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Overview of the Introduction to the New Coronavirus (Covid19): A Review

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ABSTRACT

The word corona means “crown,” and when examined clearly, the round virus has a “crown” of proteins called peplomers jutting out from its center in every direction. This paper looks at the cause, effects of COVID19 and treatment. Also, comparing with similar forms of this virus and possible means of transfer, symptoms were distinguished and preventive methods such as hand washing, touching of surfaces, being calm, avoid panic, personal hygiene, etc. This paper made clear insight into previous studies and hope which were and are been proved by some acceptable sources. The paper suggests some procedures for controlling and having a united whole management to inhibit the pandemic issue.

Keywords: COVID19; Crown; Virus; Washing; Risk
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INTRODUCTION

A coronavirus gets its name from the way it looks under a microscope. The word corona means “crown,” and when examined nearly, the round virus has a “crown” of proteins called peplomers jutting out from its center in every direction. These proteins help the virus identify whether it can infect its host. The condition known as severe acute respiratory syndrome (SARS) was also linked to a highly infectious coronavirus back in the early 2000s. The SARS virus has since been included and found to be successfully curable (WHO, 2020; NHB, 2020). The disease is caused by the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously referred to as the 2019 novel coronavirus (2019-nCoV) (CDC, 2020). It is primarily spread between people via respiratory droplets from coughs and sneezes (Campbell, 2020; CDC, 2020). Lungs are the organs most affected by COVID-19 because the virus accesses host cells via the enzyme ACE2, which is the most abundant in the type II alveolar cells of the lungs. The virus uses a special surface glycoprotein, called "spike", to connect to ACE2 and intrude the hosting cell (Letko et al., 2020). The density of ACE2 in each tissue correlates with the severity of the disease in that tissue and it has been suggested that decreasing ACE2 activity might be protective (Zhang et al., 2020; Zheng et al., 2020) though another view is that increasing ACE2 using Angiotensin II receptor blocker drugs could be protective and that these hypotheses need to be tested by determining the clinical patient records (Jin et al., 2020 ; WHO, 2020). As the alveolar disease progresses respiratory failure might develop and death might ensue. ACE2 might also be the path for the virus to assault the heart causing acute cardiac injury. People with existing cardiovascular conditions have the worst prognosis.

The virus is thought to have an animal origin. It was first transmitted to humans in Wuhan, China, in November or December 2019, and the primary source of infection became human-to-human transmission by early January 2020.

COVID-19 vs. SARS

In early 2020, a new kind of virus began generating headlines all over the world because of the unprecedented speed of its transmission. From its origins in a food market in Wuhan, China in December 2019 to countries as far-flung as the United States and

the Philippines, the virus (officially named COVID-19) has infected tens of thousands, with a rising death toll now over 2,000. But despite the global panic in the news about this virus, you are unlikely to contract COVID-19 unless you have been in contact with someone who recently traveled to certain parts of China. There is no need to worry about the 2019 coronavirus if you have not recently traveled to China or been in contact with someone who have been diagnosed with the virus. Information on the new coronavirus is coming out rapidly. The accuracy of the following information is subject to change. This is not the first time a coronavirus has made news, the deadly 2003 SARS outbreak was also caused by a coronavirus. As with the 2019 virus, the SARS virus was first found in animals before it spread to humans. The SARS virus is thought to have come from bats and then was transferred to another animal, and then to humans. Once transmitted to humans, the SARS virus began spreading quickly among people. What makes COVID-19 so newsworthy is that a treatment or cure has not yet been developed to help prevent its rapid spread from person to person. SARS has been successfully contained and treated.

What are the symptoms?

Doctors are learning new things about this virus every day. So far we know that COVID-19 may not initially cause any symptoms. Any individual can carry the virus for 2 days or up to 2 weeks. Some common symptoms that have been specifically linked to the 2019 coronavirus include: feeling short of breath, having a cough that gets more severe over time, a low-grade fever that gradually increase body temperature. The full list of symptoms is still being investigated. If you experience any of the symptoms above and have traveled to China in the past 14 days, or have been in close contact with someone with confirmed COVID-19 within the last 14 days, call your doctor right away. The symptoms of COVID-19 are similar to that of the influenza (flu) virus. The flu virus is much more common and much more deadly than the 2019 coronavirus. At least 6.8 percent of Trusted Source of people who developed the flu during the 2019–2020 flu season in the United States have died (as of February, 2020), compared to around 2 percent trusted Source of those diagnosed with the 2019 coronavirus (WHO, 2019). Here are some common symptoms of a flu infection: cough, runny or stuffy nose, sneezing, sore throat, fever, headache, fatigue, chills, body aches and lacking taste and smell.

