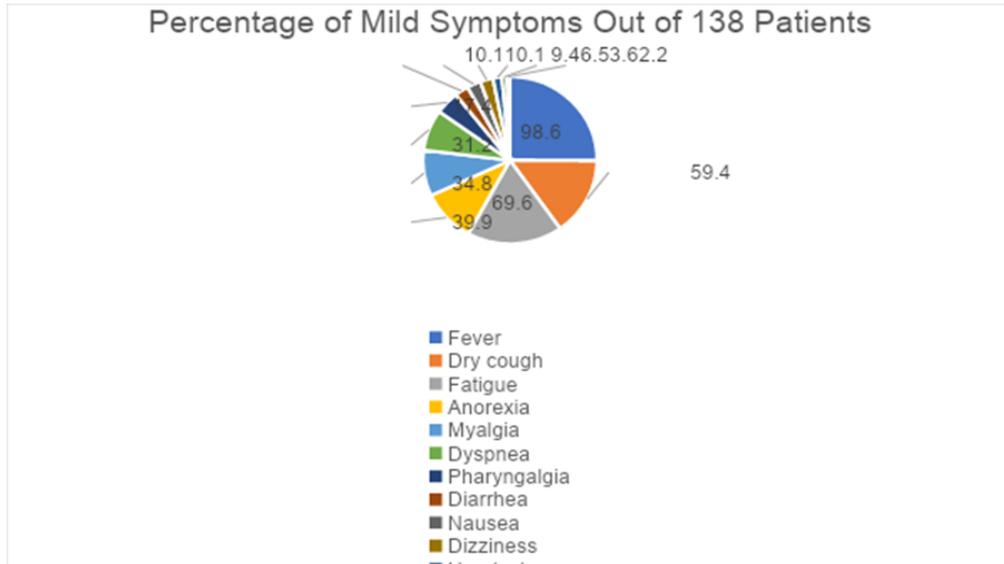


Figure 3 Percentage of Mild Symptoms Out Of 138 Patients

To clarify so that it might be remembered better, we subdivided the criteria for severe cases of breathing, issues of oxygenation, and radiological problems. Issues of breathing were classified as brutal if they had dyspnea or even shortness of breath, or even if they'd a respiratory frequency of more than 30 breaths a minute. Issues of oxygenation have also been classified as severe when they had had an oxygen saturation of less than 93 percent or had a PF ratio of significantly less than 300. In a healthy individual breathing room air, the partial pressure of oxygen measured in an arterial blood gas will be 100 millimeters of mercury. The percentage of oxygen in-room atmosphere is 21 percent or 0.21; therefore, 100 separated by 0.21 equals 500. The PF ratio can be a parameter that is often employed for diagnosing the severity of acute respiratory distress syndrome or ARDS, which is fundamentally the reason for departure for some COVID-19 patients that die from the disease.

