EGYPTIAN ACADEMIC JOURNAL OF
BIOLOGICAL SCIENCES
MICROBIOLOGY

G

ISSN
2090-0872

WWW.EAJBS.EG.NET

Vol. 14 No. 1 (2022)

Citation: *Egypt. Acad. J. Biolog. Sci. (G.Microbiolog) Vol.14 (1) pp.125- 138 (2022)*
DOI: 10.21608/EAJBSG.2022.230224

Egypt. Acad. J. Biolog. Sci., 14(1):125-138(2022)

Egyptian Academic Journal of Biological Sciences
G. Microbiology

ISSN: 2090-0872
https://eajbsg.journals.ekb.eg/

Transmission and Controlling Strategies of COVID-19

Ghafour, Omer Ahmed[1], **Khalaf, Jutyar kazm**[1] and **Hama Soor, Taib Ahmed**[1,2*]

1-Technical college of health and medical technology, Sulaimani polytechnic university, Sulaimani/ Iraq

2- Medical Laboratory Analysis, Cihan University-Sulaimaniya, Slemani, Iraq.

*E.Mail: omerahmad99@gmail.com - jutyarkazm97@gmail.com - dr.taibahmed@gmail.com

REVIEW INFO

Review History
Received: 4/2/2022
Accepted:19/3//2022
Available:22/3/2022

***Keywords*:**
ACE2, SARS-Cov 2, transmission, Covid-19.

ABSTRACT

The current threat to global health is the respiratory disease called Coronavirus Disease 2019 (Covid-19), which is affected by severe acute respiratory syndrome coronavirus 2 (SARS-Cov 2). Coronaviruses are covered, single? Do stranded RNA viruses infect lung alveolar epithelial cells of humans and a wide variety of animals through angiotensin? Converting enzyme II (ACE2) entry receptors. The essential four structural proteins of this virus are included spike (S), envelope (E), membrane (M), and nucleocapsid (N), which have a role in pathogenesis and disease transmission. Direct contacts and respiratory droplets are the fundamental way to transmit the disease. The clinical sign of COVID-19 alters by asymptomatic until severe respiratory failure. In this review, epidemiology, transmission, clinical indication, genetic diversity, prevention and control, and illness diagnosis were explained. This is an effort to expand the level of individual and social awareness against covid-19 infection and to present the most convenient way of protecting.

INTRODUCTION

The cause of mild and moderate respiratory infections has been reported by coronavirus across five decades. Although this class of viruses has been taken from many various animals, bats are accepted main natural reservoir of coronaviruses (Fung, T.S, *et al.*, 2019, Cui,J. *et al.*, 2019, Yu, P, *et al.* (2020)). In December 2019, Wuhan city in China declared an active pneumonia epidemic connected with a novel COVID, known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Ramanathan, K. *et al.*, 2020). After several weeks, infections increase rapidly all over the republic of china and worldwide (Phan, Lan, T, *et al.*, 2020, Giovanetti, M. *et al.*, 2020). Immediately Chinese media, scientific institutions, and clinical have responded rapidly about recognizing the newest virus. Also, the viral genome sequence is quickly published worldwide (Ramanathan, K. *et al.*, 2020). On 30th January 2020, the World Health Organization (WHO) reported an outbreak of Public Health Emergency of 5 International Concerns (PHEIC) (WHO, 2020). However, there are four human coronaviruses, HKU1, NL63, 229E, and OC43, identified as causes of the usual cold in humans (Fung, T.S 2019).

Previously-determined coronaviruses are MERS-CoV (2012), SARS CoV (2002) changed all identified closes about this virus class to these viruses caused severe acute respiratory infections and outbreaks. A novel coronavirus was identified as SARS -CoV-2 (2019) At the end of 2019. Unexpectedly came out in Wuhan city of the Hubei province of China. On January 31, 2020, The World Health Organization (WHO) announced that the epidemic is a public health emergency of international trouble. The coming out coronavirus infection, COVID-19, has been increasing worldwide, causing more than two million cases and 137,000 deaths on April 16, 2020. Also, In the Iraq region, more than 270,000 cases are recorded, with 35,000 deaths and 34,000 active patients. In a case like this, that takes a significant part in our lifetime by its spreading speed and transmissibility and its mortality.

Epidemiology:

The COVID19 epidemic spread throughout China in early December after being transferred to a rising number of countries from Wuhan, China's 7th most populous city. On the 13th of January 2020, the first confirmed case of COVID19 outside of China was discovered in Bangkok (Thailand) (WHO, 2020). On March 2nd, 2020, 8565 COVID19 confirmed cases had been recorded outside mainland China in 67 districts, resulting in 132 deaths. Significant community transmission is also occurring in other countries worldwide, including Iran and Italy, and the WHO declared a global pandemic on March 11, 2020. (Israel Ministery OF Health, 2020). Just a month after the outbreak, Guan et al. Conducted a systematic review of the clinical features of infected patients from more than 500 hospitals in 30 Chinese provinces. Even though COVID-19 is responsible for many deaths, SARS-CoV-2 appears to have a lower fatality rate when compared to SARS-CoV or MERS-CoV. Because of the disease's rapid spread, public health officials and government bodies have been forced to impose unprecedented measures such as tour restrictions, large-scale curfews, mask use, isolation, and quarantine of illness individuals. COVID-19 outbreaks have been declared in Wuhan, China, since December. However, the virus quickly spread to other countries globally, and the increased number of cases indicates that the disease is still spreading. To begin with, a large number of instances (>50 people) of acute pneumonia connected to COVID-19 have been recorded in China, all of which have been linked to a seafood marketplace in the Wuhan area. Following that, the number of infected people has risen to approximately ten million, which might still be underrated given the high likelihood of unrecovered exposures and asymptotic individuals.