How are coronaviruses diagnosed?

Diagnostic guidelines released by Zhongnan Hospital of Wuhan University suggested methods for detecting infections based upon clinical features and epidemiological risk. These involved identifying people who had at least two of the following symptoms in addition to a history of travel to Wuhan or contact with other infected persons: fever, imaging features of pneumonia, normal or reduced white blood cell count, or reduced lymphocyte count (Jin, 2020; Daniel and Annie S, 2019).

A study published by a team at the Tongji Hospital in Wuhan on 26 February 2020 showed that a chest CT scan for COVID-19 has more sensitivity (98%) than the polymerase chain reaction (71%).

False-negative results may occur due to PCR kit failure, or due to other issues with the sample or issues performing the test. False-positive results are likely to be rare (Sauder et al., 2006; Bai, 2020; Ahandani, 2018). The 2019 coronavirus can be diagnosed similarly to other viral infections: using a blood, saliva, or tissue sample. In the United States, only the CDC Trusted Source currently can diagnose a COVID-19 infection (Ciota et al., 2007; Shi et al., 2008). Talk to your doctor right away if you think you have a coronavirus infection, especially if you've traveled to China in the past 14 days. Your doctor will speak to local public health officials to provide guidance on whether testing for the virus is needed. A laboratory technician will either draw a sample of your blood with a needle or use a cotton swab to take a small sample of saliva or respiratory secretions from your nose or the back of your throat (WHO, 2020; CDC, 2020; Alinia-Ahandani et al., 2018). The sample is then sent to a testing facility to confirm the presence of viral material or antibodies that respond to the virus.

How to prevent coronaviruses?

Preventive measures to reduce the chances of infection in locations with an outbreak of the disease are similar to those published for other coronaviruses: stay at home, avoid travel and public activities, wash hands with soap and hot water often, practice good respiratory hygiene and avoid touching the eyes, nose, or mouth with unwashed hands (Hoffmann et al., 2019; Iwata-Yoshikawa et al., 2019; Gao et al., 2020; Alinia-Ahandani et al., 2020). Social distancing strategies aim to reduce contact of infected persons with large groups by closing schools and workplaces, restricting travel and canceling mass gatherings. The best way to prevent the spread of this virus is to avoid or limit contact with people who are showing symptoms of the virus and have traveled to China in the past 14 days. The next best thing you can do is practice good hygiene to prevent bacteria and viruses from spreading:

(i) Wash your hands frequently for at least 20 seconds at a time with warm water and soap.

(ii) Do not touch your face, eyes, nose, or mouth when your hands are dirty.

(iii) Do not go out if you're feeling sick or have any cold or flu symptoms.

