A REVIEW ON COVID 19

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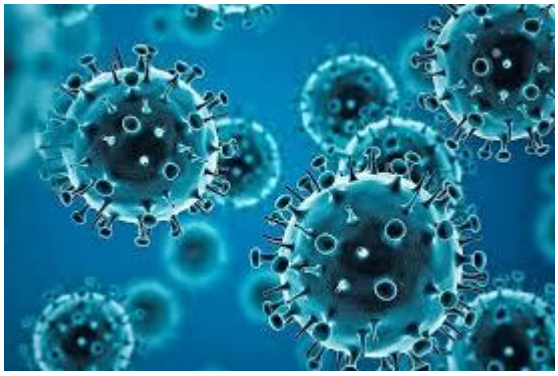
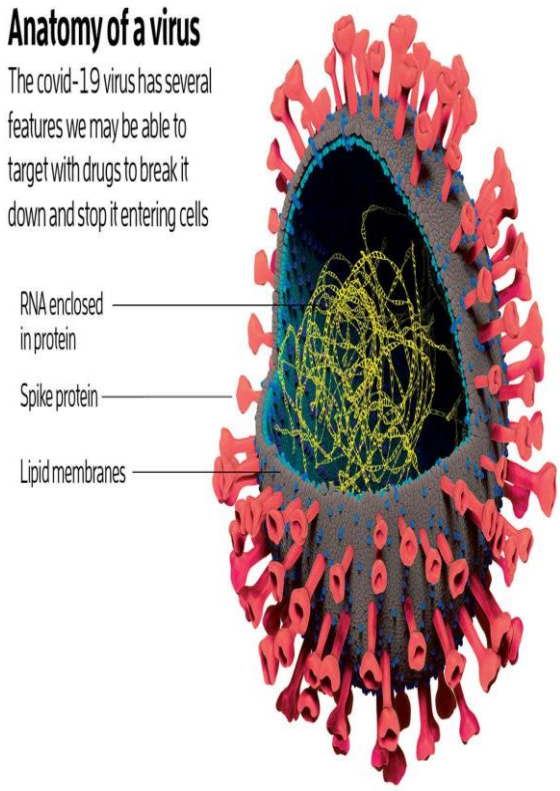
Abstract
The coronavirus disease, known as COVID-19, is caused by a new virus called SARS-CoV-2, which first appeared in Wuhan, China, in late 2019. This virus is part of a family that often leads to respiratory illnesses in both humans and animals. SARS-CoV-2 is an RNA virus with spike proteins on its surface that attach to ACE2 receptors on human cells, allowing it to enter the body and cause infection.
The symptoms of COVID-19 vary widely. Some people show no symptoms at all, while others experience severe illness. Common signs include fever, dry cough, fatigue, loss of taste or smell, and difficulty breathing. In more serious cases, it can lead to pneumonia, acute respiratory distress, organ failure, and even death, particularly in older adults and those with preexisting conditions like heart disease, diabetes, or lung problems.
The creation of COVID-19 vaccines was a significant step in managing the pandemic. Various vaccines, including mRNA types (such as Pfizer-BioNTech and Moderna), viral vector vaccines (like AstraZeneca and Johnson & Johnson), and inactivated virus vaccines (such as Sinopharm and Sinovac), were approved for emergency use. These vaccines have helped reduce the severity of the disease, as well as hospitalizations and deaths, although some people still got infected, especially with the arrival of highly contagious variants like Delta and Omicron.
COVID-19 has had a massive impact worldwide. Economically, it caused businesses to close, led to job losses, and disrupted supply chains. Socially, it changed the way people interact, work, and access healthcare. Schools moved to online learning, and healthcare systems were overwhelmed, particularly during spikes in cases. The pandemic also had a psychological effect, increasing feelings of isolation, fear, and uncertainty, which contributed to a rise in mental health issues.
Keyword-*COVID 19, Epidemic, Lockdown, Vaccine, Immunity*