The causal agent has been recognized as a unique kind of coronavirus, thanks to the sequence-based analysis of samples from patients. In addition, sequencing technology and other techniques have aided in accurately diagnosing viral infections (Shereen, m. a, *et al*,,2020, Guan, W . *et al.*, 2020). Those who had visited the fish market were initially thought to have been infected with SARS-CoV-2. Following further contact tracing and investigation of COVID-19-positive patients, it was discovered that several people who had never visited a seafood market tested positive for the disease. These findings suggested that the virus may be transmitted from person to person, later confirmed in more than 200 nations worldwide.

SARS-CoV-2 is mainly spread through cough, sneeze, respiratory droplets, or aerosols near an infected person. These aerosols could enter the lungs from the mouth or nose and be inhaled into the lungs. Other respiratory illnesses like SARS-CoV and MERS-CoV are also a possibility. Tiny droplets spread SARS-CoV-2. Respiratory droplets are droplets with a particle diameter greater than 5 to 10 m. Droplets smaller than 5 m in diameter are called nuclei (WHO,2014). Diseases are transmitted through tiny droplets. Airborne transmission is the term used to describe the virus that remains after huge droplets have evaporated.

These airborne droplets last for a long time in the atmosphere and can be transmitted over a distance of more than a meter between individuals. SARS-CoV-2, on the other side, is mainly spread through respiratory droplets and direct contact. Indeed, no airborne transmission was observed in a comprehensive investigation of over 75,000 COVID patients in China (WHO,2020). When a person comes into close contact with respiratory symptoms like coughing or sneezing.

SARS-CoV-2 is transmitted by droplets. Sick droplets from the infected individual's mucosae (mouth and nose) or conjunctiva could transmit the virus to others (eyes). The virus is most commonly transmitted through mucosae. However, it is also sent through the conjunctiva (Peng, Y, et al, 2020). SARS-CoV-2, like the other coronaviruses, can cause nosocomial outbreaks through environmental contamination. The manner and amount of environmental contamination, by the way, are still being investigated. Ong et al. Recently looked at various samples, including surface samples of things used on sick people, PPE samples, and swabs from patients in a well-protected isolation room (12 air exchanges per hour). SARS-CoV-2-positive individuals may have contaminated the surroundings by shedding respiratory droplets and feces, according to the research. Accurate and trustworthy statistics are necessary to comprehend the pandemic fully. They will likely aid in the study of disease spread and the assessment of the epidemic's impact on people's lives worldwide. Furthermore, statistical data can compare the efforts adopted by various countries to combat the pandemic. Due to a lack of data and difficulty in making an accurate diagnosis, estimates of many elements of disease, such as the rate of spread and death, were not very accurate. More reliable inferences may now be made because of the gathering of a large amount of data and the united efforts of many research institutions. Nonetheless, the whole study of the COVID-19 outbreak is announced in a hazy manner at several levels. The "number of COVID instances" reported by various media outlets, for example, is frequently inaccurate. Patients with symptoms were allowed to be treated as laboratory-confirmed without accurate laboratory testing, as was the situation in many cases. Simultaneously, the recorded case is defined as "a person who has had SARS-CoV-2 infection confirmed in the laboratory." Only a tiny percentage of the overall number of instances are confirmed. It counts only those with COVID-19 and confirmed their diagnosis by a lab (Ong, S.W.X. *et al.,* 2020. Roser, M. *et al.,* 2020).

Transmission:

According to recent research, the COVID19 virus is disseminated by respiratory droplets or contact channels (Liu, J, et al, 2020, Chan, J. F . W. *et al.,* 2020, Li, Q. *et al.,* 2020, Ramanathan,K. *et al.,* 2020, Burke,R.M.*etal.*,2020,WHO-CHINA,2019).

When a person comes in close touch with somebody coughing or sneezing (within one meter), droplet transmission occurs. As a consequence, the mucosae (mouth and noses) or conjunctiva (eye) may be exposed to potentially infectious respiratory droplets (often > 5-10 m in diameter). Fomites in the sick person's immediate environment can also spread the virus through droplets (Roser,M. *et al.,* 2020).

The COVID-19 virus is disseminated via direct contact with an infected person and indirect contact on surfaces containing the infected person's medical equipment, including a stethoscope or a thermometer.

Antibiotics within droplet nuclei, particles smaller than 5mm in diameter that forms when bigger droplets evaporate or exist among dust particles, are called droplet transmission. They have the potential to linger within the air for a long time and also be transferred to another over distances of much more than a meter.

In the case of COVID-19, airborne transmission could be possible in specific circumstances and settings in which aerosol-generating procedures like endotracheal intubation, bronchoscopy, nebulized treatment administration, manual ventilation before actual intubation, open suctioning,

turning the patient to the prone position, disconnecting the ventilator, non-invasive positive-pressure ventilation, tracheostomy, as well as cardiopulmonary resuscitation have been performed. An examination of 75,465 COVID-19 patients in China found no evidence of airborne transmission of the virus (WHO-CHINA. 2019).

COVID-19 infection has been linked to feces-borne intestinal disease. The COVID-19 virus has only been cultivated from a single stool sample in one investigation so far (Zhang, Y.et al., 2020).

Clinical Manifestations:

Clinical manifestations of COVID-19 range from asymptomatic shapes to clinical conditions affected by severe respiratory failure possibly requiring mechanical ventilation as well as support in intensive care (ICU) to multiorgan as well as systemic manifestations including such sepsis, septic shock, and multiple organ dysfunction syndromes (MODS) (Lupia, T.*et al.,* 2020). Although asymptomatic infections have indeed been explained, the prevalence of these illnesses has not been determined. Fever, cough, dyspnea, headache, sore throat, and rhinorrhea are the most common symptoms. In addition, pneumonia appears to be the most common serious illness, with symptoms including fever, cough, dyspnea, and bilateral infiltrates on chest imaging (Yang, Y.*et al.,* 2020). COVID-19 cannot yet be distinguished from other viral respiratory infections due to a lack of particular clinical characteristics.

