INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact Factor: 6.078
(Volume 11, Issue 1 - V11I1-1176)
Available online at: https://www.ijariit.com

COVID-19 Pandemic: A Review Article

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ABSTRACT

COVID-19 is a new coronavirus disease that could endanger millions of lives globally. Recent months have seen a significant amount of knowledge generation, which calls for a careful examination to pinpoint research gaps and help set an agenda for additional studies. Investigating current research areas and their variations concerning income levels and COVID-19 transmission characteristics is the aim of this study. Introduction, history, pathophysiology, coronavirus, kinds, symptoms, causes, spread, transmission, diagnosis, prevention, therapy, and management of COVID-19 infection are the main topics of this review.

Keywords: - *COVID-19, SARS-CoV, Pandemic*

1. INTRODUCTION.

The COVID-19 pandemic, caused by a newly identified coronavirus, has become a significant public health concern. The virus, named SARS-CoV-2, was first detected in Wuhan, China in December 2019 and has since spread rapidly around the world due to its high contagiousness. The World Health Organization (WHO) declared the outbreak a public health emergency, and the virus has been identified as a member of the coronavirus family, which typically causes respiratory infections.[1] The first cases of COVID-19 were reported in early December 2019, with 29 cases of "pneumonia of unknown etiology" documented. The Chinese Center for Disease Control and Prevention (CDC) collaborated with local CDCs to investigate the outbreak, and the virus was later identified as the cause of the disease.2 The WHO Director-General, Dr. Tedros Adhanom Ghebreyesus, announced that the disease caused by the novel coronavirus would be known as COVID-19, or coronavirus disease 2019.[3]

The COVID-19 pandemic is not the first coronavirus outbreak, as two other CoVs epidemics have occurred in the last two decades. The SARS-CoV epidemic, which started in China and spread to two dozen countries, resulted in an estimated 8,000 cases and 800 deaths. The MERS-CoV epidemic, which started in Saudi Arabia and spread to 21 other countries, has resulted in an estimated 2,500 cases and 800 deaths. The exact origin of SARS-CoV-2 is still unknown, but it is believed to have originated from animals, similar to MERS-CoV and SARS-CoV.[4]

2. HISTORY

Human coronaviruses (HCoVs) were first identified in the 1960s, with two species, HCoV-229E and HCoV-OC43, found in patients with the common cold. Since then, seven other coronavirus subtypes have been discovered in humans, including SARS-CoV, MERS-CoV, and SARS-CoV-2, which are thought to have originated from bats.[5]

The first global CoV pandemic occurred in 2002 with the emergence of SARS-CoV, which caused severe acute respiratory syndrome. The outbreak started in Guangdong province, China, and spread to 26 countries, resulting in 8,000 cases and 774 deaths. The World Health Organization (WHO) reported that the outbreak was contained in July 2003.[6]

Another CoV outbreak occurred in 2012 with the emergence of MERS-CoV in Saudi Arabia, which resulted in 858 deaths and 2,494 cases. The virus is thought to have originated from bats and possibly camels as an intermediate host, and spread to other animals through genetic recombination.[7,8]

3. PATHOPHYSIOLOGY

The pathophysiology of COVID-19 involves the invasion of the SARS-CoV-2 virus into host cells, primarily through the angiotensin-converting enzyme 2 (ACE2) receptor.[9] The virus then replicates and triggers an immune response, leading to the release of pro-inflammatory cytokines and the activation of immune cells.[10] This can cause damage to the lungs, heart, and other organs, resulting in symptoms such as fever, cough, and shortness of breath. In severe cases, the virus can lead to acute respiratory distress syndrome (ARDS), multi-organ failure, and death.[11]

Step 1: Viral Entry
Viral binding
Viral entry
Viral replication

Step 2: Innate Immune response
Pattern recognition receptors
Cytokine release
Activation of immune cells

Step 3: Adaptive Immune response
T-cell activation
Antibody production
Immune-mediated tissue damage

