

2019 Novel Coronavirus (2019-Ncov): An Integrated Review.

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ABSTRACT: SARS-CoV-2 is indigenous to the family of coronaviruses which have been established with zoonotic transmission and manifests in form of severe respiratory distress with symptoms ranging from the common cold to chronic obstructive pulmonary disorder (COPD). The outbreak of COVID-19 in the year 2020 started in Wuhan, China and was declared a global pandemic by WHO in March 2020. The basis of the article is based on the review of the COVID-19 outbreak which is detailed in the etiology, manifestation, and clinical management of the virus. Several management preventive methods are being employed to combat the spread of the virus and the management of the symptoms as well as the treatment options which include numerous clinical trials ranging from convalescent plasma therapy to antibody testing for the SARS-Cov-2 virus and the use of widespread vaccinations.

Keywords: SARS-CoV-2, Coronaviruses, Severe acute respiratory syndrome (SARS)

I. INTRODUCTION

Coronaviruses are positive stranded RNA viruses that cause severe respiratory disorders and present a cascade of varied symptoms ranging from the common cold to pulmonary complications seen in humans in four (4) notable variants (HCoV) NL63, OC43, HKU1, 229E. The novel coronavirus manifests in different forms of respiratory distress as seen in Severe acute respiratory syndrome coronavirus (SARS-Cov-1), Middle east respiratory syndrome coronavirus (MERS-CoV), and the most recent one (SARS-Cov-2). The coronavirus presents obvious symptoms such as fever, fatigue, body aches, cough, dyspnea, loss of smell and taste, and more serious complications such as pneumonia, pulmonary failure, cardiovascular, and hepatic problems, stroke and eventually death. The severe complications are more likely to occur in individuals with underlying health conditions such as chronic kidney disease, diabetes, sickle cell disease, cardiovascular and hepatic disorders, cystic fibrosis and individuals with a weakened or

depleted immune system. An inflammatory condition being referred to as Multisystem Inflammatory Syndrome (MIS) has been observed in pediatrics and may be linked to the novel coronavirus.

The major bane of the novel coronavirus is the ease with which it spreads, primarily due to the human-human transferability. It spreads through droplets that are discharged from a cough or a sneeze and it can exist on a surface for a substantial amount of time. One can become infected after coming in contact with an infected person as droplets can be propelled from a few feet away, hence the need for social distancing. Touching one's face after coming in contact with an infected individual or an infected surface will also lead to an infection hence the need to sanitize as frequently as possible. Around 30 million people have been affected across different countries as of the middle of 2020 and that estimate is considered undervalued as only a relatively meager number of acute infections are diagnosed and recorded. Based on incidence and prevalence reported from CoVID-19 testing, countries like the USA (more than 7 million cases), India (more than 6 million), Brazil (around 4.8 million) and Russia (more than a million) have reported the most cases since the outbreak of the virus, with the mortality rate ranging from 0.6 – 1.09 % (more than a million dead as of September 2020) based on the infection fatality ratio and the case fatality ratio.

The novel coronavirus has been shown to mutate as seen in the identification of the L and S strain based on a Chinese case study, and the distinctions of the detailed consequences of both strains based on their manifestations is yet to be ascertained. Ongoing clinical trials are being employed to yield valued results and help combat the action and progression of different strains in form of a vaccine. The understanding of the novel coronavirus and the intricacies of its elaborate features and complications is primary in the facilitation of concrete means to control its progression.

A CONCISE REVIEW OF CoVID-19.

REF. NO.	AUTHOR	YEAR OF ISSUE	STUDY	CONCLUSION
1.	Inna G. Orysannikova et al.	2020	The role of host genetic in the immune response to SARS-CoV-2. Susceptibility and Severity.	It provides the review of study that evaluates the role of genetic and viral presence in the immune response to Covid-19. It discusses research points and provides possibilities for future scientific endeavors in the understanding of the immunology of SARS-CoV-2.
2.	Robert J. Mason	2020	Pathogenesis of COVID-19 (from the perspective of cell biology)	CoVid-19 progress to the alveolar should be specifically monitored, and airway infections aren't as serious and can be self-treated.
3.	Emilio D, Maria et al	2020	Genetic variants of the human host influencing the coronavirus associated phenotype (SARS, MERS and CoVID-19). Rapid systemic review and field synopsis.	The article reviews the spectrum of phenotypes associated with the SARS-Cov-2 infection. It provides a review that encompasses the scientific literature which includes studies on SARS, MERS and COVID-19.
4.	Aakriti Gupta et al	2020	Extra pulmonary Manifestations of CoVID-19	It reviews the causality of substantial respirator pathology, leading to several extra pulmonarymanifes tations.