Symptoms such as headaches, sore throat, & rhinorrhea have been less common. Besides respiratory symptoms, gastrointestinal issues (such as nausea & diarrhea) have indeed been reported. Although respiratory droplets are the most prevalent mode of infection, illness can also be spread through person-to-person contact among asymptomatic people (Lupia, T .*et al.*, 2020, Yang, Y.et al 2020). Headache (70.3%), loss of smell (70.2%), nasal obstruction (67.8%), rhinorrhea (60.1%), cough (63.2%), asthenia (63.3%), myalgia (62.5%), gustatory dysfunction (54.2%), sore throat (52.9%), and fever were the most prevalent symptoms in a study of 1420 patients with mild or severe illness (45.4 percent) (Lechien,J .R . *et al.,* 2020). COVID-19 hospitalized cases from various clinical settings were included in the latest World Severe Acute Respiratory & Emerging Infections Consortium (ISIC) study. The five most prevalent symptoms at admission are fever, shortness of breath, cough, weariness or malaise, and confusion (ISARIC), 2020). Fever, cough, and dyspnea (80.5 percent, 58.3 percent, and 23.8 percent, respectively) are the most prevalent clinical symptoms, per an examination of data from 4203 patients, most of whom were from China. In addition, the most prevalent comorbidities of hypertension, cardiovascular disease, & diabetes were 16.4 percent, 12.1 percent, and 16.4 percent, accordingly. And 9.8%, respectively (Zhang J., Y.,*et al.,* 2020). A study of 20133 hospitalized patients in acute care in England, Wales, and Scotland discovered three common clusters of complaints: respiratory symptoms, including cough, sputum, breathlessness, and fever. Musculoskeletal disorders include myalgia, joint discomfort, headaches, and fatigue. Enteric symptoms, including stomach pains, vomiting, and diarrhea, are the last symptoms (Docherty, A. B., *et al.,* 2020). Upon admittance, 29% of patients (5384/1805) had digestive issues caused mainly by respiratory symptoms. Only 4% of people suffered stomach issues. In 10 studies with a total sample of 1627 patients across North America, Europe, & Asia, olfactory or gustatory impairment was a common side effect, with a combined prevalence equal to 52.73 percent (Tong, J. Y. *et al.,* 2020). An altered taste sensation was found in 49.8% of COVID-19 patients in a pooled analysis from five investigations involving 817 participants (Aziz, M. *et al.,* 2020).

Causes of Infection:

The virus responsible for COVID-19 is SARS-CoV-2. This virus is a member of the Coronaviridae family in the Nidovirales order. Alfa (), beta (), gamma (), & delta () are really the four subgroups of coronaviruses

(). The four common human coronaviruses are 229E, NL63, OC43, and HKU1. SARS is generated by the SARS-CoV-2 coronavirus. Coronaviruses also contain SARS-CoV, MERS-CoV, as well as other zoonotic coronaviruses which cause acute lung injury. With roughly 80% nucleotide identity, SARS-CoV-2 is very similar to SARS-CoV. (Zhow, P., *et al.,* 2020).

Genetic Diversity:

Genetic diversity and ARS-CoV-2 variations: Unlike the other RNA viruses, coronaviruses have the molecular form shown below. A complicated molecular mechanism is required to ensure the integrity of the SARS-CoV-2 RNA genome and to prevent and correct mutations. As a result, SARS-sequence CoV-2's diversity and total evolution rate appear to be relatively low. Nevertheless, viral mutations occur and will become more widespread due to the biological evolution of advantageous mutations, accidental genetic drift, and epidemiologic factors. The D614G variation (also known as G614), which results from an A-to-G amino acid shift induced by such a single nucleotide substitution at position 23,403 in the Wuhan reference strain, is currently the most widely circulating variant of SARS-CoV-2 (D614). This variation, which originated in China, quickly spread over Europe and became the dominant strain in the world within a month. The viral community has become more homogeneous as SARS-CoV-2 is spread more rapidly than it evolves. The G614 variation has been linked to potentially increased viral loads, but not illness severity, according to CT-value analysis (Korber,B . *et al.,* 2020). Higher viral loads, however, do not involve more significant transmission potential, and the dispute about whether G614 is much more infectious than D614 continues, as Grubaugh et al. so eloquently highlighted (Grubaugh, D., N., *et al.,* 2020). Furthermore, the G614 variant is located in the S protein, according to the authors. Because this locus does not alter the virus's RBD, it looks unlikely that it will have a significant impact on vaccines currently in development or antibody-mediated protection. A second investigation was conducted, with 18514 sequences analyzed using phylogeny, population genetics, & structural bioinformatics. Also, a vaccination built on the Wuhan reference strain is likely to be effective against all currently circulating lineages, according to the findings (Dearlove, B., *et al.,* 2020). However, like with influenza, it is yet unknown if, over time, a slow accumulation of mutations will result in an antigenic drift of SARS-CoV-2, compromising vaccination effectiveness (Korber, B. *et al.,* 2020).

Covid-19 Diagnosis Technique:

In recent years, the Coronavirus outbreak has significantly impacted clinical microbiology laboratories. This opinion discusses current concerns and challenges in the laboratory detection of infections caused by the coronavirus two that causes acute respiratory syndrome (SARS (SARS-CoV-2). For a prompt and accurate identification of COVID-19, collecting the relevant respiratory specimen at the correct time from the right anatomic location during the preanalytical stage is crucial. Steps must be made to ensure the safety of lab employees while giving reliable test results. In the analytic phase of SARS-CoV-2 illness, real-time reverse transcription-PCR (RT-PCR) assays are still the method of choice for etiology diagnosis. In contrast, antibody-based approaches are becoming more familiar as additional tools. Testing results might be carefully evaluated using genetic and serological findings in the post-analytical phase. Lastly, random-access, integrated devices with expandable capacities available at the point of care will aid in the speedy and exact diagnosis and tracking of SARS-CoV-2 infections, greatly assisting in controlling this outbreak. To keep the laboratory workers safe while delivering reliable test findings, proper It is necessary to take measures. For the etiologic identification of SARS-CoV-2 infection inside the analytical stage, real-time reverse transcription-PCR (RT-PCR) tests remain the molecular method of choice. Antibody-based techniques, on the other hand, are gaining in popularity as

complementary tools. Both molecular and serological data could interpret testing results in the post-analytical phase. Finally, random-access, integrated devices with scalable capacities available at the point of care will aid in the prompt and accurate diagnosis and tracking of SARS-CoV-2 infections, assisting in the control of this outbreak significantly.