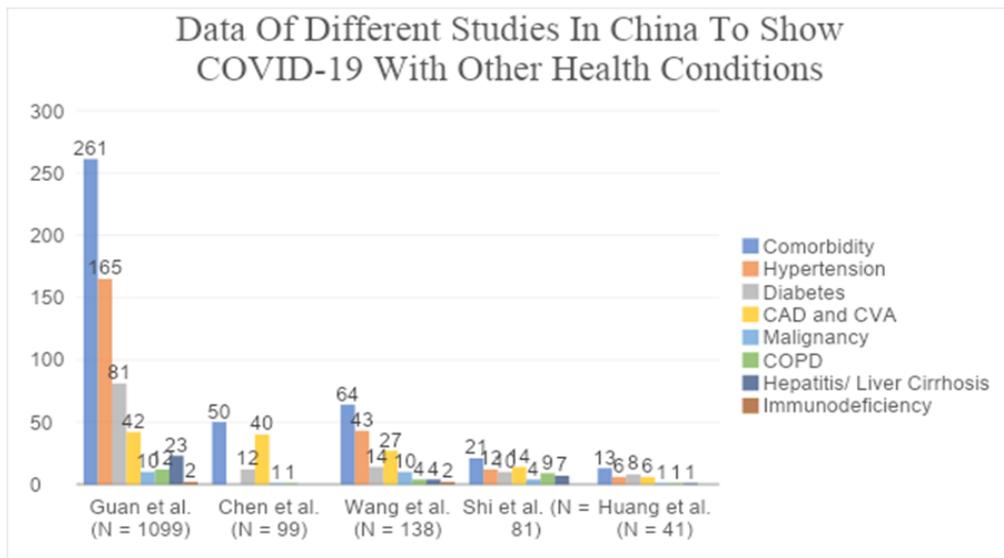


Figure 4 Data of Different Studies in China to Show COVID-19 with Other Health Condition

Physicians were rated as severe as their lung infiltrates, or pneumonia, as found on the chest x-ray or even CT, inhabited more than 50 percent of these lung areas. The case fatality in percent is calculated because of the number of deaths divided by the number of cases, times 100. Overall case fatality within this cohort of patients was 2.3 percent. No children aged nine decades or younger died from this disorder. Patients 70 to 79 years had a case fatality rate of 8 percent. Individuals aged 80 or older have a case fatality rate of 14%. The case fatality rates for people between nine and 70 years were not separately reported. No patients classified as mild or severe died.

Mostly Patients classified as mild or severe might go into the critical category whenever they got worse. Therefore, it is expected that all patients who died come in a crucial variety. Nevertheless, one inference I think we would be in a position to earn from such data is when a case is severe but stable for several times, they have less prospect of dying.

Moreover, what exactly were the case fatality levels in patients with risk factors? Well, patients using pre-existing cardiovascular disease needed 10.5 potential for perishing. Patients who have diabetes had a 7.3% chance of passing. Patients with chronic respiratory illness required a 6.3% chance of dying. What is more, patients with cancer had a 5.6% case fatality rate? Now, the writers did not report that the case fatality rates for diverse combinations of risk factors; however, it had been needed to understand that these risk factors will add up. We do not know about the interaction of varied risk factors out of reading the newspaper. Still, it is safe to presume that someone within 80 having diabetes may have a higher chance of dying than an 80-year-old patient without diabetes. Moreover, the case fatality rate will shoot up yet again if that diabetic patient had heart disease, for example.

2.4. Diagnosis

When it comes to diagnosis, it is preferred to initially discuss the more typical one that is called Reverse Transcriptase PCR testing or simply RT-PCR, and this is the test that has been most broadly utilized, frankly, since the start of this real virus right back in January. There are two fundamental approaches to lead PCR testing. One is through what is viewed as the World Health Organization type measures. Furthermore, one is through CDC-based norms. The kind of testing that we offer for the PCR premise is proportional to both. It is a significant level, high multifaceted nature type of PCR testing that gives a precise conclusion. This testing must be finished with a swab from lower respiratory or upper respiratory (nasopharyngeal or oropharyngeal).

Table 1 Technology and diagnosis facility

Diagnosis tool Companies	Country	Technology	Facility
GenMarkDx	Canada	eSensor technology based on competitive DNA hybridization and electrochemical detection	Can test a wide range of pathogens. Minimizes chances of sample contamination. Short testing time.
XCR Diagnostics	USA	Xtreme Chain Reaction brings the sensitivity of qPCR	Rapid testing possible. Can detect any kind of pathogens
SensDx	Poland	Ultra-sensitive Electrode (bioelectrodes)	Can detect any virus or bacteria quickly.
Aperiomics	USA	Metagenomic sequencing and a software Xplore-PATHOSM	Detect any kind of pathogens in less time.
MiRXES	Singapore	microRNA-specific reverse transcription (RT) primers and quantitative PCR primer pairs	Provides unparalleled specificity and sensitivity.
Mylab	India	Qualitative RT-PCR	Affordable Detection in only 2.5 hours rather than 7 hours of manual testing. At a time, lots of samples can be diagnosed.