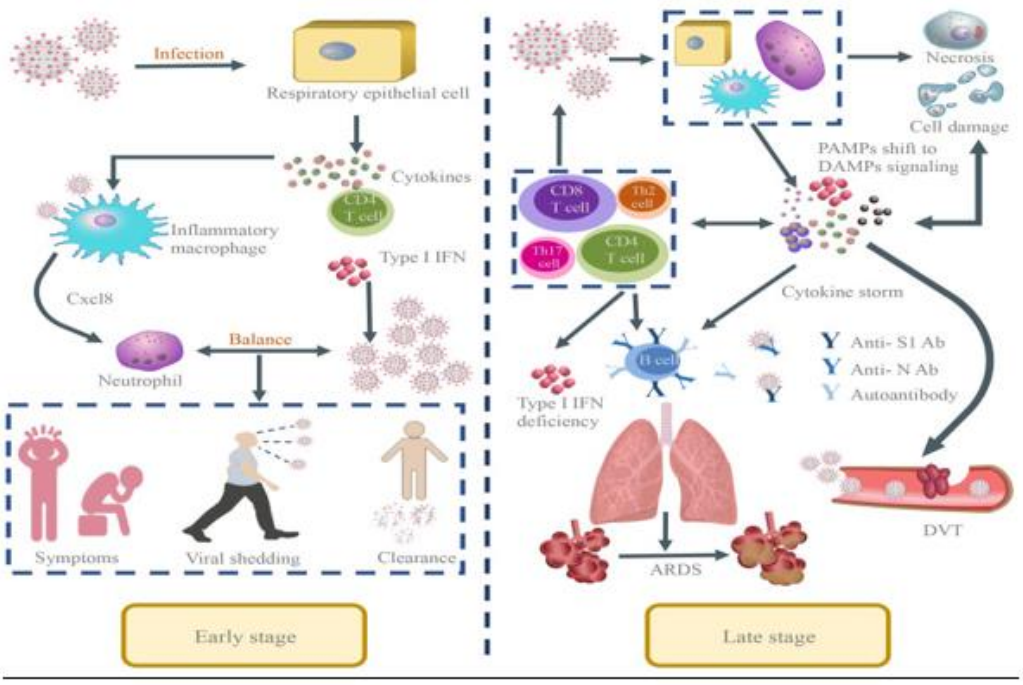

Fig-1 Stages of Pathophysiology of corona

4. CORANA

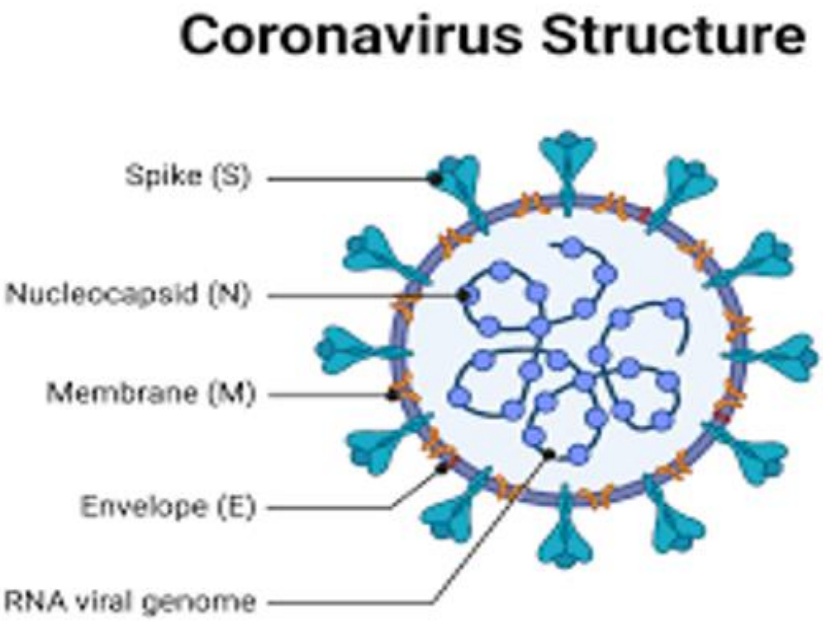

Fig - 2 Structure of coronavirus

TYPES OF CORONA VIRUS

Four coronaviruses are often found in humans:

HKU1
OC43
229E
NL63

The symptoms of common human coronaviruses are typically mild to moderate and most people will experience at least one infection during their lifetime[12]. Fortunately, the majority of individuals who contract these viral infections are able to recover on their own without any serious complications.[13,14]