Laboratory Tests:

Lymphopenia, eosinopenia, and a neutrophil/lymphocyte ratio of less than 3.13 on a complete blood count indicate increased severity and a poor prognosis. An increased risk of cardiac injury or a worse prognosis is associated with thrombocytopenia. Lymphopenia is caused by a complex mechanism that includes the virus's cytotoxic action, apoptosis induction, IL1-mediated pyroptosis, and inflammatory cytokine-mediated suppression of bone marrow (Guan, W. *et al.*,2020). Increasing levels of C-reactive protein (CRP), ferritin, D-dimer, procalcitonin, lactic dehydrogenase (LDH), prothrombin time, amyloid serum protein A, creatine kinase (CK), glutamic pyruvic transaminase (SGPT), activated partial prothrombin time, urea, and creatinine, which could indicate a more severe disease, thromboembolic complications, myocardial damage, and worse prognosis.

Laboratory Findings:

COVID-19 (9) patients have been found to have the following test abnormalities:

- WBC normal, leukopenia, lymphopenia (80%+), & thrombocytopenia on a complete blood count
- Elevated BUN/creatinine, AST and ALT levels, and total bilirubin are among chemistries to look for. Procalcitonin levels that are normal or low.
- C-reactive protein levels are high, and ferritin levels are low.
- D-dimer, interleukin-6, and lactate dehydrogenase levels should all be increased.

Imaging:

Reduced CD4 + T, CD8+ lymphocytes, and NK cells, as well as elevated levels of IL6, H-8, IL-10, TNF-IL-2R, GM-CSF, and IL-1B, are immunological indicators that may reflect risk factors for increased severity or a worse prognosis (Sharma, A. *et al.*, 2020, Li, Z. *et al.*, 2020, Long, Q. *et al.*, 2020). Findings from the lab Individuals with COVID-19 (9) have shown the following diagnostic abnormalities: --WBC normal, leukopenia, lymphopenia (80%+), and thrombocytopenia on a complete blood count --Elevated BUN/creatinine, AST and ALT values, and total bilirubin are among chemistries to look for. Procalcitonin levels that are typical or low, C-reactive protein levels that are high, and low ferritin levels. --D-dimer, interleukin-6, and lactate dehydrogenase levels should all be increased. On presentation, imaging features are frequently lacking and would not diagnose COVID. Many patients had typical imaging at the time of diagnosis, but anomalies such as the following have been recorded (Guan, W. *et al.*,2020):

- Chest X-ray: bilateral, peripheral, and patchy opacities. Chest CT scan:
- bilateral ground-glass opacities, crazy paving, and consolidation.
- Point-of-care ultrasound: B-lines, pleural line thickening, and air bronchograms consolidating.

Prevention and Control:

WHO declared the coronavirus disease outbreak of 2019 (COVID-19) in December 2019, which began in Wuhan, China, a public health emergency of international importance (Assessment, W. H. O. R. 2020). By March 2, 2020, China had reported 80026 confirmed cases, resulting in 2009 deaths, and the outbreak had spread to 25 nations (National Health Commission of the People's Republic of China. 2020). China declared the disease a second-class infectious disease on January 20, 2020, but it has already implemented first-class contagious disease control procedures (considered the most dangerous category of infection). Global health first-level response measures were implemented in most parts of the country (considered the highest level of response). Faced with a rapidly progressing disease and many affected individuals, efficient treatment is urgently required. In any

case, some of the proposed interventions lack scientific support and have not been demonstrated to be beneficial. First, even though the air transmits COVID-19, air disinfection in cities and towns is not known to be effective in disease control and must be discontinued. Disinfectant and alcohol spraying in the skies, highways, marketplaces, cars, and persons have no value. Furthermore, large quantities of alcohol and disinfectant might be toxic to humans (National Health Commission of the People's Republic of China. 2020, WHO, 2020). Second, we might try to detect distinct risk factors using personal protective equipment, implement different epidemic preventive methods, and reduce confidential protective equipment waste, as these materials are already in short supply. Even though the general public widely uses surgical masks, there is no indication that they prevent COVID-19 infection. At the same time, they may help slow the transmission of disease from an infectious person. In hospitals where healthcare professionals directly interact with infected patients, high-filtration masks like N95 masks and protective clothes (goggles and gowns) must be used (National Health Commission of the People's Republic of China. 2020).

Both of these practices violate the World Health Organization's International Convention on Child's Rights. Third, traffic snarls and village lockdowns are useless in the fight against COVID-19. Some nations have suspended travel to and from China since the onset of COVID-19 and have enacted Health Regulations to restrict the spread of the disease (Habibi, R. *et al*. 2020). Individual village and community efforts to seal up roadways are likely to be ineffective in terms of disease prevention and control in the community (Ruyi L. 2020). Civil unrest and a drop in adherence to infection prevention recommendations could ensue from such efforts.

Fourth, to reduce the anxiety and suffering generated by misinformation, public health teaching should be founded on scientific evidence. Epidemiological findings, in particular, must be presented rapidly and objectively to be appropriately appraised and understood. The rate of infection initiation after 14 weeks of application to a known sick person or transfer during limited interaction (less than 15 minutes of face-to-face contact) is low and should not be overstated. Misinformation causes panic among the general public and makes it challenging to undertake epidemic standard precautions (WHO, 2020).