What is more, that is how we get an exact perusing on that test. If Coronavirus is caught, it will be sure that the primary number of hours with a PCR test; a great many people will create a constructive PCR result from days zero or the start of indications up to around day's seven to nine. However, if it keeps on making Coronavirus during sickness, regardless of whether it has insignificant to no side effects, may keep on delivering a positive PCR result as long as 30 days out. One thing that the PCR test permits us to do is to realize that if there are dynamic lingering virus particles that are being communicated in the system, at that point, that person is really in danger of spreading this quietly. With the goal, that is the idea of closing this virus. The ideal situation is that on the off chance that somebody has had Coronavirus that they have a negative PCR test toward the finish of their sickness timeframe, which implies that you realize they cannot, at

this point, spread the virus. The second type of testing that we offer is called counteracting agent testing, and immunizer testing have been discussed broadly in the course of the most recent couple of months. Unfortunately, we do not have a single best immunizer test that is accessible. The test that we are utilizing is one of the main three that the FDA has restricted as sort of the best entertainers.

Furthermore, it is near 100%. It is someplace in the 99% territory for explicitness and 96 to 99% territory for affectability. These are real terms that mirror the precision of the actual test. Counteracting agent testing is separated into two essential antibodies. One is called IgM; IgM immune response is first created during the disease's underlying period. So ordinarily inside the initial barely any days, in a perfect world around day five to seven of the genuine coronavirus disease, and it might last as far as possible as long as 21 days out. People who do not convert their neutralizer reaction all right may have an IgM immunizer level that stays high for up to six- or two-months post-contamination. The subsequent neutralizer is called IgG or immunoglobulin G. This immunizer is basic. It reveals to us that a switch towards what is known as a counteracting killing agent has been accomplished, and that is an important thing to note for those who have had the virus and have had a full condition of recovery. One of the essential parts of contemplating these two distinct antibodies after some time is that we are attempting to examine a 30-day window. We might want to know whether somebody is toward the finish of a 30-day cycle, that they are PCR negative and on the off chance that they have had Coronavirus, we'd in a perfect world like to see IgM and IgG favorable toward the finish of that 30-day window to realize that their immune system has the most strong reaction conceivable. So, inside a multi-day timeframe with both PCR testing and neutralizer testing, we can, with an enormous level of certainty, affirm that you have been presented to Coronavirus, which has COVID-19 virus and no one of those other regular beta Coronaviruses that cause typical colds, which is why we run this complete type of testing.

3. Management

As the coronavirus disease or COVID-19 is very harmful to us, and the vaccine of it not discovered yet. So, therefore we need to manage it to remain healthy from COVID-19.

The scientist told us to do several significant steps by their researchers to manage infection across the world, and these steps are written below: -

3.1. Preventive Measures

There are many difficulties in avoiding contamination with COVID-19 in different fields. The American CDC (centre for Disease Control) suggests that medical service providers should use personal protective equipment (PPE) and apply regular contact. Li et al. added that the health worker should wear protective outfits, gloves, and either an N95 respirator in addition to confronting shields or a full air purging respiratory. For taking care of your health, and others take the subsequent steps. Take steps to protect yourself:-

- Please wash your hands regularly and thoroughly with soap for 20 seconds or with alcohol-based sanitizer that contains at least 60% alcohol and rub those, mostly after you have been visited a public place or after blowing the nose, sneezing, or coughing.
- Avoid touching nose, eyes, or mouth because hands touch many surfaces and pick up viruses and these contaminated hands. Through them, the virus can enter the body and many cause persons to sick.
- Maintain social distancing at least 1 meter and avoid close contact with people who are coughing or sneezing. When infected individuals cough or sneezes, they spray small droplets from their nose or mouth, which may have specific COVID-19 virus.
- Avoid significant events and mass gatherings take steps to protect others.
- Stay at home whether you are feeling unwell unless you are going to medical care.
- If you have a cough, fever, and difficulty breathing and seek as the first consult with the doctor.
- Whenever you cough or sneeze, cover your mouth and nose with a tissue paper and wear a face mask when you are around other people.
- If you are sick, avoid sharing bedding, dishes, glasses, and other household items.
- If possible, use a separate bathroom and toilets from the family and stay home for a duration of time provides by the doctor's instruction.
- Before clinical care is started, identify the potential cases as soon as possible and isolate the people separately from those who confirmed cases of the virus COVID-19 to prevent the potential transmission of infection to other patients and health care staff.
- Avoid direct physical contact with respiratory and other body secretions.