5.	Nicolas Vabret et al	2020	Immunology of COVID-19: Current state of the science.	This article provides an insight into the innate and adaptive immune response generated by SARS-CoV-2 infection and immunological pathways.
6.	Rishita Pujari et al	2020	Therapeutic option for COVID-19.	This article reviews several trial drugs such as remdesivir, hydroxychloroquine and lopinavir based on their efficacy in a clinical setting.
7.	Evan M Bloch et al	2020	Deployment of convalescent plasma for the prevention and treatment of CoVID-19.	This provides an overview of the benefit of convalescent plasma therapy in all its consideration and proposed clinical trials.
8.	Nicholas S. Hendren et al	2020	Description and proposed management of the acute CoVID-19 cardiovascular syndrome.	This article provides a descriptive and analytical review on acute cardiovascular symptoms associated with CoVID-19 and its management.
9.	Mack Sheraton et al	2020	A review of neurological complications of CoVID-19.	This article provides a detailed review on the neurological association with the virus and its invasion mechanism as well its pathological complications.

10.	SuEun Park	2020	Epidemiology, virology and clinical features of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2).	This article provides a descriptive review into the spread of the virus(114 countries) and its mortality rate as well as its transmission and clinical features.
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II. DISCUSSION

Based on clinical observations, coronavirus is more likely to be transmitted during the early stages of infection. After 7-10 days, the probability of transmission decreases especially for individuals with no underlying health conditions. Similarly, the virus is more likely to provide considerable disruption to immune-compromised patients, hence the increased mortality ratio, especially in patients with cardiopulmonary disorders and decreased lung function due to coronavirus manifesting primarily as an acute respiratory illness. Age has also been noted as a factor in the mortality rate, as older individuals have been observed to be more likely to die from the infection than younger individuals based on the high risk group index (Age > 60 years).

When the SARS-CoV-2 virus is inhaled, it becomes attached to the epithelial cells present in the nasal cavity and upon activation by the receptorangiotensin converting enzyme 2 (ACE2), it proceeds to replicate. The immune response is mild and the viral load is notably sensitive at this stage. The virus propagates locally and moves through the airways where it is concentrated for most of the infected patients, hence the greater incidence of the mild cases and the corresponding need for basic symptomatic treatment. However, in a minimum no. of patients, the virus proceeds to ingratiate itself in the lungs and affects the alveolar cells and as it further propagates, it releases an increased number of viral particles and causes cellular and alveolar damage which may lead to fibrosis. In most cases, epithelial regeneration and mucociliary clearance serves as an immune response and leads to recovery but increased age will become a factor because the presence of an abated immune system will decrease the chances of recovery. This is seen in the age discrepancies in the manifestation of CoVID-19, based on the differences in the immune system and the status of the maturity and expression of the ACE-2 receptor

as well as its regulation based on the state of the epithelial destruction (ciliated and non-ciliated cells). Neurological, cardiovascular and extrapulmonary manifestations of the virus may also be observed depending on the clinical state of the patient.

The management protocol being employed for CoVID-19 patients by the All India Institute of Medical Sciences dictates that in the presence of any acute respiratory illness such as cough, fever, difficult or labored respiratory action (having been in a high risk CoVID-19 environment or having come in close contact with a CoVID-19 patient or a health personnel involved with symptomatic CoVID-19 patients), home quarantine and daily monitoring for asymptomatic individual is advised. In a mild case (cough, rhinorea, low grade fever), Tab. Oseltamivir 75mg. BD and antibiotics (preferably azithromycin and amoxicillin/clavulanate) are prescribed as well as Tab. Paracetamol 500mg SOS. In moderate to severe cases in which the respiratory rate exceeds 24 breaths per minute, the systolic and diastolic blood pressure is less than 90mmHg and 60mmHg respectively, oxygen supplementation is administered to maintain the oxygen saturation levels above 94%. Antipyretics, antitussives and antibiotics are also administered. Hydroxychloroquine (400mg BD for 1 day proceeded by 200mg BD for 5 days) is indicated. Within ten days of the presence of the symptoms based on the severity, administration of Remdesivir is common and Lopinavir (200mg 2 tabs BD) may be deliberated upon. Drug interaction between lopinavir and hydroxychloroquine should be taken into account and the use of corticosteroids is usually advised against. If the patient tests negative at least twice 24 hours apart and shows overall progress in recovery, they may be discharged. However, if the symptoms worsen and low blood pressure occurs as well as respiratory frictions, then intensive care is employed and the patient is placed