Fifth, the World Health Organization has said that antiviral medicines, antibiotics, glucocorticoids, and traditional Chinese medicine are not yet known to be effective treatments for COVID-19. Despite this, oseltamivir, lopinavir/ritonavir, prednisone, antibiotics, and traditional Chinese medicine have all been reported to be used in the treatment of COVID-19 patients (Wang, D. *et al.* 2020). Patients with COVID-19 should be careful not to be given medications with unclear efficacy since this could be harmful.

Control strategies and preventive

SARS-CoV-2 is highly contagious and pathogenic, and it thrives in the unique environment of public transportation. As a result, several efficient counter-measures, such as management measures, disinfection, environmental hygiene, personal protection, and health promotion, must be implemented to prevent or control the disease's spread:

Personal Protective Equipment:

The WHO advises against using a medical mask in public if you don't have any respiratory symptoms. Because it does not negate the importance of other infection-prevention methods, a single-use mask does not obstruct the sickness. COVID-19 infection is increased when the mask is misused. The priority usage of medical shows by health staff was stressed in the WHO's interim guidance "Advice about the use of masks in the case of COVID-19" (50). The ECDC recommends using face masks to prevent COVID-19 from spreading to possibly asymptomatic or pre-symptomatic patients (WHO, 2020). The community's using face masks may be solely for source control purposes. In epidemic scenarios,

where the amount of asymptomatic but infected people in the population is expected to be high, this measure can be handy. When visiting crowded and enclosed locations, such as grocery stores and shopping malls, using a face mask would've been recommended. When using public transportation for some workplaces and occupations that require physical proximity to many other people (such as police officers, shop assistants - if not behind a glass divider), teleworking is not an option. In early April 2020, the Centers for Disease Control and Prevention (CDC) modified its recommendations in the USA, advising people to wear a cloth respirator mask (such as homemade masks or bandanas) in public places where community distancing is hard to achieve, particularly in areas where community transmission is standard (CDC, 2020).

Social Distancing:

The goal is to reduce interactions among individuals in a larger community. Individuals who may be contagious but have yet to be found and thus have not been isolated (Wilder-Smith, A. *et al.,* 2020). Because respiratory droplets spread the disease, it necessitates proximity between people. As a result, the social distance between people reduces transmission. Social space is especially beneficial in situations where community transmission is suspected. Still, the connections between cases are uncertain, and where limiting exposure to only those who have been disclosed is thought to be ineffective in preventing further transmission. The closing of education or office buildings, as well as the suspension of open markets and the cancellation of meetings, are examples of social separation.

1. Quarantine:

One of the earliest used techniques for managing communicable illness epidemics is quarantine. Ships having arrived at the Venice port from plague-infected ports were required to attachment point and stand in line for forty days (in Italian: Quaranta for 40 days) before departing their surviving passengers. The restriction of actions or isolation of people who are not unwell but may have been exposed to an infected individual or disease to observe their symptoms and guarantee rapid identification of cases is called quarantine. Quarantine is not the same as isolation, separating diseased people from the rest of the population to prevent infection or contamination. According to the current research, quarantine has been the most effective approach for decreasing sick and deceased people (Outcomes, M. 2020, Iwasaki, A. and Grubaugh, N. D. 2020). It has proven to be far more efficient in countries that have implemented strong quarantine policies from the start. Results show that quarantine could reduce the number of diseases by 81 percent to 44 percent and the number of victims by 61 percent to 31 percent, according to a Cochrane Library study that evaluated 29 studies (Nussbaumer-Streit, B. *et al.*, 2020).

2. Cleaning and Disinfectant:

In healthcare environments where specific medical procedures are conducted, environmental surfaces are much more probable be infected with the COVID-19 virus (Ye, G. *et al.,* 2020, Faridi, S. *et al.* 2020, Roser, M. 2020). As a result, these surfaces, particularly those where COVID-19 patients are cared for, must also be thoroughly cleansed and disinfected to prevent future transmission. Similarly, this guidance applies to non-traditional settings for COVID-19 patients with uncomplicated and moderate illnesses, such as residences and non-traditional hospitals (WHO, 2020). SARS-CoV-2 is an enclosed virus with a frail outer lipid envelope, similar to other coronaviruses, making it more sensitive to disinfectants than non-enveloped viruses including rotavirus, norovirus, and poliovirus (Rutala, W. A. 2019). The COVID-19 virus has been studied to see how long it may survive on various surfaces. According to one study, the COVID-19 virus may be discovered on cloth and wood for up to 1 day, glass for up to 2 days, metal and plastic for up to 4 days, and the outermost part of a surgical mask for up to a week (Chin, A. W. H. *et al.*, 2020). The

COVID-19 virus lasted for four hours on copper, 24 hours on cardboard, and up to 72 hours on plastic and stainless steel, according to another investigation (Doremalen, N. van *et al.*, 2020). The COVID-19 virus can persist in various concentrations and temperature conditions, although it is vulnerable to heat and typical disinfection treatments (Chin, A. W. H. *et al.*, 2020). These experiments were carried out in a laboratory setting with no cleaning or disinfection procedures and should be taken with caution in a real-world environment. Cleaning is an essential first operation in every disinfection process because it removes germs or dramatically reduces their load on contaminated objects. Washing with water, soap, or a neutral detergent, as well as mechanical action, eliminates and eliminates dirt, debris, and other organic matter like blood, secretions, and excretions but does not destroy germs (John A., Jamie B., Yves C. 2008). As a result, after cleaning, a chemical disinfectant, such as chlorine or alcohol, should be used to eliminate any leftover bacteria. Seventy percent ethanol could clean areas that cannot be sanitized with bleach. Using a diluted bleach solution, clean and disinfect toilets and bathrooms (one-part bleach to 9 parts glasses of water to get a 0.5 percent sodium hypochlorite solution).