Introduction.
The global COVID-19 pandemic has affected nearly every country in the world, with the first outbreak detected in December 2019 in Wuhan, China. Governments quickly advised their citizens to follow safety measures such as handwashing, wearing masks, physical distancing, and avoiding large gatherings to prevent the spread of the virus. Lockdowns and stay-at-home orders were introduced to slow down the transmission of COVID-19 (Sintema, 2020). In Bhutan, schools and businesses reduced hours in early March 2020, and a nationwide lockdown followed on August 1st (Palden, 2020). During this period, some activities resumed with restrictions, such as certain schools and offices reopening for select groups, while other students continued their education online. More than 170,000 students in Bhutan were impacted by school closures, and the disruption to education has been profound, likely affecting learning in the current academic year and beyond. Many schools and universities around the world also stopped in-person classes, highlighting

the need for alternative teaching and assessment methods. COVID-19 has pushed the use of digital learning forward, but challenges like poor online infrastructure, limited teacher experience with online platforms, and unequal access to resources at home have been obstacles (Dhawan, 2020).





Lockdowns and social distancing measures have led to school closures worldwide. As a result, educators have had to shift to online learning platforms. Although this move to online education has helped maintain teaching during the pandemic, it has been challenging for both teachers and students to adapt quickly to this new reality. The sudden transition from traditional classrooms to online environments has forced education systems to adopt digital tools, such as Microsoft Teams, Google Classroom, and Blackboard, which allow for virtual meetings, content sharing, and student assessments. These platforms support various file types and enable student learning to continue in an organized, remote way (Subedi et al., 2020). However, students and teachers need proper support to adjust to this new mode of learning, with some learners finding it easier than others. Different age groups and subjects require varied approaches to online teaching (Doucet et al., 2020).

While some students benefit from the flexibility of online learning, especially those with physical disabilities, many face emotional and psychological stress due to isolation and disruptions in their routines. The best practices for effective online education are still being explored, and the expertise in using digital tools varies widely among educators and students. Virtual classrooms using platforms like Zoom, Google Meet, and Moodle are becoming more common, and the "flipped classroom" model—where students review materials before class and use class time for discussion—has been an effective strategy for encouraging problem-solving and critical thinking (Doucet et al., 2020).

In the context of the immune system, about 70% of the immune cells in the blood are T cells, which play a critical role in fighting infections. There are two main types of T cells: CD4+ T cells, which help coordinate the immune response by activating other immune cells, and CD8+ T cells, which directly attack infected or cancerous cells. CD4+ T cells respond to non-self substances (like viruses) by producing chemicals called cytokines, which promote inflammation and help the immune system function properly. However, if T cells are activated incorrectly, they may fail to respond or die off, which can prevent the immune system from working efficiently.

Diagnosis of COVID 19

1. Clinical Symptoms and Initial Evaluation

COVID-19 symptoms can mimic other respiratory infections like the flu, so healthcare providers often rely on a combination of symptoms and exposure history to make an initial assessment. Early signs such as fever, dry cough, and fatigue are common, but other symptoms like the loss of taste and smell are more specific to COVID-19. In severe cases, symptoms can worsen to include breathing difficulties, chest pain, confusion, and bluish lips or face. The risk of severe disease is higher in older adults or those with underlying health conditions (e.g., heart disease, diabetes, chronic lung disease).

2. Laboratory Testing Methods

Laboratory tests are crucial to confirm a COVID-19 diagnosis, with molecular testing (RT-PCR) being the gold standard.

A. Molecular Testing (PCR Testing)

PCR testing is highly accurate because it directly detects the virus's RNA (genetic material). The process involves collecting a sample, usually from the nasal or throat swabs, where the virus tends to accumulate. In cases of severe lung infection, samples from the lower respiratory tract might be taken.

Process: Once the sample is collected, viral RNA is converted into DNA, which is then amplified using PCR techniques to detect the presence of SARS-CoV-2.

Turnaround: Though PCR tests are very sensitive and can detect even low levels of the virus, results might take anywhere from a few hours to a couple of days, depending on the testing capacity.

B. Antigen Testing

Antigen tests are faster but less accurate than PCR tests, making them suitable for rapid screening, especially in settings like airports or workplaces. These tests detect proteins from the surface of the virus.