- Most patients presenting in community pharmacies are unlikely to have COVID-19. If they have coughs, colds or flu-like symptoms but not relevant to COVID-19, travel or contact history, pharmacies should proceed in line with their best practice and routine management of the cross-infection risks to staff and other patients.
- Restrict the no. of individuals entering isolation areas, including the room of a patient with suspected and confirmed COVID-19.

3.2. Social Distancing

Social distancing is our most important way to decrease the spread of COVID-19 at this time. Social distancing means that we are avoiding getting together with extensive collections of individuals. When we are with people, we are maintaining at least 6 feet of separation between the people. That is important because COVID-19 is primarily distributed through large droplets and those travelling a distance of between 3 and 6 feet, and then settle down onto surfaces. COVID-19 can also begin using very, really subtle signs or symptoms.

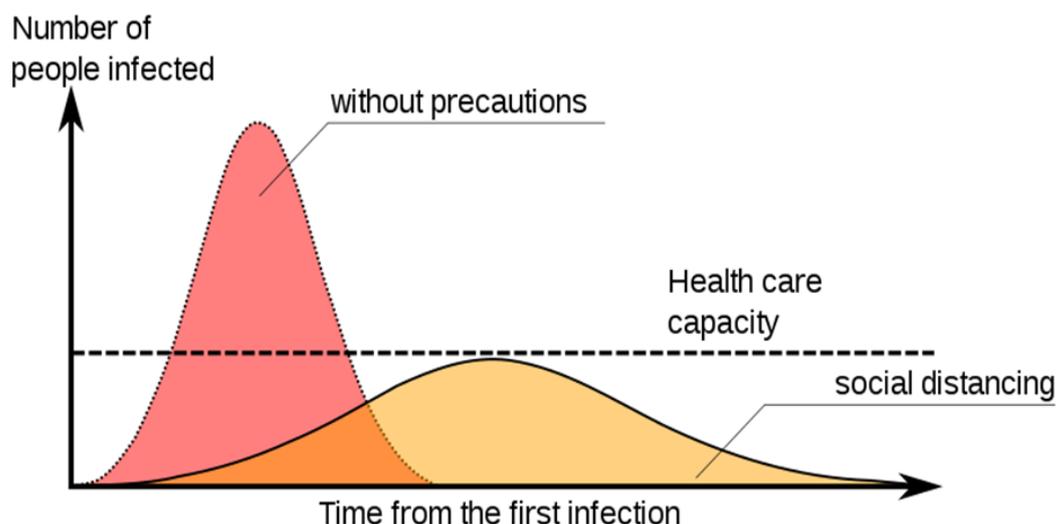


Figure 5 Graph showing the Impact of Social Distancing on Flattening the Curve

It may be hard to learn whether anybody is experiencing seasonal allergies or whether they are only tired in a long day or if someone in the early stages of infection. Besides, we are learning more and more, from some of the nursing home outbreaks, so that people can be positive for COVID-19 till they have any symptoms. So, if people keep 6 feet and other individuals that will be the perfect method to lower the spread of COVID-19. Therefore, when anybody is contemplating social distancing, it is crucial to stay home. That is only going to work if everybody plays their role and sticks for it very strictly.

3.3. Therapeutics

To date, any drugs or medications for COVID-19 are not approved by food and drug administration (FDA). Some of the therapeutics permitted for several investigational mediators and other symptoms are under attention in countless random trials worldwide. Numerous other drugs are developing, and some others are newly designed and undergoing the human trial period. Also, a few medications can be utilized in severe cases through emergency use authorization or compassionate use mechanism. Below are some instances of treatment for various patients:

Previously mentioned, the patients are divided into five groups, such as presymptomatic or asymptomatic, mild illness, moderate illness, severe illness, and critical condition. According to the group, treatment will be provided. For the asymptomatic one, there should not any special treatment or laboratory examination recommended. The patients with mild illness, there is inadequate information to suggest any special anti-viral or immune-based treatment. It is recommended to conduct close monitoring of moderately infected patients as the pulmonary disease was seen to increase. The severe illness patients enter the phase when they can generate aerosols to infect others rapidly. They should be located in AIIRs, possibly, and provide oxygen therapy straightaway by nasal cannula or high-flow oxygen. Whether there is any sepsis or bacterial pneumonia found, it is advised to offer empiric antibiotics. Critical illness shows harsh features such as acute respiratory distress syndrome, cardiac dysfunction, septic shock, elevations in multiple inflammatory, or raised underlying comorbidities. Placing them in AIIRs is highly recommended as they are prone to transmit disease by aerosol. In each of the above cases, regular monitoring should be conducted. To avoid maternal

severe disorders and risks, most of the treatments are restricted to pregnant women. There are lots of other particular guidelines in case of multiple comorbidities, children, or pregnancy cases.

Some mostly used anti-viral medications recommended during severe illness or to ease the condition due to COVID-19 are stated below:

3.3.1. *Chloroquine or Hydroxychloroquine*

It was not recommended to use chloroquine except in clinical trials. Chloroquine has lots of adverse effects, including gastrointestinal result, hypoglycemia, hemolysis, rash, myopathy, and also some issues regarding heart rhythm. It has an addictive effect on other drugs and can inhibit CYP2D6 and P-GP. The panel also not advised to use hydroxychloroquine alone or with azithromycin. Like chloroquine, hydroxychloroquine also has various adverse effects like hepatitis, hypoglycemia, myopathy, anxiety, agitation or hallucination, even allergic reactions.

3.3.2. *Remdesivir*

It was advised to use Remdesivir to the hospitalized patients with $SPO_2 \leq 94\%$ at sea level or those who require oxygen supplement. Patients with mechanical ventilation or extracorporeal membrane oxygenation (ECMO) are also recommended to take Remdesivir as medication. Remdesivir has some side effects too. These include mild, reversible PT prolongation without INR change or hepatic effects, gastrointestinal symptoms, and transient elevations in ALT or AST levels.

3.3.3. *Lopinavir/ritonavir*

Only in clinical trials lopinavir and ritonavir or any other HIV protease inhibitor can be utilized according to the panel recommendation. It has several adverse effects like diarrhea, vomiting, nausea, or hepatotoxicity.

3.3.4. *Dexamethasone – First life-saving COVID-19 drug*

After many clinical attempts, finally, the breakthrough of a cheap and widely used steroid called dexamethasone happened. It is generally used in Arthritis like diseases for reducing inflammation, and it was found that dexamethasone can decrease the illness from critical COVID-19 patients.

All the above drugs are under the medical trial. Thus various immune-based therapies are also under development including, COVID-19 Convalescent Plasma and SARS-CoV-2 Immune Globulins, Non-SARSCoV-2 Specific Intravenous Immune Globulin, Interferon Alfa and Interferon Beta, interleukin-1 inhibitor Anakinra, interleukin-6 inhibitor Sarilumab, Siltuximab, and Tocilizumab, Also Janus kinase inhibitor baricitinib. These also have several adverse effects and reactions with other medications. Some antithrombotic therapies are also within medical attempts.

4. Vaccination

Vaccination probably offers the best option for blocking infectious disease circulation. Vaccine-induced humoral immune responses, significantly improving the production of neutralizing antibodies, are crucial to limiting infection and preventing reinfection.

For example, only a few promising vaccines, the mRNA-1273 vaccine for SARS-CoV and SARS CoV-2, bind the same host cell receptor ace-2. They may share similar disease pathogenesis and limited cross-neutralizing antibody. Current approaches for the development of the SARS-CoV-2 vaccine are mostly based on methods used for the development of SARS-Vcov vaccines. The vaccine is divided into different types containing inactivated vaccines, live attenuated vaccines, vectored vaccines, nucleic acid-based vaccines, recombinant subunit vaccines.