Prevention And Control Measures in Chamchamal Town:

The Kurdish authorities implemented several various containment measures. Restrictions on travel between cities, social distancing, cleaning and using disinfection of public places, and closure of schools and certain types of workplaces-also, and quarantine of chamchamal's citizens.

Activities of the youth center by cooperation with Aswda hospital in chamchamal by giving people more awareness and an eye-opening about novel coronavirus and providing information and instruction to chamchamal's population by reducing their fears and depression, and replacing it with instructions for prevention against the disease.

The Kurdish government announced on 1st March that all schools, including universities and institutes, were to be closed starting from March 10th.

The data mentioned in this section was in the chamchamal district dated from 15 March 2020 until the end of 2020, with 7910 tests. One thousand nine hundred ninety-one out of all tests were positive and had 113 deaths of all recorded cases. During the outbreak of Covid-19, two hospitals opened (Asuda and Omer khalifa hospital). Those patients from Aswda were severe cases with the best quality care and services from the hospital. Therefore, the number of patients that entered Aswda was 473. From this number, 97 of them died, and most of the cases were over 60 years. Also, male patients were more than female patients (%60.7 male, and %39.3 female) from Aswda hospital. Besides this hospital was Omer Khalifa hospital, which had patients with mild symptoms, and several patients entered the hospital where 436 patients between these patients, 16 died. The percentage of males was more than females (%62.2 male, and %37.8 female).

Conclusion

Even though COVID-19 has authorized vaccines that have lowered the risk of contamination, it is critical to prevent the disease's spread in society because it is a highly transmissible disease. Wearing masks, hand cleanliness, social distancing, and quarantine are the critical aspects in avoiding the transmission of the disease in society. Increased testing capacity, as well as the detection of more confirmed patients in the community, will help to reduce secondary cases by enforcing more stringent regulations.

REFERENCES

Assessment, W. H. O. R. (2020). Novel Coronavirus (2019-nCoV). https:// apps. who. int/iris/bitstream/ handle/ 10665/332071/WHO-2019-nCoV-HCW_risk_factors_protocol-2020. 3 -eng.pdf?sequence=1&is Allowed = y .

Aziz, M. *et al*. (2020). ‘Taste Changes (Dysgeusia) in COVID-19: A

Systematic Review and Meta-analysis', *Gastroenterology*, 159, pp. 1132–1133. doi: doi.org/10.1053 /j.gastro.2020.05.003.

Burke, R. M. *et al.* (2020). 'Active Monitoring of Persons Exposed to Patients with Confirmed COVID-19 — United States, January–February 2020', *MMWR. Morbidity and Mortality Weekly Report*, 69(9), pp. 245–246. doi: 10.15585/ mmwr.mm6909e1

Centers for Disease Control and Prevention (CDC) (2020). Coronavirus Disease 2019 (COVID-19) [online]. Website sick/ cloth-face-cover.html [Accessed 12 April 2020].

Chan, J. F. W. *et al.* (2020). 'A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster', *The Lancet*. Elsevier Ltd, 395(10223), pp. 514–523. doi: 10.1016/S0140-6736(20) 301 54-9.

Chin, A. W. H. *et al.* (2020). 'Stability of SARS-CoV-2 in different environmental conditions', *The Lancet Microbe*, 1(may2020), p. e10. doi.org/10.1016/ S2666-5247(20)30003-3.

Cui, J., Li, F. and Shi, Z. L. (2019) .'Origin and evolution of pathogenic coronaviruses', Nature Reviews Microbiology. Springer US, 17(3), pp. 181–192. doi: 10.1038/s41579-018-0118-9.

Dearlove, B. *et al.* (2020). 'A SARS-CoV-2 vaccine candidate would likely match all currently circulating variants', *Proceedings of the National Academy of Sciences of the United States of America*, 117(38), pp. 23652–23662. doi: 10.1073/pnas.2008281117

Docherty, A. B. *et al.* (2020). 'Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO Clinical Characterisation Protocol: Prospective observational cohort study, *The BMJ*, 369(March), pp. 1–12. doi: 10.1136/bmj.m 1985.

Doremalen, N. van *et al.* (2020). 'Aerosol and Surface Stability of SARS-CoV-2 as Compared with SARS-CoV-1', *The new engl and journal of medicine Corre*, 2020(382), pp. 1564–1567. doi: 10.1056/NEJMc 2004973

European Centers for Disease Control (ECDC) (2020). Using face masks in the community reduces COVID-19 transmission from potentially asymptomatic or pre-symptomatic people through use of face masks ECDC Technical Report[online].(https://www.cd. gov/ coronavirus/2019-ncov/ prevent getting- ssed 8 April 2020).

Faridi, S. et al. (2020). 'Afield indoor air measurement ofSARS-CoV-2 in the patient rooms of the largest hospital in Iran', *Science of the Total Environment journal*, 735(2020), p. 138401. doi: doi. org/ 10.1016/j.scitotenv. 2020. 138401.

Fung, T. S. and Liu, D. X. (2019). 'Human Coronavirus: Host-Pathogen Interaction', pp. 529–560.

Giovanetti, M. *et al.* (2020). 'The first two cases of 2019-nCoV in Italy: Where they come from?', *Journal of Medical Virology*, 92(5), pp. 518–521. doi: 10.1002/ jmv.25699.

Grubaugh, D. N. *et al.* (2020). 'Making Sense of Mutation: What D614G Means for the COVID-19 Pandemic Remains Unclear',

Cell, 182(4), pp. 794–795. doi: doi.org/10.1016/j.cell.2020.06.040.

Guan, W. *et al.* (2020). 'Clinical Characteristics of Coronavirus Disease 2019 in China', *New England Journal of Medicine*, 382(18), pp. 1708–1720. doi: 10.1056/nejmoa2002032.

