ISSN: 2378-3656

Amer and Ouhida. Clin Med Rev Case Rep 2021, 8:373
DOI: 10.23937/2378-3656/1410373
Volume 8 | Issue 11
Open Access

Clinical Medical Reviews and Case Reports

REVIEW ARTICLE

Short Review of the Covid-19 Pandemic

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Abstract

There is a dangerous virus spread across the globe since the end of 2019. The virus's name is Coronavirus disease (Covid-19). Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. COVID-19 is caused by one virus, called severe acute respiratory syndrome coronavirus 2, or SARS-CoV-2. An epidemic of Coronavirus disease 2019 (COVID-19) outbroke in December 2019 in China, Wuhan, which is becoming a Public Health Emergency of International Concern. As this entity has become one of the worst infectious disease outbreaks of recent times, with mortality estimates in general population ranging from 1.4% to 8%, it is crucial to better understand the prognostic factors which can be associated to the outcome of this disease. This paper provides the existing data of the literature of all the prognosis factors of COVID-19 infection such as older age, obesity, laboratory results and imaging features of COVID-19.

Research methodology: This is a review paper. All the information was taken from the several review and guidelines published by CDC, WHO, NIH, etc.

Conclusion: In this review, we summarize the current knowledge about human coronavirus causing COVID-19 infection.

Keywords

COVID-19, Disease, Coronavirus, SARS-CoV-2

Introduction

The first severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak in China (in 2003), which spreads out in 29 countries so far and infected about 9000 people with more than 10% mortality [1]. In fact, SARS-CoV-2 is originated on 26th December 2019 at Wuhan city of China, and causes a life-threatening pneumonia, and is the most pathogenic human coronavirus identified so far [2]. The outbreak of COVID-19 had rapidly spread in China and even around the world resulting in numerous human casualties [3].

On January 7, a novel coronavirus, originally abbreviated as 2019-nCoV by WHO, was identified from the throat swab sample of a patient [4]. This pathogen was later renamed as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the Coronavirus Study Group [5] and the disease was named corona virus disease 2019 (COVID-19) by the WHO. As of January 30, 7736 confirmed and 12,167 suspected cases had been reported in China and 82 confirmed cases had been detected in 18 other countries [6]. In the same day, WHO declared the SARS-CoV-2 outbreak as a Public Health Emergency of International Concern (PHEIC).

In this review, we summarize the current knowledge on human coronavirus COVID-19 (since now will be mentioned as such) infection emphasizing on its impact in human life.

Sources of Corona Virus and Zoonosis

SARS-CoV-2 like other human corona virus, MERS-CoV, SARS-CoV, has is originated from Bats [7]. The zoonosis has shown in Table 1.

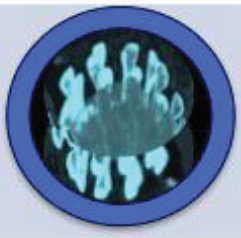
Like Flu virus, SARS-CoV-2 is capable to infect the respiratory system, and facilitating the spread through coughing and sneezing, especially to the immune-compromised and the elderly people [8].

However, unlike to other common cold or allergy issues, SARS-CoV-2 attack mainly lower respiratory tract, and results deadly Pneumonia [9]. No medicine is there yet, either control and/or cure, but only several

Citation: Amer H, Ouhida A (2021) Short Review of the Covid-19 Pandemic. Clin Med Rev Case Rep 8:373. doi.org/10.23937/2378-3656/1410373

Accepted: November 28, 2021: **Published:** November 30, 2021

Table 1: Comparison of novel corona virus (covid-19) with SARS and MERS.

			
Virus	SARS	MERS	COVID 19
Full Name	Severe Acute Respiratory Syndrome	Middle East Respiratory Syndrome	Wuhan Coronavirus (2019nCov) [4]
Origin	2003 in China [3]	2012 in Middle East, Africa and South Asia [3].	2019 in China (Wuhan) [4].
Confirmed cases	8,437 in 29 Countries [1]	2,494 in 27 Countries as of Nov 30, 2019 [3]	>130,000 as of Mar 12, 2020 in 46 countries [13]
Death Rate (as of March 7, 2020)	>10%	>35%	3%
Zoonosis	Bat > Palm Civet > Human [5].	Bat > Dromedary Camel> Human [5].	Bat > ?? > Human (Not known yet)
Symptoms	Fever, Shortness of Breath, Cough	Fever, Cough and Shortness of Breath	Fever, Cough and Shortness of Breath
Diagnosis	Diagnosis procedures are same for all those, three, and they include, along with the above symptoms the RT PCR to detect virus in stool, blood and nasal fluid, and Serological test for virus antibodies in the blood [5,8,13].		
Treatment	No antiviral therapy yet, only supportive and prevention strategy are advised. Vaccines are at an stage of development.		

efforts for prevention.