4.1. **Inactivated vaccines and life attenuated vaccine**

These vaccines are based on the antigenicity of killed and the weekend version of the virus. In inactivated vaccines may containing whole inactivated virus particles, specific components that are chemically modified to destroy their pathogenicity. Live attenuated vaccines are derived from microbial agents that had been weekend via physical, chemical, or biological means under laboratory conditions.

4.2. Vectored vaccines

Vectored vaccines utilize other viruses as vectors for SARS 2nd November proteins; among such vaccines, vectors are other chimeric protein influenza viruses, rabies virus, vesicular stomatitis virus, and adenovirus. Scientists of rocky mountain laboratories (USA) and Oxford University collaborated to develop chimpanzee adenovirus vectored vaccine against SARS-CoV-2.

4.3. Nucleic acid-based vaccine

Injection of nucleic acid built that can express viral or bacterial genes can result in the activation of both humoral and cellular immune response. Zydus Cadila has a program to develop a DNA vaccine against the measure of viral membrane protein responsible for the sale entry of SARS-CoV-2. After the plasmid DNA is introduced into the host cells, it will be translated into viral proteins, elicit immune responses, provide protection from infection, and lead to viral clearance.

Applied DNA science USA and texas biotech a developing a linear DNA vaccine for SARS-CoV-2 encoding for the viral s-protein in collaboration with the national institute of health USA.

4.4. Recombinant subunit vaccine

It is composed or made up of several microbial components produced in heterologous expression systems. Recombinant subunit vaccines are significant safety profiles as they contain only non-infectious recombinant proteins or synthetic peptides which no infectious viruses. The s protein of sars CoV-2 plays a crucial role in receptor binding, and membrane fusion as such vaccines based on the s protein may be able to induce antibodies to block virus binding and fusion and, thus, neutralize antibody and virus infection. Clover biopharmaceutical china has initiated the development of a recombinant subunit vaccine forers CoV-2 that utilizes s protein subunit trimer antigen.

5. Vaccination in India

Bharat Biotech International Limited has developed 1st Coronavirus vaccine Covaxin, Hyderabad, in collaboration with the national institute of virology (NIV) and Indian Council of Medical Research (ICMR) approved for human trials on 30th June 2020. Covaxin is an ethnic, inactivated vaccine for COVID-19. It is approved for phase I and Phase II human clinical trials by Central Drugs Standard Control Organization (CDSCO) and decided to be launched by 15th August after clinical attempts.

6. Conclusion

There are hundreds of coronaviruses, the majority of which circulate animals. Only 7 of those viruses infect humans, and a few of them trigger symptoms of the frequent cold. However, three times in the last twenty years, a coronavirus has jumped from animals to people to cause acute diseases. SARS, a beta coronavirus emerged in 2002 and has been controlled mainly by aggressive public health measures. MERS emerged in 2012 still exist in camels and can infect people who have close contact with them. Covid-19, a brand new and sometimes fatal respiratory disease that's thought to arise in China's live animal market, has spread quickly throughout that country and the planet. The new Coronavirus was first detected in Wuhan, China, in December 2019. Tens of thousands of people were infected in China, with the virus spreading quickly from person to person in many parts of that nation. The noble coronavirus infections were at first associated with travelling from Wuhan.

The virus has established itself in 177 countries and territories around the world in a fast-expanding pandemic. Health officials in the USA and around the world are working to contain the spread of the virus via public health measures such as social distancing, contact tracing, analyzing, quarantines, and travel restrictions. The World Health Organization declared the novel coronavirus outbreak "a Public Health emergency of international concern" on 30th January. On 11th March 2020, after the spread of the disease outside of China, the World Health Organization declared the COVID-19 epidemic a pandemic. Public Health measures, like once implemented in China and now around the world, will hopefully blunt the spread of the virus while treatments and the vaccine are developed to stop it. During the first two months of the present outbreak, COVID-19 spread rapidly throughout China. It caused a varying degree of illness, patients of 10 presented without fever, and many did not have abnormal radiologic findings.

Compliance with ethical standards

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Disclosure of conflict of interest

The study was approved by Dr. Purabi baral associate consultant of microbiology, sum ultimate medicare, bhubanewsar, all the collected data is copy from any other sources all method were carried out in accordance with approval guideline.

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