Habibi, R. *et al.* (2020). 'Do not violate the International Health Regulations during the COVID-19 outbreak', Lancet, 395, pp. 664–666. doi: doi.org/10.1016/S0140-6736(20)30373-1.

ISARIC. (2020). COVID-19 Report: 19 May 2020. https://media.tghn.org/ medialibrary/ 2020/05/ ISARIC_Data_Platform_COVID-19_Report_19MAY20.pdf

Israel Ministry of Health. (2020). 'The Novel Coronavirus - Guidlines', 49(3), pp. 105–107. Available at: https://govextra.gov.il/ministry -of-health/corona/coronavirus/guidelines/.

Iwasaki, A. and Grubaugh, N. D. (2020). 'Why does Japan have so few cases of COVID- 19?', *EMBO Molecular Medicine*, 12 (e12481), pp. 10–12. doi: 10.15252/emmm.202012481

John A., Jamie B., Yves C. (2008). Essential environmental health standards in health care, WHO Library Cataloguing-in-Publication Data.

Korber, B. *et al.* (2020). 'Tracking Changes in SARS-CoV-2 Spike: Evidence that D614G Increases Infectivity of the COVID-19 Virus', *Cell*, 182(4), pp. 812-827.e19. doi: 10.1016/j.cell.2020.06.043.

Lechien, J. R. *et al.* (2020). 'Clinical and epidemiological characteristics of 1420 European patients with mild-to-moderate coronavirus disease 2019', *Journal of Internal Medicine*, 288(3), pp. 335–344. doi: 10.1111/ joim.13089.

Li, Q. *et al.* (2020). 'Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia', *New England Journal of Medicine*, 382(13), pp. 1199–1207. doi: 10.1056/nejmoa 2001316.

Li, Z. *et al.* (2020). 'Development and clinical application of a rapid IgM - IgG combined antibody test for SARS - CoV - 2 infection diagnosis', *Journal of Medical Virology*. John Wiley & Sons, Ltd, (February). doi: 10.1002/jmv.25727.

Lili F. (2020). Why is the incubation period of the new corona virus from 3 to 24 days? *Science and Technology Daily;* Feb 14, 2020.science/202002/14/c_138782675.htm (accessed Feb 17, 2020). https://www. thelancet. com/journals/laninf/article/PIIS14733099(20)301523/fulltext?luicode=10000011&lfid=1076032181898044&u=https%3A%2F%2Fwww.thelancet.com%2Fjournals%2Flaninf%2Farticle%2FPIIS1473-3099%2820 % 2930152-3%2Ffulltext

Liu, J. *et al.* (2020). 'Community Transmission of Severe Acute Respiratory', *Emerging Infectious Diseases*, 26(6).

Long, Q. *et al.* (2020). 'Antibody responses to SARS-CoV-2 in patients with COVID-19', 26(June). doi: 10.1038/s41591-020- 0897-1.

Lupia, T. *et al.* (2020). '2019 novel coronavirus (2019-nCoV) outbreak: A new challenge', *Journal of Global Antimicrobial Resistance*, 21(2020), pp. 22–27.

National Health Commission of the People's Republic of China. (2020). Notice of the General Office of the National Health and Health Commission on

issuing the guidelines for the use of common medical protective products in the prevention and control of pneumonia infected by a new coronavirus (trial). Jan 27.(accessed Feb 25, 2020). https://www.ncbi.nlm. nih.gov/ pmc/articles/PMC7580738/

National Health Commission of the People's Republic of China. (2020). Notice of the General Office of the National Health and Health Commission on issuing a new coronavirus pneumonia prevention and control plan (fourth edition). Feb 7, 2020.(accessed Feb 17, 2020). http://en.nhc.gov.cn/202003/29/ c_ 78469.htm

Nussbaumer-Streit, B. *et al.* (2020). 'Quarantine alone or in combination with other public health measures to control COVID-19: a rapid review (Review)', *Cochrane Database of Systematic Reviews Quarantine,* (4), p. Art. No.: CD013574. doi: 10. 1002/ 14651858. CD013574.www. cochranelibrary.com.

Ong, S. W. X. *et al.* (2020). 'Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) from a Symptomatic Patient', *JAMA - Journal of the American Medical Association,* 323(16), pp. 1610–1612. doi: 10.1001/ jama. 2020.3227.

Outcomes, M. (2020). 'Association of Public Health Interventions With the Epidemiology of the COVID-19 Outbreak in Wuhan, China', 02115(19), pp. 1915–1923. doi: 10.1001/jama. 2020.6130. https://jamanetwork. com/journals/jama/fullarticle/27 64658/

Peng, Y. and Zhou, Y. H. (2020). 'Is novel coronavirus disease (COVID-19) transmitted through conjunctiva?', *Journal of Medical Virology,* 92(9), pp. 1408–1409. doi: 10.1002/jmv. 25753.

Phan, Lan T., *et al.* (2020). 'Importation and Human-to-Human Transmission of a Novel Coronavirus in Vietnam', *The new engl and journal of medicine,* 382(9), pp. 872–874. doi: 10.1056/NEJMc2001272.

Ramanathan, K. et al. (2020). 'Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China', The Lancet, 395(January), pp. 497–506.

Roser, M.; Ritchie, H.; Ortiz-Ospina, E.; Hasell, J. (2020). Coronavirus Disease (COVID-19) Statisticsand Research. Our World Data. (2020). Available online: https://www. sipotra. it/w-content/ uploads/ 2020/ 03/Coronavirus-Disease-COVID-19 (accessed on 23 December 2020).

Rutala, W. A. (2019). 'Best Practices in Disinfection of Noncritical Surfaces in the Healthcare Setting', Am J Infect Control, 47, pp. A96–A105.