(iv) Cover your mouth with the inside of your elbow whenever you sneeze or cough. Throw away any tissues you use to blow your nose or sneeze right away.
(v) Keep any objects you touch a lot clean. Use disinfectants on objects like phones, computers, utensils, dishware, and door handles.
(vi) First and foremost, do not panic. You do not need to wear a mask or be quarantined unless you have been diagnosed with this coronavirus. Following simple hygiene guidelines may help prevent you from developing this and other viruses. The 2019 coronavirus probably seems scary when you read the news about new deaths, quarantines, and travel bans to and from China. But in context, the coronavirus is much less severe and widespread than more common and more threatening infectious conditions, like the flu.
(vii) Stay calm and follow your doctor's instructions if you are diagnosed with a coronavirus infection so that you can recover and help prevent it from spreading.
South Korea declared a health "red alert" last week as cases soared there. Investigators have not yet been able to determine the source of several of the country's 833 known cases. Today, the UN granted the International Federation of Red Cross and Red Crescent Societies an exemption from sanctions on North Korea so it could help the impoverished country deal with Covid-19. We also do not know the source of many of the 165 cases in northern Italy, and there are a handful of similarly untraceable cases in seven other countries (Praveen, 2020; Lu and Drug, 2020; Wang et al., 2020). Until now, efforts to fight the virus have focused on containment, in which all detected cases and their contacts are quarantined. But when there is enough infection about, people catch it without it being obvious who they got it from (WHO, 2020). Once the virus spreads "in the community" this way, like flu, containment becomes impossible. That is the "window" Tedros fears is closing. As containment fails, countries enter the "mitigation" phase of epidemic response, with quarantine replaced by actions such as closing schools, canceling mass gatherings and similar "social distancing" measures (WHO, 2019; WHO, 2020; CDC, 2020). This is aimed not at preventing the epidemic, but slowing it, so cases won't peak so fast that they overwhelm medical facilities. It is possible, even likely, that community spread of the virus may eventually happen in the US, Nancy Messonnier of the US Centers for Disease Control and Prevention said on 21 February (Iwata-Yoshikawa et al., 2020; Gao et al., 2020; Zhou et al., 2020). The US is using random screening for the virus in six cities, including Honolulu, which gets heavy air traffic from Asia. Research finds new ways COVID-19 can be spread. Researchers are studying how people infected shed the virus and what impact it's having on affected populations. Testing and confirmation of COVID-19 infection are currently carried out by oral swabs. But research published February 17,2019 in Emerging Microbes and Infections finds evidence that there's an oral-fecal transmission route. The scientists reported that COVID-19 genetic material was detected in both anal swabs and blood samples. Chinese researchers conducted the study in Wuhan, China, hospital, and analyzed samples collected from about 180 patients (WHO, 2020; CDC, 2020). Recommended measures to prevent the disease include frequent hand washing, maintaining distance from other people and not touching one's face (CDC, 2020). The use of masks is recommended for those who suspect they have the virus and their caregivers but not for the general public (Li et al., 2019; Beeching et al., 2020; Cascella et al., 2020). There is no vaccine or specific antiviral treatment for COVID-19; management involves treatment of symptoms, supportive care and experimental measures.
Crucially, evidence of COVID-19 was found in anal swabs and blood- even when it wasn't detected using oral swabs. According to the study, this was particularly true for those people receiving supportive care for several days. Findings also suggest that timing is an important factor. On day 1 of the illness, 80 percent of oral swabs were COVID-19-positive, but by day 5, 75 percent of anal swabs were positive, while only half of the oral swabs showed infection, according to the study. This means that sneezing isn't the only way for transmission; blood and fecal matter can carry the virus, even when conventional testing comes back negative.

Coronavirus study finds who most at risk is

Although medical staff, people with illnesses, and older adults are most at risk, more than 80 percent of COVID-19 cases have been mild, according to a new report from the Chinese Center for Disease Control and Prevention (China CDC, 2020). The Hubei province in China, where the infection is believed to have originated, is the hardest hit, according to the report. The province's death rate is almost 3 percent, compared with just under a half percent in the rest of the country. In the United States, the Americans who were evacuated from the Diamond Princess cruise ship on U.S. charter flights are being tested and treated for COVID-19, according to the University of Nebraska Medical Center. They'll be held in the new National Quarantine Unit, which was designed to safely monitor Americans after exposure to an infectious disease. The unit is nearby the Nebraska Biocontainment Unit Team, which cared for three people who contracted Ebola in 2014. The information currently available about the different COVID-19 clusters of cases in four Regions in Italy is limited. The situation is dynamically evolving, with more cases expected in the coming days. The risk assessment for the EU/EEA might change when more data become available. The clusters are currently limited to a few Regions in northern Italy. No close contacts or other related cases have been reported to be linked to other European countries. The possibility of

new introductions from other countries outside China in the EU/EEA appears to be increasing as the number of non-EU/EEA countries reporting cases keeps going up. Among the increasing number of countries reporting COVID-19 cases are Israel, Lebanon, Iran, and Egypt, while the number of cases in countries outside of China (South Korea, Japan) has been increasing over the last few days. This also increases the possibility of cases being introduced from other countries outside China by travelers to the EU/EEA. The impact of sustained transmission in the EU/EEA would be moderate to high, especially for elderly populations with comorbidities, given that the reported case severity is high among these groups (Bull et al., 2005; Eigen, 1993; Alinia-Ahandani et al., 2019; Shi et al., 2008., WHO, 2020; CDC, 2020).