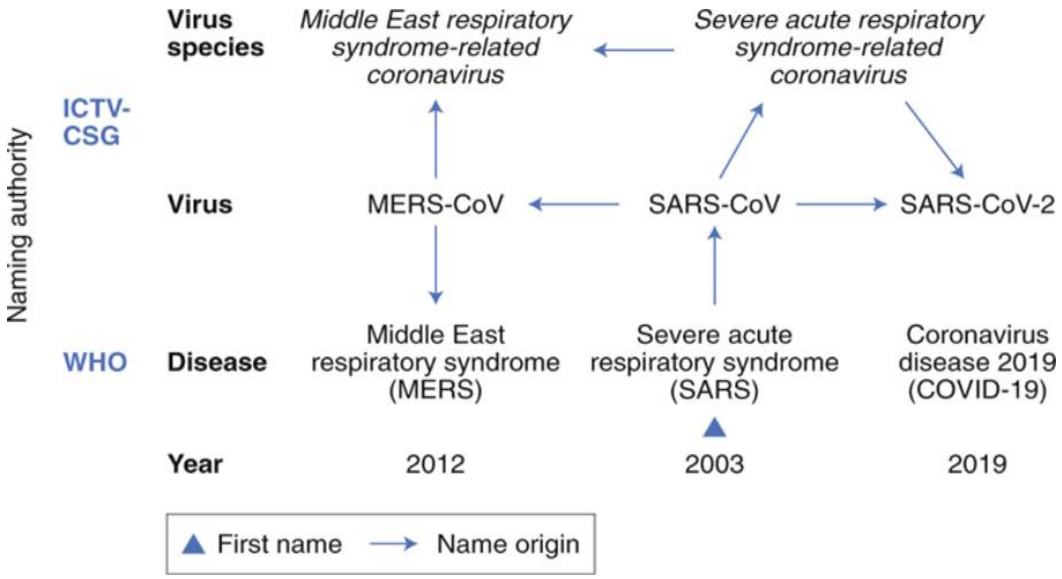

Fig No. 3 - Types of corona virus

5. SYMPTOMS

The COVID-19 symptoms that are most prevalent are
A a high body temperature
A cough with dryness.
Exhaustion.
Other, less frequent symptoms that some people may experience include
Odor or taste loss.
Congestion in the nasal passages.
Conjunctive inflammation commonly referred to as red eyes.
Pharyngitis.
A migraine.
Sore joints or muscles.
Varieties of skin rashes.
Feeling queasy or throwing up
A diarrheal illness.
Cold or lightheadedness.
Severe COVID-19 illness symptoms include:
Breathlessness.
Hunger loss.
Bewilderment.
Continuous chest pressure or pain
High heat (above 38 °C). Other less typical signs and symptoms include
Anger.
Perplexity
Diminished awareness (sometimes linked to seizures).
Worry.
A depressive state.
Problems with sleep.

6. TRANSMISSION OF CORONA

The COVID-19 virus has a unique feature that enables cross-species transmission, including a similarity to the snake Bungarus multicinctus.15 However, research suggests that pangolins are a key intermediate host, sharing 91.02% of their genome with the human COVID-19 virus. This discovery implies that pangolins may be a natural reservoir for the virus and play a crucial role in its transmission to humans.[16,17]