Ruyi L. (2020). Ministry of Communications: it is strictly forbidden to seal highways, highways, and quarantine stations. *Beijing Daily Client;* Feb 11, 2020. (Accessed Feb 17, 2020). https://www.thelancet. com/ pdfs/journals/ laninf/ PIIS1473-3099(20) 30152-3.pdf

Sharma, A. *et al.* (2020). 'Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2): a global pandemic and treatment strategies Atul', *International Journal of Antimicrobial Agents journal,* 56(2020), p. 106054 Contents. doi: doi.org/10. 1016/ j.ijantimicag.2020.106054.

Shereen, M. A. *et al.* (2020). 'COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses', *Journal of Advanced Research*. THE AUTHORS, 24(2020), pp. 91–98. doi: 10.1016/j.jare.2020. 03. 005.

Tong, J. Y. *et al.* (2020). 'The Prevalence of Olfactory and Gustatory Dysfunction in COVID-19 Patients: A Systematic Review and Meta-analysis', *Otolaryngology -Head and Neck Surgery (United States)*, 163(1), pp. 3–11. doi: 10. 1177/ 0194599820926473

Wang, D. *et al.* (2020). 'Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China', JAMA, 323(11), pp. 1061–1069. doi: 10.1001/jama.2020.1585.

WHO. (2020). Coronavirus disease 2019 (COVID-19),. situation report 29. Jan 31, 2020.situation-reports/20200218-sitrep-29 covid-19. (Accessed Feb 29, 2020). https://www.who.int/ docs/default-source/coronaviruse/ situation-reports/ 20200218-sitrep-29-covid-19.pdf

WHO. (2020). Statement on the second meeting of the International Health Regulations. (2020) (2005) Emergency Committee reg arding the outbreak of novel coronavirus (COVID-19). January 30, 2020; Accessed in April 2020 https://www.who.i nt/news-room/detail/30-01-2020- statement-on-the-second-meeting- of-the-international- health-regulations-(2005)-e mergency- committee-regarding- the-outbreak-of-novel-coronavirus-(2019-ncov).

WHO. Coronavirus disease (COVID-19) technical guidance. (2020): infection prevention and control. coronavirus-2019/technical-guidance/infection-prevention-and-control (accessed Feb 17, 2020). https://www.who. int/emergencies/ diseases/novel-coronavirus2019/technical-guidance /infection-prevention-and-control/

WHO-China Joint Mission on Coronavirus Disease .(2019.)and World Health Organization (WHO) .(2020). *Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19), The WHO-China Joint Mission on Coronavirus Disease 2019*. Available at: https://www.who. int/docs/default-source/ coronavirus /who-china-joint-mission-on-covid-19-final-report.pdf.

Wilder-Smith, A. *et al.* (2020). 'Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak', *journal of travel medicine*, pp. 1–4. doi: 10. 1093 /jtm/taaa020.

World Health Organization (WHO) (2020). Advice on the use of masks in the context of COVID-19: interim guidance, 6 April 2020 [online]. (Accessed 12 April 2020. https://apps.who.int/ iris/ handle/10665/331693

World Health Organization Novel Coronavirus (2019-nCoV), (2020). Situation Report 1. 21 January 2020. (Accessed on 25 March 2020). https://www.who. int/ emergencies/ diseases/ novelcoronavirus2019/ situation -reports.

World Health Organization. (2014). Infection Prevention and Control of Epidemic- and Pandemic-Prone Acute Respiratory Infections in Health Care; World Health Organization: Geneva, Switzerland, 2014. https://www.who.int/publications/i/item/infection-prevention and control of-epidemic-and-pandemic-prone-

acute-respiratory-infections-in-health-care

World Health Organization. Modes of Transmission of Virus Causing COVID-19. (2020): Implications for IPC Precaution Recommendations: Scientific Brief, 27 March 2020; World Health Organization: Geneva, Switzerland, 2020. https:// covid19-evidence. paho. org/ handle /20.500.12663/856.

World Health Organization; (2020). Home care for patients with suspected novel coronavirus (nCoV) infection presenting with mild symptoms and management of contacts. (2020) Geneva: (for-patients-with-suspected-novel-coronavirus-(ncov) -infection-presenting-with-mild-symptoms-and-management-of-contacts, accessed 10 May 2020). https://apps.who.int/iris/rest/bitstreams/1292529/retrieve

Yang, Y. *et al.* (2020). 'The Deadly Coronaviruses: The 2003 SARS Pandemic and the 2020 Novel Coronavirus Epidemic in China, The Company' s Public News and Information', Journal of Autoimmunity, 109(January), p. 102487. doi: doi.org/10.1016 /j.jaut. 2020.102434.

Ye, G. *et al.* (2020). 'Environmental contamination of SARS-CoV-2 in healthcare premises', *Journal of Infection*, 81(2020), pp. e1–e5. doi: doi.org/10.1016/j. jinf.2020.04.034.

Yu, P. and Hu, B. (2020). 'Geographical structure of bat SARS-related coronaviruses', *Infection, Genetics and Evolution*, 69(2019), pp. 224–229. doi: 10. 1016/j.meegid.2019.02.001.

Zhang, J. J. Y. *et al.* (2020). 'Risk Factors for Severe Disease and Efficacy of Treatment in Patients Infected with COVID-19: A Systematic Review, Meta-Analysis, and Meta-Regression Analysis', *Clinical Infectious Diseases*, 71(16), pp. 2199–2206. doi: 10. 1093/cid/ciaa576.

Zhang, Y. *et al.* (2020). 'Isolation of 2019-nCoV from a Stool Specimen of a Laboratory-Confirmed Case of the Coronavirus Disease 2019 (COVID-19)', China CDC Weekly, 2(8), pp. 123–124. doi: 10. 46234/ccdcw2020.033.

Zhou, P. *et al.* (2020). 'A pneumonia outbreak associated with a new coronavirus of probable bat origin', Nature. Springer US, 579(7798), pp. 270–273. doi: 10. 1038/s41586-020-2012-7.