Accuracy: Antigen tests are less reliable for detecting the virus in people who don't show symptoms or who have low viral loads. While results are available in minutes, false negatives are more common compared to PCR testing, which could miss early-stage or mild infections.

C. Antibody Testing (Serology Testing)

Antibody tests are not used to diagnose active infections but are important in determining if someone has been exposed to COVID-19 in the past.

Timing: It takes time for the body to produce antibodies after infection, usually around one to two weeks. Therefore, these tests are most useful for identifying previous infections and for conducting population-level studies to understand how widespread the virus has been.

Limitations: Antibodies fade over time, and the presence of antibodies does not necessarily equate to long-lasting immunity.

3. Imaging Studies

Imaging isn't used to confirm a COVID-19 diagnosis but can help evaluate the severity of the disease, especially in hospitalized patients.

A. Chest X-rays

X-rays may reveal lung abnormalities such as patchy shadows or opacities, indicating pneumonia. However, these changes usually appear in more advanced stages of the disease, so X-rays might not show abnormalities in the early stages of infection.

B. CT Scans

CT scans are more sensitive than X-rays and can show lung damage even in early or mild cases. A common finding in COVID-19 patients is "ground-glass opacities," which are hazy areas of the lung seen in CT images, indicating fluid build-up or inflammation.

Usefulness: CT scans help assess the extent of lung involvement and can be crucial in determining the need for critical care in patients with moderate to severe symptoms. However, CT scans aren't typically part of routine COVID-19 diagnosis due to the cost and radiation exposure.

4. Other Diagnostic Tests

Additional tests help monitor disease severity and manage complications:

Complete Blood Count (CBC): A decrease in lymphocytes (a type of white blood cell) is often seen in COVID-19 patients, indicating that the immune system is actively fighting the virus.

C-reactive protein (CRP): This is a marker of inflammation. High levels suggest a more severe inflammatory response, which could indicate worsening disease.

D-dimer: Elevated D-dimer levels are associated with clotting disorders, which are common in severe COVID-19 cases. High levels may signal the risk of blood clots (thrombosis), a dangerous complication.

Liver Function Tests: In some patients, especially those severely ill, liver enzymes

may rise, indicating liver stress or damage from the infection.

5. Special Considerations in Diagnosis

Asymptomatic Testing: Many individuals infected with COVID-19 remain asymptomatic or only show mild symptoms. Since they can still spread the virus, testing asymptomatic individuals is essential for containing outbreaks, especially in high-risk environments like nursing homes or schools.

False Negatives: No test is perfect. A false negative can occur if the viral load is too low at the time of testing or if the sample isn't collected properly. Retesting may be needed, particularly if the person has symptoms or has been exposed to someone with confirmed COVID-19.

Ct Value in PCR Tests: The cycle threshold (Ct) value is a marker used in PCR tests to determine viral load. Lower Ct values suggest higher viral loads, which might be associated with more severe disease or increased infectiousness. However, Ct values are not commonly used in day-to-day clinical management.

6. Home-Based and Point-of-Care Testing

During the pandemic, various home testing options became available:

Rapid Antigen Tests: These tests allow people to self-test at home with results in as little as 15 minutes. They're useful for quick screening before gatherings or travel but are not as accurate as lab-based tests.

Home PCR Kits: These tests require individuals to collect a sample at home and send it to a laboratory for PCR analysis. Results are typically available within a day or two.

7. Genomic Sequencing for Variants

As new variants of the virus, such as Delta and Omicron, emerged, genomic sequencing became important for tracking their spread and understanding how these variants differ in terms of transmission, severity, or vaccine resistance.

Purpose: Sequencing helps identify mutations in the virus's genetic code and informs public health strategies, including decisions on vaccine updates or targeted interventions.

Treatment of COVID 19

The treatment of COVID-19 depends on how severe the illness is, with different approaches for mild cases and more aggressive care for those who are seriously ill. Here's a breakdown of the current treatments:

1. Care for Mild to Moderate Cases

Most people with mild symptoms can stay at home and recover with basic care.Home Isolation and Rest: It's important to self-isolate at home to avoid spreading the virus. Rest and staying hydrated help recovery.