The current event in Italy indicates that local transmission may have resulted in several clusters for which an epidemiological link to areas where ongoing transmission is presumed, was not apparent. The accumulated evidence from clusters reported in the EU/EEA and the UK indicates that once imported, the virus causing COVID19 can transmit rapidly. This may emanate from cases with mild symptoms that do not provoke healthcare-seeking behaviour. The increases in cases and the number of countries outside China reporting those cases increases the potential routes of importation of the infection into the EU/EEA and the UK. If a significant increase in COVID-19 cases were to coincide with a high level of influenza activity, the potential impact on healthcare systems would be moderate to high. The increased number of cases would require additional resources for testing, case management, surveillance, and contact tracing. Increased transmission could result in further pressure on healthcare systems. This situation would be exacerbated should a substantial number of healthcare workers become infected (WHO,2020; Alinia-Ahandani et al., 2020).

As governments and health officials worldwide grapple with the epidemic of severe acute. With as many as 72,000 cases, the national security strategy for COVID-19 within China has shifted to so-called wartime control measures, putting cities on lockdown and affecting an estimated 760 million people. Regional identification, isolation, and treatment implementation have brought a range of high-tech and militarized approaches (Gurwitz, 2020; Mahtani, 2020; WHO, 2020). Identification of suspected cases has included extensive efforts in contact tracing, using everything from transportation documents to mobile phone hotlines. Harsh criticism has been levied about the silencing of dissenting voices in China, including Dr. Li Wenliang, who was arrested after raising concerns about the virus on social media and subsequently died from COVID-19. Other concerns have been raised about reported measures such as isolation and mass round-ups and quarantining of people at makeshift medical facilities for unspecified durations. Western media have also reported that some residential areas have been sealed off in a grid system, with checkpoints and monitoring of movements, effectively detaining residents. Some internal public transport and external travel to China have been halted via advisories and bans restricting commercial flights. However, there is little evidence that travel bans effectively halt the spread of infectious diseases, and instead, they can hamper supply chains, lead to stigma and mistrust, and might violate the principles of the International Health Regulations, as outlined in a Comment published in The Lancet (WHO,2020, Alinia-Ahandani et al., 2020).

Research and vaccine

There's currently no treatment specifically approved for the 2019 coronavirus, and no cure for an infection, although treatments and vaccines are currently under study. Instead, treatment focuses on managing symptoms as the virus runs its course (WHO, 2020; CDC, 2020). Seek immediate medical help if you think you have COVID-19. Your doctor will recommend treatment for any symptoms or complications that develop. Other coronaviruses like SARS and MERS do have vaccines and treatments. Some treatments for these similar viruses include: antiviral or retroviral medications, breathing support like mechanical ventilation, steroids to reduce lung swelling, blood plasma transfusions (Ciota et al., 2007; Li and Clercq, 2020; Steenhuysen et al., 2020; Praveen, 2020). Because of its key role in the transmission and progression of the disease, ACE2 has been the focus of a significant proportion of research and various therapeutic approaches have been suggested. There is no available vaccine, but research into developing a vaccine has been undertaken by various agencies. Previous work on SARS-CoV is being utilized because SARS-CoV-2 and SARS-CoV both use ACE2 enzyme to invade human cells (CDC, 2020). Three vaccination strategies are being investigated. First, researchers aim to build a whole virus vaccine. The use of such a virus is inactive or dead, aims for a prompt immune response of the human body to a new infection with COVID-19. A second strategy, subunit vaccines, aims to create a vaccine that sensitizes the immune system to certain subunits of the virus. In the case of SARS-CoV-2 such research focuses on the S-spike protein that helps the virus intrude the ACE2 enzyme. A third strategy is the nucleic acid vaccines (DNA or RNA vaccines, a novel technique for creating a vaccination). Experimental vaccines from any of these strategies would have to be tested for safety and efficacy. No drug has yet been approved to treat coronavirus infections in humans by the WHO although some are recommended by the Korean and Chinese medical authorities (WHO, 2020).Trials of many antivirals have been started in patients with COVID-19 including oseltamivir,

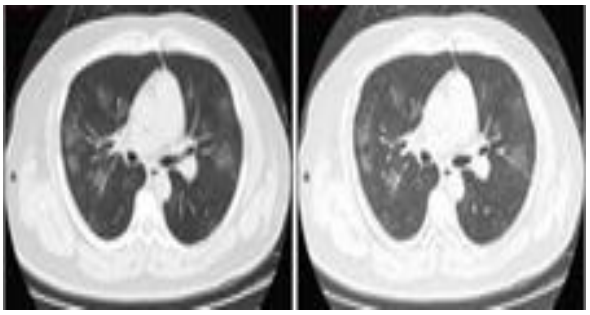

Figure 1. Typical CT imaging findings.