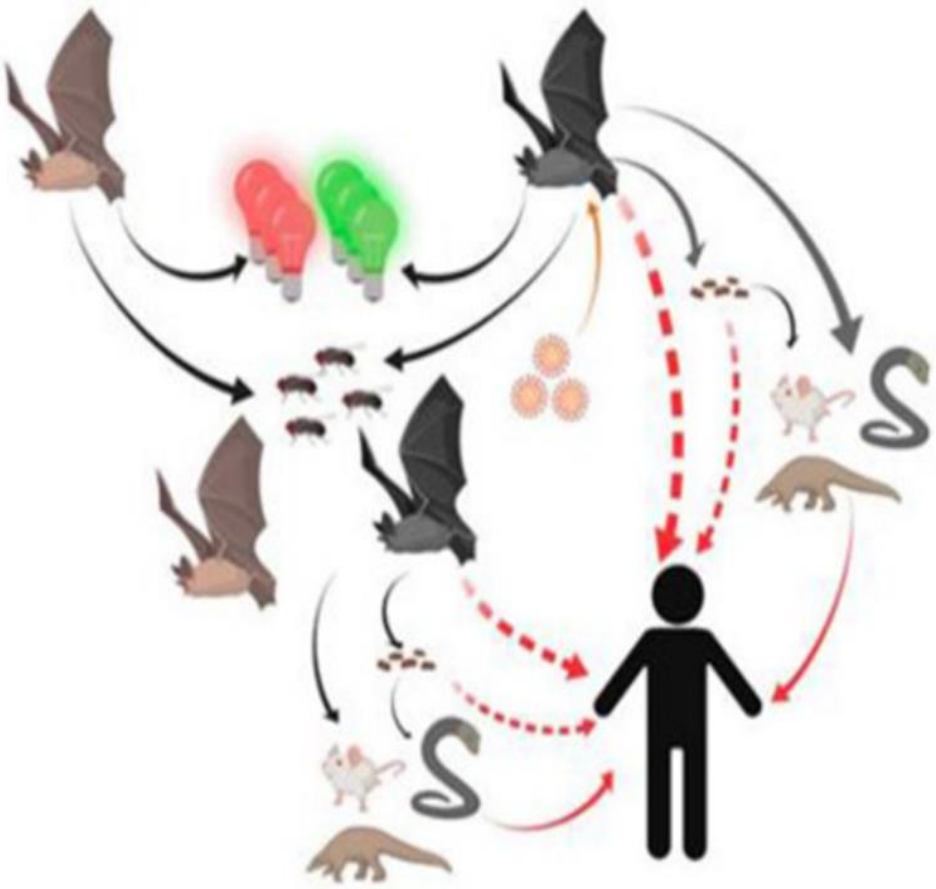

Fig - 4 Transmission of corona

7. DIGONOSIS

7.1 COVID-19 infection diagnosis

A patient's history of exposure to or close contact with probable or confirmed cases is a key factor in diagnosing COVID-19.[18,19] However, in patients with unclear medical history, imaging findings and clinical symptoms may suggest a possible case of COVID-19. In such cases, a real-time reverse transcription polymerase chain reaction (RT-PCR) test should be performed as a reference.[20]

7.2 Laboratory examinations

COVID-19 patients often experience lymphopenia, neurotoxicity, and decreased WBC count, accompanied by elevated CRP and normal PCT levels. These changes suggest that COVID-19 affects lymphocytes, particularly T cells, and alters immune response components, leading to inflammatory responses and increased cytokines.[21] Intravenous immunoglobulin was administered to patients with low WBC and lymphocyte counts. Elevated pro-inflammatory cytokine levels have been reported, which are associated with disease severity.[22,23]

Medical Samples	**Entire cases: 1060 specimens from 206 victims**	**Entire Cases : 15 specimens from 5 victims**
Bronchoalveolar lavage fluid	83%	Negative
Mucus	62%	73%
Swabs for the nose	53%	15%
blood	2%	Negative
Feces	25%	Unsuccessful
Urine	00 %	Negative