on aided ventilation (non-invasive ventilation) and the use of a high flow nasal cannula is also considered. If the patient is not in shock, conservative fluid management is applied, depending on the progression of the symptoms. The preventive measures applied for CoVID-19 borders on daily hygienic procedures. Proper sanitization and regular washing of hands and clothing, especially after public outings or social interactions should be encouraged. Social distancing and the use of a mask also minimizes the risk of the virus spreading as the lack of proximity limits the reach of the virus and the presence of filters in masks limits the chances of infection. If an individual is diagnosed with any of the symptoms that correspond with CoVID-19, then self-isolation is advised, even in the cases where the individual is asymptomatic. Vaccines was introduced in late 2020 with the intention of bringing an end to the spread of the virus by boosting the immune system's memory cells (T-lymphocyte) to discern familiar antigens and generate antibodies to combat their presence. The vaccines work by building up immunity to the likely occurring antigens and this sometimes present some symptoms similar to the ones seen in the manifestation of the virus. The three main types of vaccines currently available or progressively continued in clinical trials on a broad scale feature in three (3) major forms. The first is the **mRNA vaccines** which provides the information for the creation of a protein (spike protein) that is singularly attuned to the virus with material from the virus itself and then proceeds to destroy its genetic composition so that our immune cells recognize the protein as foreign and produce memory cells (T-lymphocytes and B-lymphocytes) to detect and eliminate the virus in the future. The mRNA vaccine basically teaches the cells of the body to create a protein or part of it so as to elicit an immunological response that produces antibodies which recognize the presence of the virus and prevents infection. The second is the **protein subunit vaccines** which functions by introducing parts of the virus proteins responsible for the manifestation of the symptoms of COVID-19 as opposed to the full product and the introduction of the vaccine indoctrinates the immune system against the foreign proteins which creates antibodies to eliminate the virus and recognize its presence in the future. The third is the **vector vaccines** which act by introducing a viral vector (which is basically lessened version of the virus with its genetic component) into our cells

which guides it to produce a protein that is attuned specifically to the causative virus. The cells then replicate the proteins and implore the immune system to create lymphocytes that will recognize the presence of the virus in the future. Vaccination presents varied side effects like pain, swelling, headache, fever, tiredness, etc. The safety of the vaccines is also primarily considered with monitoring systems in place to detect adverse responses or allergic reactions which may be mild or moderate or severe (anaphylaxis) with symptoms ranging from swelling, fever to respiratory complications. Allergic reactions to distinct or varied vaccine components are also monitored such as an allergic reaction to polysorbate or to polyethylene glycol. These reactions are monitored with guidelines that range from reporting increase in side effects or an unusual adverse manifestation to highlighting the various potential risk factors of patients with different medical health conditions. Prior to this, clinical trials which include case control studies, clinical screening, cohort studies, and others are employed to ascertain the possible effectiveness of the vaccines.

III. CONCLUSION

The prevalence of the novel coronavirus is evident in its contagious nature and its ability to mutate and manifest in varied symptoms and degree of severity. Several preventive measures and clinical procedures are being employed to manage the complications. Various research studies and clinical trials have produced ideas and results that serve to epitomize the contribution of clinical parameters that are necessary for the control of the pandemic. Assertive contributions such as antibody testing, immunological studies, convalescent plasma therapy, neurological, extrapulmonary and cardiovascular implications and the genetic variants that influence the novel coronavirus have provided valued insight and progressive information that pertains to the management of the coronavirus. Clinical trials for vaccines which include mRNA and DNA, as well as viral vector and recombinant protein vaccines are being orchestrated and Bacille-Calmette Guerin (BCG) vaccination of CoVID-19 is also being researched. Clinical trials for post exposure prophylaxis against CoVID-19 is also being researched with the consideration of employing monoclonal antibodies and hydroxychloroquine to influence the treatment and management patterns. Towards the end of 2020, vaccines were authorized for use officially with the major vaccines in use being Pfizer-BioNtech

CoVID-19 vaccine (BNT162b2) and Moderna's CoVID-19 vaccine (mRNA-1273) with the former reported to be 95 percent effective and the latter reported to be 94.1 percent effective. Both of these vaccines are mRNA vaccines and they both have similar side effects. As of December 2020, continuing clinical trials are in effect to develop more vaccines, some of which are AstraZeneca's CoVID-19 vaccine, Janssen's CoVID-19 vaccine, Novavax's CoVID-19 vaccine, BBIBP-CorV, Sputnik V, and Convidicea (Ad5-nCoV).

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