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SARS-CoV-2: Dissecting the Puzzle of a Global Pandemic in 2019

Akhilesh Kumar Saini, Purnima Tyagi and Jitendra Kumar*

Department of Molecular and Cellular Medicine, Institute of Liver and Biliary Sciences, New Delhi, India

***Corresponding author:** Jitendra Kumar, Department of Molecular and Cellular Medicine, Institute of Liver and Biliary Sciences, New Delhi, India, E-mail: jkumar1@ilbs.in

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Abstract

The virus responsible for the COVID-19 pandemic, SARS-CoV-2, is thought to have originated in bats and spreads predominantly through respiratory droplets and contaminated surfaces. Symptoms can range from mild to severe and elderly adults and those with underlying health conditions are at greatest risk. The global response has included the implementation of public health measures, the development and distribution of vaccines, and the consideration of socioeconomic effects. Lessons learned include the need for enhanced surveillance, collaboration, and equitable healthcare access. Long-term consequences include the significance of resilient healthcare systems, mental health support, education, and a sustainable economic recovery. Understanding the complexity of SARS-CoV-2 is essential for developing effective strategies to combat the pandemic and construct a more resilient future.

Key words: SARS-CoV-2; Pandemic; Virus; Symptom

Description

In late 2019, SARS-CoV-2 began a global health disaster that continues to affect societies globally [1]. Here, we summarized and explores SARS-CoV-2 origin, genetics transmission patterns, clinical manifestation, worldwide response, socio-economic ramifications, lessons learned, future considerations, and potential long-term effects.

Origin and genetics characteristics

Coronaviruses, enclosed, single-stranded RNA viruses, are zoonotic. SARS-CoV-2 may have originated from bats and spread to people through an intermediate animal host, presumably at Wuhan, China wildlife market [2]. The bat-derived SARS-CoV and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) share genetic similarities with the virus, but it has different traits that make it efficient for human-to-human transmission [3]. SARS-CoV-2 has 30,000 base pairs, according to genetic sequencing. Virus reproduction, immune evasion, and host interactions require structural and non-structural proteins from the viral DNA [4]. The spike protein on the virus surface binds to the ACE2 receptor to allow viral entrance into human cells. SARS-CoV-2 genetic architecture was helpful in creating diagnostics, vaccines and treatments [5].

Transmission dynamics

Coughing, sneezing, talking, and exhaling propagate SARS-CoV-2. These droplets can infect nearby people. Touching contaminated surfaces and subsequently touching the eyes, nose, or mouth can potentially spread the virus. Airborne particles may also spread SARS-CoV-2 in poorly ventilated settings. These people can spread the infection before or during symptoms. Asymptomatic transmission spreads the pathogen rapidly. Widespread testing, contact tracing, mask-wearing, social distancing, and hand cleanliness reduce transmission rates.

Clinical manifestation and disease severity

SARS-CoV-2 can cause flu-like symptoms to severe respiratory distress and multi-organ failure. The median incubation duration is 5-6 days. Most infected people have fever, cough, exhaustion, body aches, sore throat, and loss of taste and smell. Some people are asymptomatic or have mild symptoms like a cold. Most SARS-CoV-2 patients have mild to moderate symptoms and recover without hospitalization, although older adults and those with underlying health issues can develop severe cases. Respiratory distress, pneumonia and other consequences characterize severe COVID-19. Some people get the condition quickly and need specialized treatment [6].

Global response

The SARS-CoV-2 pandemic response has included public health actions, healthcare system preparedness, research and development, and international collaboration. Testing, contact tracing, isolation, quarantine, travel restrictions, and public health campaigns have been used to control the infection. SARS-CoV-2 vaccination is a scientific accomplishment. Emergency vaccinations and global immunization initiatives have been approved. COVID-19 vaccinations have reduced hospitalizations and mortality. Vaccine reluctance, equitable distribution, and large-scale immunization campaign logistics remain obstacles. Other therapeutic options include antiviral medicines, immune modulators, and convalescent plasma. Clinical trials have illuminated treatment efficacy and safety. Global scientific collaboration has accelerated treatment development and evaluation [7].

Socio-economic Impact

COVID-19 has had major socioeconomic effects. Lockdowns, travel restrictions, and business closures have impacted economies worldwide. The epidemic has cost jobs, money businesses, and various

sectors. Informal workers, migrant workers, and marginalized communities have been disproportionately affected. Education has suffered from school closures. Remote learning programs, while vital to contain the virus, have shown gaps in technology, internet connectivity, and education. The pandemic may impair academic performance, educational attainment, and social development. Pandemic mental health effects are serious. Virus-related isolation, fear, and uncertainty have raised anxiety, sadness, and psychological suffering. Mental health issues are common in frontline healthcare personnel and viral victims. The epidemic highlighted the need for mental health treatments and support [8].

Lessons learned and future considerations

SARS-CoV-2 taught pandemic preparedness and response numerous important lessons. First, early warning and effective control require robust and agile surveillance systems with rapid detection and monitoring. Public health infrastructure, including laboratories, testing, and surveillance networks, is essential for outbreak response. Global health emergencies require cooperation and information sharing. Transparent and timely communication, collaboration between scientists, researchers, and policymakers, and data, research findings and best practices have been emphasized by the pandemic. To respond globally, vaccine and treatment research, development, and distribution must be coordinated [9]. Strong healthcare systems were highlighted by the epidemic. For managing demand and providing quality care, hospitals need beds, critical care facilities, medical supplies, and skilled staff. To improve pandemic response, investment in healthcare system readiness, worker training, and supply chain resilience is very vital. Health equity and universal healthcare are essential. The pandemic has disproportionately affected vulnerable populations, particularly those without healthcare, socioeconomically challenged people, and marginalized communities. Health equality and resilience require reducing health inequities, distributing vaccines fairly, and improving healthcare infrastructure in marginalized communities [9].

Long-term implications

The SARS-CoV-2 epidemic has far-reaching effects. Social, economic, and political effects may last decades. Global health, socioeconomic factors, and environmental sustainability are interconnected due to the pandemic. Global health security requires investments in R&D, surveillance, healthcare infrastructure, and international cooperation. The pandemic has shown the importance of disease surveillance, early detection, contact tracing, and risk communication. Mental health treatments should be integrated into healthcare systems due to the pandemic's effects. Future pandemic preparedness and response require mental health support, stigma reduction, and mental well-being [10]. The pandemic has highlighted the need for remote learning tools, equitable education access, and student and educator assistance. Future readiness requires resilient education institutions that can withstand interruptions and maintain learning. To recover from the pandemic, affected industries, jobs, and development will need tailored actions and regulations. Innovation, digital transformation, and green technologies may construct resilient and sustainable economies [10].

Conclusion

The COVID19 pandemic was major threat to humanity. Effective containment, mitigation, and recovery methods require knowledge of the virus's origin, transmission patterns, clinical manifestations, global response, socioeconomic repercussions, lessons learned, future considerations, and long-term ramifications. Scientists, healthcare experts, policymakers, and communities worldwide are crucial to overcoming this global crisis and constructing a more resilient future.

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