The Virus: Classification and Origin

SARS-CoV-2 is a member of the family Coronaviridae and order Nidovirales. The family consists of two subfamilies, Coronavirinae and Torovirinae and members of the subfamily Coronavirinae are subdivided into four genera:

a) Alphacoronavirus contains the human coronavirus (HCoV)-229E and HCoV-NL63;

b) Betacoronavirus includes HCoV-OC43, Severe Acute Respiratory Syndrome human coronavirus (SARS-HCoV), HCoV-HKU1, and Middle Eastern respiratory syndrome coronavirus (MERS-CoV);

c) Gammacoronavirus includes viruses of whales and birds and; (d) Deltacoronavirus includes viruses isolated from pigs and birds [9].

SARS-CoV-2 belongs to Betacoronavirus together with two highly pathogenic viruses, SARS-CoV and MERS-CoV. SARS-CoV-2 is an enveloped and positive-sense single-stranded RNA (+ssRNA) virus [10].

Diagnosis of Corona Virus in Human

- Chest radiography can reveal a typical feature of bronchiolitis.
- Identification of unknown pathogens using molecular biology tools is difficult, but genome-specific PCR primers can be designed for RT-PCR analysis. The presence of restriction enzyme

fragment length polymorphism (RFLP) can also be done.

The Centres for Disease Control and Prevention (CDC) and NIAID has developed a test to diagnose COVID-19 in respiratory and serum samples from clinical specimens [11,12].

Clinical Manifestations

Clinical manifestations of 2019-nCoV infection have similarities with SARS-CoV where the most common symptoms include fever, dry cough, dyspnoea, chest pain, fatigue and myalgia [13,14]. Less common symptoms include headache, dizziness, abdominal pain, diarrhoea, nausea, and vomiting [13]. Based on the report of the first 425 confirmed cases in Wuhan, the common symptoms include fever, dry cough, myalgia and fatigue with less common are sputum production, headache, haemoptysis, abdominal pain, and diarrhoea [13]. Approximately 75% patients had bilateral pneumonia [15]. Different from SARS-CoV and MERS-CoV infections, however, is that very few COVID-19 patients show prominent upper respiratory tract signs and symptoms such as rhinorrhoea, sneezing, or sore throat, suggesting that the virus might have greater preference for infecting the lower respiratory tract [13]. Pregnant and non-pregnant women have similar characteristics [16].

Severe complications such as hypoxaemia, acute ARDS, arrhythmia, shock, acute cardiac injury, and acute kidney injury have been reported among COVID-19 patients [15]. A study among 99 patients found that approximately 17% patients developed ARDS and, among them, 11% died of multiple organ failure [16]. The median duration from first symptoms to ARDS was 8 days [13].

Laboratory Tests Indexes

Neutrophil-to-lymphocyte ratio

In the clinical practice of treating patients with COVID-19, emerging evidences suggested that the neutrophil-to-lymphocyte ratio (NLR), an inflammatory index reflecting systemic inflammatory cascades, can be used as systemic inflammation marker.

Several studies have reported that this ratio could differentiate between mild/moderate and severe/critical groups and give the probability of death in patients with COVID-19. Moreover, current evidence suggests that NLR may also be a reliable predictor of COVID-19 progression and that an elevated NLR correlates with higher mortality [17].

In laboratory examination of COVID-19, lymphopenia is common. In severe or non-survival patients with COVID-19, the lymphocytes count decreases progressively, while the neutrophils count gradually increases (probably due to excessive inflammation and immune suppression caused by SARS-CoV-2 infection). On the one hand, neutrophils are generally regarded as pro-inflammatory cells, which can be triggered by virus-related inflammatory factors. On the other hand, systematic inflammation triggered by SARS-CoV-2 significantly depresses cellular immunity, leading to a decrease in T cells (CD3+, CD4+ and CD8+ T cells). Hence, NLR can be easily calculated from peripheral blood routine tests and may be associated with the progression and prognosis of COVID-19 [17].

Other recent studies have also stated that the NLR was the most helpful independent prognostic biomarker in determining COVID-19 presence and the treatment efficacy. Besides, NLR had a higher diagnostic accuracy than other assessment tools, such as the CURB-65 [18].

NLR has good predictive values on disease severity and mortality in patients with COVID-19 infection [18]. NLR is readily calculated and cost-effective, which means clinicians can screen high-risk individuals earlier. This is especially desirable in settings experiencing healthcare resource scarcity [18]. Evaluating NLR can help clinicians identify potentially severe cases early, conduct early triage and initiate effective management in time, which may reduce the overall mortality of COVID-19 [17] as NLR could help in assessing the allocation of respiratory equipment in ICU patients and early evaluation of those in need of extracorporeal membrane oxygenation [18].

PaO_2/FiO_2 ratio

In COVID-19 infection, the lung is the most important organ invaded by SARS-CoV-2, several COVID-19 patients being characterized by hypoxia and respiratory distress. Hence, PaO_2/FiO_2 ratio, the most commonly used oxygenation index, is used in COVID-19 infection [19]. PaO_2/FiO_2 ratio is a widely used measure of hypoxemia in respiratory failure, calculated as the ratio between the arterial oxygen partial pressure (PaO_2) and the fractional inspired oxygen (FiO_2). This ratio was validated as a criterion for ARDS definition and severity [20].