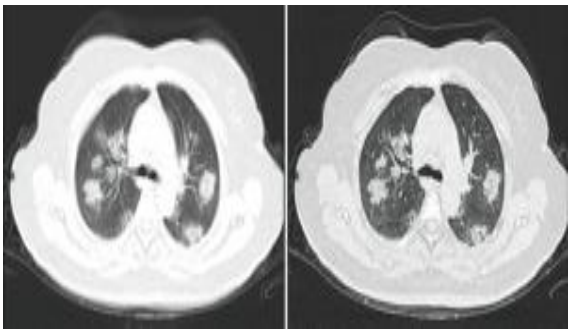

Figure 2. CT imaging of rapid progression stage.

lopinavir/ritonavir, ganciclovir, favipiravir, baloxavir marboxil, umifenovir, interferon alfa but currently, there are no data to support their use. Korean Health Authorities recommend lopinavir/ritonavir or chloroquine and the Chinese 7th edition guidelines include interferon, lopinavir/ritonavir, ribavirin, chloroquine and/or umifenovir. Research into potential treatments for the disease was initiated in January 2020, and several antiviral drugs are already in clinical trials.Although, completely new drugs may take until 2021 to develop. Several of the drugs being tested are already approved for other antiviral indications or are already in advanced testing. Remdesivir and chloroquine effectively inhibit the coronavirus in vitro. Remdesivir is being trialled in US and China (CDC, 2020). Preliminary results from a multicentric trial announced in a press conference and described by Gao, Tian and Yang, suggested that chloroquine is effective and safe in treating COVID-19 associated pneumonia, improving lung imaging findings (Figures 1 and 2) (Salehi et al.,2019), promoting a virus-negative conversion, and shortening the disease course (Gao et al., 2020; WHO, 2020; CDC, 2020). Recent studies have demonstrated that initial spike protein priming by transmembrane protease serine 2 (TMPRSS2) is essential for entry of SARS-CoV-2, SARS-CoV and MERS-CoV via interaction with the ACE2 receptor (Hoffmann et al., 2020; Iwata-Yoshikawa et al., 2020). These findings suggest that the TMPRSS2 inhibitor Camostat approved for clinical use in Japan for inhibiting fibrosis in liver and kidney disease, postoperative reflux esophagitis and pancreatitis might constitute an effective off-label treatment option (related reports in website, 2020). The rapid approval means that Actemra (tocilizumab) – an interleukin-6 inhibitor – can be used to treat patients infected with the new coronavirus who have developed serious lung damage and also have elevated levels of IL-6 in the blood. Prior research has suggested that elevated levels of IL-6 – a biomarker for inflammation and a high-level immune response – is associated with a higher mortality rate in people with community-acquired pneumonia. Actemra's approval stems from China's hope that the drug could be able to interrupt 'cytokine release syndrome' (CRS), a runaway form of systemic inflammatory response that can occur as a complication of some diseases or infections. But the cited sources in this approving aren't enough and we try not to tell so more. The vaccine race is anybody's game. Dennis O'Brien on May 7th pointed there is new technology being deployed by both Moderna and Pfizer/BioNTech, known as messenger RNA. That's allowed those companies to move at incredibly fast speeds but it's also a drawback in that no drug or vaccine based on mRNA has ever reached the market, so there are many questions, including about safety and efficacy. The team at Oxford is using an approach they've already tried in other coronaviruses, so they may have a head start (they started their trials in humans in April). Meanwhile, Johnson and Johnson, which has tremendous credibility in vaccine

development in outbreak scenarios after developing an Ebola vaccine, says it aims to start human trials in September 2020. On the front of the treatment, other than Gilead's Remdesivir, which has received its share of ink in the last month, one of the nearest-term hopes is Regeneron's antibody approach. The company successfully developed an antibody-drug for Ebola that proved effective in a clinical trial in the Democratic Republic of Congo, and it's doing the same thing for Covid-19, with plans to enter human trials in June 2020. They expect they could get data on how well their drug works one to two months later. If it does work, it could provide a bridge to a vaccine and other drugs (specifically, easier-to-take pills in development for Covid-19 at Pfizer and other drug companies, and in the lab of AIDS research pioneer David Ho (https://www.cnbc.com/2020/05/07). The expectation is pills like this could be taken earlier in the course of the disease or even preventively. Iranian scientists are working on some potential vaccines or some drugs based on medicinal plants which had mostly positive effects on COVID19.