Treating Symptoms: Over-the-counter medicines like acetaminophen (Tylenol) or ibuprofen can reduce fever and pain. Cough suppressants or lozenges can ease a cough,

and decongestants can help with a stuffy nose.

Monitoring: Patients should keep an eye on their symptoms, especially watching for signs of worsening, like trouble breathing. A pulse oximeter can help monitor oxygen levels, which should stay above 95%.

2. Antiviral Medications

Several antiviral drugs are available for more serious cases, especially for people in the hospital.

Remdesivir: This drug helps stop the virus from replicating and is given to hospitalized patients who need oxygen. It is given through an IV over 5 to 10 days.

Molnupiravir: This oral medication is used for high-risk people with mild or moderate COVID-19 to reduce the risk of hospitalization. It is taken within five days of symptoms starting.

Paxlovid: A combination of two drugs, Paxlovid helps reduce the risk of severe illness if taken early. It's an oral medication used for mild to moderate cases in high-risk patients.

3. Anti-Inflammatory Treatments

Severe cases of COVID-19 can cause the immune system to overreact, leading to excessive inflammation. Certain drugs are used to calm the immune response.

Dexamethasone: This steroid reduces inflammation and is used for hospitalized patients who need oxygen or a ventilator. It has been shown to improve survival in these patients.

Tocilizumab: This drug is used to control severe inflammation in patients who have high levels of inflammation and need oxygen support. It is given through an IV.

Baricitinib: Another drug that helps reduce inflammation, Baricitinib is used with remdesivir or steroids in hospitalized patients.

4. Oxygen Therapy and Ventilation Support

For people with severe COVID-19, breathing assistance may be necessary.

Oxygen: If a patient's oxygen levels drop, supplemental oxygen is given through nasal tubes or masks.

Non-invasive Ventilation: If oxygen alone isn't enough, techniques like CPAP or BiPAP can provide breathing support without needing intubation.

Mechanical Ventilation: For patients with severe breathing problems, a ventilator might be necessary to help them breathe.

ECMO: In the most extreme cases, a machine called ECMO can be used to oxygenate the blood outside the body when the lungs aren't functioning.

5. Blood Thinner Therapy

COVID-19 can increase the risk of blood clots. To prevent this, blood thinners like low-molecular-weight heparin are often given to hospitalized patients to reduce the risk of clotting complications.

6. Monoclonal Antibody Treatments

Monoclonal antibodies are lab-made proteins that mimic the body's immune response.

Casirivimab and Imdevimab: These antibodies block the virus from entering cells. They are used in people who are at high risk of severe illness and can also be given to prevent infection after exposure.

7. Convalescent Plasma

This treatment involves giving patients plasma from people who have recovered

from COVID-19, which contains antibodies. However, studies have shown mixed results, and its effectiveness remains uncertain.

In summary, the treatment for COVID-19 ranges from simple home care to complex medical interventions, depending on the severity of the disease.

Conclusion

In conclusion, the treatment of COVID-19 involves a spectrum of interventions, from supportive care for mild cases to advanced therapies for severe illness. For mild cases, home isolation, rest, and symptom management are typically sufficient, while more serious cases may require antiviral medications, anti-inflammatory drugs, and oxygen support. As the virus can trigger complications like excessive inflammation and blood clots, additional therapies such as corticosteroids, monoclonal antibodies, and anticoagulants are crucial in preventing severe outcomes. Emerging treatments like antivirals and monoclonal antibodies have expanded the options for early intervention, reducing hospitalizations and deaths. While research continues to evolve, these treatment strategies have become critical tools in managing the pandemic and improving patient outcomes.In conclusion, the treatment of COVID-19 involves a comprehensive approach, adapting to the severity of the disease. From basic supportive care for mild cases to advanced therapies for severe ones, including antivirals, corticosteroids, and oxygen support, treatment strategies continue to evolve. Novel therapies like monoclonal antibodies and antiviral medications offer promising results, particularly when administered early. Ongoing research and vaccine development remain essential in reducing the global impact of the virus, while enhancing treatment efficacy.

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