An observational, prospective and multicenter study demonstrated that moderate-to-severe impairment in PaO_2/FiO_2 (< 200 mmHg) was independently associated with a threefold increase in risk concerning in-hospital mortality. The severity of respiratory failure assessed with the PaO_2/FiO_2 ratio is significantly associated with intubation rate and need for respiratory support. This study has also suggested that the severity of hypoxemia could be useful to triage patients with COVID-19 as well as to identify patients at higher risk of unfavorable outcomes [21].

In another study, PaO_2/FiO_2 ratio was significantly associated with prolonged hospital-stay. Moreover, the authors also reported that its use at the admission, so as to make a decision on the treatment intensity, as a

single measurement, predicts a longer hospitalization [20].

Imaging

Chest CT can accurately evaluate the type and extent of lung lesions, as supported by Kunhua Li, et al. who investigated the clinical and CT features associated with severe COVID-19 pneumonia. CT manifestations of COVID infection include ground glass opacities, consolidation, reticular patter, and bronchial wall thickening (BWT) [22].

In what concerns to advanced disease, several studies have mentioned more frequent occurrence rates of consolidation, linear opacities, crazy-paving pattern, multiple lung lobe involvement, BWT and extrapulmonary lesions when compared to non-severe patients [22].

It was also determined that the presence of bilateral pneumonia and progressive radiographic deterioration on follow-up CT could have a roll as worst prognosis markers [23].

Control and Prevention Strategies

COVID-19 is clearly a serious disease of international concern. By some estimates it has a higher reproductive number than SARS, and more people have been reported to have been infected or died from it than SARS [24]. Similar to SARS-CoV and MERS-CoV, disrupting the chain of transmission is considered key to stopping the spread of disease [25]. Different strategies should be implemented in health care settings and at the local and global levels.

Health care settings can unfortunately be an important source of viral transmission. As shown in the model for SARS, applying triage, following correct infection control measures, isolating the cases and contact tracing are key to limit the further spreading of the virus in clinics and hospitals [25]. Suspected cases presenting at healthcare facilities with symptoms of respiratory infections (e.g., runny nose, fever and cough) must wear a face mask to contain the virus and strictly adhere triage procedure. They should not be permitted to wait with other patients seeking medical care at the facilities. They should be placed in a separated, fully ventilated room and approximately 2 m away from other patients with convenient access to respiratory hygiene supplies [26]. In addition, if a confirmed COVID-19 case requires hospitalization, they must be placed in a single patient room with negative air pressure - a minimum of six air changes per hour. Exhausted air has to be filtered through high efficiency particulate air (HEPA) and medical personnel entering the room should wear personal protective equipment (PPE) such as gloves, gown, disposable N95, and eye protection. Once the cases are recovered and discharged, the room should be decontaminated or disinfected and personnel entering the room need to wear PPE particularly facemask, gown, eye protection [26]. In a community setting, isolating infected people are the primary measure to interrupt the transmission. For example, immediate actions taken by Chinese health authorities included isolating the infected people and quarantining of suspected people and their close contacts [27]. Also, as there are still conflicting assumptions regarding the animal origins of the virus (i.e., some studies linked the virus to bat [28,29] while others associated the virus with snake [30], contacts with these animal fluids or tissues or consumption of wild caught animal meet should be avoided. Moreover, educating the public to recognize unusual symptoms such as chronic cough or shortness of breath is essential therefore that they could seek medical care for early detection of the virus. If large-scale community transmission occurs, mitigating social gatherings, temporary school closure, home isolation, close monitoring of symptomatic individual, provision of life supports (e.g., oxygen supply, mechanical ventilator), personal hand hygiene, and wearing personal protective equipment such as facemask should also be enforced [30].

In global setting, locking down Wuhan city was one of the immediate measures taken by Chinese authorities and hence had slowed the global spread of COVID-19 [30]. Air travel should be limited for the cases unless severe medical attentions are required. Setting up temperature check or scanning is mandatory at airport and border to identify the suspected cases. Continued research into the virus is critical to trace the source of the outbreak and provide evidence for future outbreak [30].

Conclusion

COVID-19 is emerging and spreading at an unprecedented rate, triggering a heavy impact worldwide. As described throughout this article, the classification and origin, severe clinical manifestation, prevention strategies and laboratory diagnosis of the COVID-19 infection.

This review was developed not only in the hope of helping healthcare providers worldwide effectively recognize and deal with the 2019 SARS-CoV-2, but also to deliver a reference for future studies.

Conflict of Interests

The authors declare no conflicts of interest regarding the publication of this paper.

Authors Contribution

All the authors contributed equally to prepare this article, read, and approved the final manuscript.

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