The international COVID-19 response has been focused on avoiding a pandemic, of which many experts suggest we could be in the early stages. As of February 18, 2020, WHO reported 804 total confirmed cases and three deaths in 25 countries outside China? In addition to confirmed cases from travelers to Wuhan and on cruise ships, countries including Singapore, Japan, Thailand, and South Korea have identified clusters of locally transmitted cases (CDC,2020; WHO,2020). The numbers are small, but the rate of secondary and tertiary transmission is of grave concern and misinformation and fear are rampant. Thousands of medical workers in China are thought to have COVID-19 and, as countries implement scaled-up diagnosis and surveillance, the risks from inadequate protective gear and shortages in testing kits are heightened (Mahtani et al., 2020; WHO,2020). The first confirmed case in Africa (in Egypt) is worrying, as weak primary health-care systems could undermine preparedness.

WHO has called for more investment in surveillance and preparedness, but governments have been slow to take heed. A huge amount of funding has been committed for vaccine platforms but, even with four candidates in development, there is unlikely to be a viable vaccine for at least another 12–18 months. Dozens of clinical trials of treatment are underway, but it will be weeks or months before the results are known (https://www.who.int/health-topics/coronavirus;https://www.cdc.gov/coronavirus/2019-ncov/index.html; Zhou et al., 2020; Alinia-Ahandani et al., 2019).

CONCLUSION

The World Health Organization (WHO) has declared the 2019–20 coronavirus outbreaks a pandemic and a Public Health Emergency of International Concern (PHEIC) (WHO, 2020; CDC, 2020). Evidence of local transmission of the disease has been found in multiple countries across all six WHO regions. Staying at home and having self-quarantine are the best ways for controlling the virus. It's also so essential for having information for those who are related to ill ones or have some special symptoms. Absolutely some in danger countries like Iran must be assisted soon cause of the United States' sanctions which won't let money transfer between banks or sending free aims. All regions have to build united thought for inhabitation as soon as possible.

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REFERENCES

ACR Recommendations for the use of Chest Radiography and Computed Tomography (CT) for Suspected COVID-19 Infection". American College of Radiology.

Advice for public. World Health Organization. Archived from the original on 26 January 2020. Retrieved 15 February 2020.(https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=CjwKCAjw8J32BRBCEiwApQEKgQ4n53_9FKF4bqDb_dyTyCy4ZLD4_JG3jR76-CtLgEzlNkye0sGLsxoChVIQAvD_BwE)

Ahandani EA (2018). Medicinal plants with disinfectant effects. J. Pharm. Sci. Res., 10: 1-1.

Ahandani EA (2018). Milk-increasing medicinal plants. J. Pharm. Sci. Res., 10: 4-4.

Ahandani EA, Gawwad MRA, Yavari A (2013). Extraction and preparation of psoralen from different plant part of psoralea corylifolia and psoralen increasing with some elicitors. J. Plant Biol. Res., 2: 25-37.

Alinia-Ahandani E (2019). New approaches of some herbs used for reproductive issues in the world: Short review. J. Gynecol. Womens Health, 16(1). 10.19080/JGWH.2019.16.555927.

Alinia-Ahandani E, Fazilati M, Alizadeh Z, Boghozian A (2018). The introduction of some mushrooms as an effective source of medicines in Iran Northern. Biol. Med., 10. 10.4172/0974-8369.1000451.

Alinia-Ahandani E, Fazilati M, Boghozian A, Alinia-Ahandani M (2019). Effect of ultraviolet (UV) radiation bonds on growth and chlorophyll content of Dracocephalum moldavica L herb. J. Biomol. Res. Ther.,8. 10.4172/2167-7956.1000172.