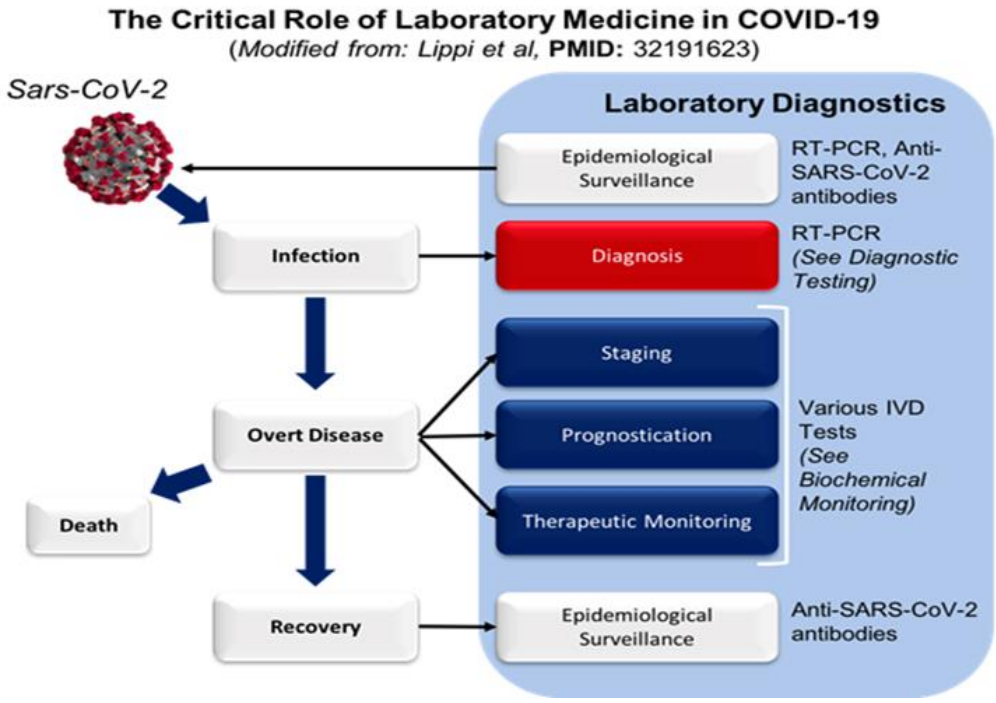

Fig – 5 Role of laboratory medicine in covid19

8. PREVENTION

To protect yourself and those around you from COVID-19, follow these guidelines:
Get vaccinated as soon as it's your turn and follow local vaccination guidelines.
Maintain a distance of at least 1 meter from others, even if they appear healthy, and avoid crowded areas.
Wear a well-fitting mask when physical distancing is not possible or in poorly ventilated areas.
Regularly wash your hands with soap and water or use an alcohol-based hand sanitizer.
Cover your nose and mouth with a tissue or your bent elbow when coughing or sneezing, and dispose of used tissues promptly.
If you contract COVID-19 or become ill, self-isolate until you recover.

Fig 6 - Preventive actions

9. TREATMENT AND MANAGEMENT

The National Institutes of Health (NIH) defines the pathogenesis of COVID-19 as the rapid replication of the SARS-CoV-2 virus, which disrupts the body's defense system and leads to widespread tissue damage.[24] To treat COVID-19, the NIH guidelines recommend the use of antiviral medications, such as remdesivir, in the early stages of the disease to prevent viral replication, and immunomodulators in the later stages to modulate the immune response. [25] Additionally, the US authorities have approved the use of high-titer convalescent plasma, molnupiravir, and ritonavir-boosted nirmatrelvir under Emergency Use Authorizations (EUAs). Monoclonal antibodies, such as cilgavimab and tixagevimab, have also been approved, although EUAs for other monoclonal antibodies were revoked due to their reduced effectiveness against Omicron subvariants.[26,27]
Main Drugs that are used in Covid 19 management and therapy areas follows :
Remdesivir

Nirmatrelvir-ritonavir

Remdesivir

Administration: Remdesivir is an intravenous injection (IV) and it is Administered intravenously. It is developed by the Gilead Sciences and The Brand name of remdesivir is Veklury.

Fig-7: Remdesivir injections

Nirmatrelvir-ritonavir

Nirmatrelvir-ritonavir which is an antiviral medication used in treatment of COVID 19. It is manufactured by Pfizer and having brand name Paxlovid.

Figure-8: Nirmatrelvir tablets

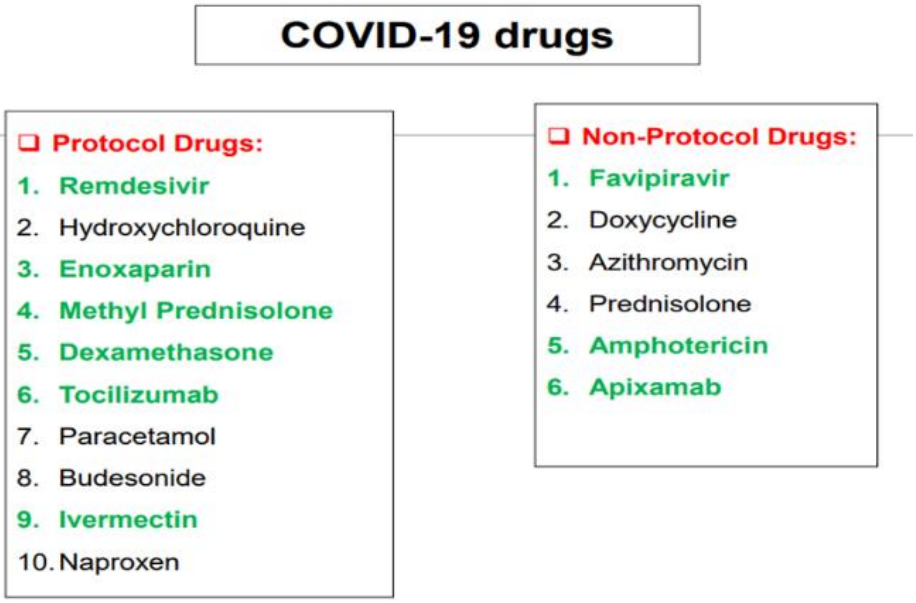

Fig - 8 Covid-19 Drugs

10. CONCLUSION

COVID-19 was not a catastrophic incident. It might also be a prelude to a far worse epidemic that could occur at any time. We have to get ready for a world where pandemics happen more often and are more dangerous. An essential responsibility of national and international government must be to prevent them and never again permit the human losses and economic harm that we have witnessed in the current crisis. The global government must take decisive measures to prevent pandemics and reduce the amount of deaths and economic damage because they are becoming more frequent and destructive.

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