Alinia-Ahandani E, Nazem H, Boghozian A, Alizadeh Z (2019). Hepatitis and some effective herbs: A review. EAS J. Parasitol. Infect. Dis., 1: 20-27.

Bai Y, Yao L, Wei T, Tian F, Jin D, Chen L, Wang M (21 February 2020). Presumed Asymptomatic Carrier Transmission of COVID-19. JAMA. doi:10.1001/jama.2020.2565.

Beeching NJ, Fletcher TE, Fowler R (2020). BMJ Best Practices: COVID-19.

Bull JJ, Meyers LA, Lachmann M (2005). Quasispecies made simple. PLoS Comput. Biol. 1:61.

Campbell C (2020).The Wuhan Pneumonia Crisis Highlights the Danger in China's Opaque Way of Doing Things. Time. Retrieved 13March2020(https://www.ijrrjournal.com/IJRR_Vol.7_Issue.4_April 2020/IJRR0065.pdf).

Cascella M, Rajnik, M, Cuomo A, Dulebohn S C., Di Napoli R (2020). Features, Evaluation and Treatment Coronavirus (COVID-19). PMID 32150360. Retrieved 11 March 2020.

CDC - https://www.cdc.gov/coronavirus/2019-ncov/index.html

CDC (11 February 2020). 2019 Novel Coronavirus (2019-nCoV). Centers for Disease Control and Prevention. Archived from the original on 14 February 2020. Retrieved 15 February 2020(https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/summary.html).

Centers for Disease Control (2009). Coronavirus Disease 2019 (COVID-19): Prevention & Treatment. Archived from the original on 15 December 2019. Retrieved 10 February 2020. (Wikipedia).

Ciota AT, Ngo KA, Lovelace AO, Payne AF, Zhou Y, Shi PY (2007). Role of the mutant spectrum in adaptation and replication of West Nile virus. J. Gen Virol. 88:865–874.

Corona virus COVID-19 (2020). Global Cases by Johns Hopkins CSSE". ArcGIS. Johns Hopkins CSSE. Retrieved 13 March 2020.(https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html #/bda7594740fd40299423467b48e9ecf6)

Coronavirus Disease 2019 (COVID-19). Centers for Disease Control and Prevention (CDC). 15 February 2020. Archived from the original on 26 February 2020. Retrieved 20 February 2020.(https://www.cdc.gov/mmwr/Novel_Coronavirus_Reports.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcommunication%2Fpublications.html).

Daniel L and Annie S (January 2020). China Deserves Some Credit for Its Handling of the Wuhan Pneumonia. Foreign Policy. Retrieved 13 March 2020.(https://foreignpolicy.com/2020/01/14/china-response-wuhan-pneumonia-better-sars/).

Eigen M (1993). The origin of genetic information: viruses as models. Gene. 135:37–47.

Gao J, Tian Z, Yang X (2020). Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. Bioscience Trends. doi:10.5582/bst.2020.01047.

Gorbalenya AE (2020). Severe acute respiratory syndrome-related coronavirus – The species and its viruses, a statement of the Coronavirus Study Group. bioRxiv (preprint). doi:10.1101/2020.02.07.937862.

Gurwitz D (2020). Angiotensin receptor blockers as tentative SARS-CoV-2 therapeutics. Drug Development Research. doi:10.1002/ddr.21656.

Hoffmann M, Kleine-Weber H, Krüger N, Müller M, Drosten C, Pöhlmann S (2020). The novel coronavirus 2019 (2019-nCoV) uses the SARS-coronavirus receptor ACE2 and the cellular protease TMPRSS2 for entry into target cells". bioRxiv (preprint). doi:10.1101/2020.01.31.929042.

https://www.cnbc.com/2020/05/07/timeline-on-covid-19-vaccine-and-treatments-under-development-now.html

Iwata-Yoshikawa N, Okamura T, Shimizu Y, Hasegawa H, Takeda M, Nagata N (2019). TMPRSS2 Contributes to Virus Spread and Immunopathology in the Airways of Murine Models after Coronavirus Infection. Journal of Virology. 93 (6).(e01815-18.https://doi.org/10.1128/JVI.01815-18.)

Jin Y, Cai L, Cheng Z, Cheng H, Deng T, Fan Y, Fang C, Huang D, Huang L, Huang Q, Han Y, Hu B, Hu F, Li B, Li Y, Liang K, Lin L, Luo L, Ma J, Ma L, Peng Z, Pan Y, Pan Z, Ren X, Sun H, Wang Y, Wang Y, Weng H, Wei C, Wu D, Xia J, Xiong Y, Xu H, Yao X, Yuan Y, Ye T, Zhang X, Zhang Y, Zhang Y, Zhang H, Zhao Y, Zhao M, Zi H, Zeng X, Wang Y, Wang X (2020). A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus (2019-nCoV) infected pneumonia (standard version). Military Medical Research. 7 (1): 4. doi:10.1186/s40779-020-0233-6.

Letko M, Marzi A, Munster V (2020). Functional assessment of cell entry and receptor usage for SARS-CoV-2 and other lineage B betacoronaviruses. Nature Microbiology: 1–8. doi:10.1038/s41564-020-0688-y.

Li G, De Clercq E (2020).Therapeutic options for the 2019 novel coronavirus (2019-nCoV). Nature Reviews Drug Discovery. 19 (3): 149–50. doi:10.1038/d41573-020-00016-0. PMID 32127666.

Lu H and Drug (2020). Drug treatment options for the 2019-new coronavirus (2019-nCoV). Biosci Trends. doi:10.5582/bst.2020.01020

Mahtani S, Berger M, O'Grady S, Lati M (2020). Naming the coronavirus disease (COVID-19) and the virus that causes it. World Health Organization. Archived from the original on 28 February 2020.(https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it).

receptor: molecular mechanisms and potential therapeutic target. Intensive Care Medicine. doi:10.1007/s00134-020-05985-9.

Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A (2020). Coronavirus Disease 2019 (COVID-19): A Systematic Review of Imaging Findings in 919 Patients". AJR. American Journal of Roentgenology: 1–7. doi:10.2214/AJR.20.23034. PMID 32174129.

Sauder CJ, Vandenburgh KM, Iskow RC, Malik T, Carbone KM, Rubin SA (2006). Changes in mumps virus neurovirulence phenotype associated with quasispecies heterogeneity. Virology. 2006; 350:48–57.

Shi Z, Hu Z (2008). A review of studies on animal reservoirs of the SARS coronavirus. Virus Res.133:74–87.

Steenhuysen J, Kelland K (24 January 2020). With Wuhan virus genetic code in hand, scientists begin work on a vaccine. Reuters. Archived from the original on 25 January 2020. Retrieved 25 January 2020. (https://www.reuters.com/article/us-china-health-vaccines/with-wuhan-virus-genetic-code-in-hand-scientists-begin-work-on-a-vaccine-idUSKBN1ZN2J8)

Wang M, Cao R, Zhang L, Yang X, Liu J, Xu M (2020).Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. Cell Research. 30 (3): 269–71. doi:10.1038/s41422-020-0282-0.

WHO Director-General's opening remarks at the media briefing on COVID-19". World Health Organization (WHO) (Press release). 11 March 2020. Retrieved 12 March 2020.

World Health Organization (2020). Advice for Public. Archived from the original on 26 January 2020.Retrieved 10 February 2020.(https://www.who.int/emergencies/diseases/novel-coronavirus-2019?gclid=CjwKCAjw8J32BRBCEiwApQEKgbnziZa3z-2shfKCzc3sz_xs5YURVg3_uya7dZNJyER3D505Bjy82BoC8GgQAvD_BwE)

Xu H, Zhong L, Deng J, Peng J, Dan H, Zeng X, Li T, Chen Q (2020). High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. International Journal of Oral Science. 12 (1): 8. doi:10.1038/s41368-020-0074-x.

Xu H, Zhong L, Deng J, Peng J, Dan H, Zeng X, Li T, Chen Q (2020). High expression of ACE2 receptor of 2019-nCoV on the epithelial cells of oral mucosa. International Journal of Oral Science. 12 (1): 8. doi:10.1038/s41368-020-0074-x.

Zhang H, Penninger JM, Li Y, Zhong N, Slutsky AS (2020). Angiotensin-converting enzyme 2 (ACE2) as a SARS-CoV-2

Zheng Y, Ma Y, Zhang J, Xie X (2020). COVID-19 and the cardiovascular system". Nature Reviews Cardiology. doi:10.1038/s41569-020-0360-5.

Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W (2020).Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin. bioRxiv (preprint). doi:10.1101/2020.01.22.914952.