



Research Paper

EPIDEMIOLOGY AND CONTROL OF CORONAVIRUS EMERGING AND RE-EMERGING INFECTION IN THE WORLD

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Abstract

The Covid-19 pandemic, also known as the Coronavirus pandemic, is an ongoing pandemic of Coronavirus disease 2019 caused by severe acute respiratory syndrome Coronavirus 2 (SARS-COV-2), which belongs to a family of single stranded RNA viruses known as *Coronaviridae*, a common type of virus which affects mammals, birds and reptiles. It was first identified in December 2019 in Wuhan, China. WHO declared the outbreak a public health emergency of international concern in January, 2020 and a pandemic in March, 2020. As of 6 May 2021, estimate of 155million cases have been confirmed with more than 3.2million death attributed to covid-19. People at the greatest risk from covid-19 tend to be those with underlying condition, such as weakened immune system, serious heart or lungs problem, elderly individuals (age 65years and above) etc. The virus spread directly through the air when people are close to each other or indirectly through contaminated surfaces. It leaves an infected person as they breathe, sneeze, cough or speak and enter another susceptible person through mouth, nose or eyes. Recommended preventive measures include; social distancing, wearing of face mask, proper hand washing with soap etc. Treatments focus on addressing symptoms through supportive care, these symptoms also helps in diagnosis. Signs and symptom can be mild, moderate or severe.

Key words: Epidemiology, Control, Emerging, re-emerging, infection.

INTRODUCTION

Although considerable progress has been made in the area of medical sector, the emergence or re-emergence of novel pandemic viruses remains an enduring problem in human health (Parvez and Parveen, 2017). Infectious viral diseases are never-ending challenge that can emerge or re-emerge in unpredictable regions and at unpredictable times. An emerging viral disease is newly evolved, or newly recognized or have not been

observed previously within a population or geographic location. Re-emerging viral diseases are resurgence or recurring outbreaks for a significant part of the population, after a previous decline in incidence (Abebe, 2020). Viruses such as Severe Acute Respiratory Syndrome-associated Coronavirus (SARS-CoV), Middle East respiratory syndrome Coronavirus (MERS-CoV), human Coronaviruses (229E, OC43, HUK1, NL63), Avian influenza A (H7N9), and Ebola are examples of emerging viruses which have been evolved in different periods. Among many human viruses corona viruses are known to be involved in more serious respiratory diseases, such as bronchitis, bronchiolitis or pneumonia, especially in young children and neonates, elderly people and immune-suppressed patients (Parvez and Parveen, 2017). The continued emergence or re-emergence of such viral diseases has a detrimental impact on health, economy, social security and stability worldwide. Newly emerged pathogens pose an intractable problem due to scarcity of knowledge and experience. The same is true for the newly emerged COVID-19 which costs lives of millions because of lack of vaccine or antiviral drugs (Sanche *et al*, 2020). Additionally, the newly emerged viral disease may create panic within a community which leads instability (Abebe, 2020). Many early cases of covid-19 has been attributed to people who visited the Huanan sea food wholesale market in Wuhan, Hubei, China, and was named COVID-19 by WHO on February 11, 2020 (Sun *et al*, 2020; Lovelace, 2020). The SARS-CoV-2 which causes the outbreak (Gorbalenya *et ai*, 2020), is closely related to Pangolin corona viruses, bat Coronaviruses and SARS-CoV, thus scientific consensus is that COVID-19 is a Zoonotic virus that arose from bats in natural settings (Cyracoski, 2020; Zhang, 2020; Latine *et al*, 2020). COVID-19 is termed pandemic because of its global effect, with United States, India and Brazil having the highest prevalence and Federated state of Micronesia, Vanuatu and Tanzania (no data) with lowest prevalence (Wikipedia, 2021). Therefore, the aim of this review article is to provide an overview of emerging viral diseases, contributing factors, with special emphasis to COVID-19.

CLASSIFICATION AND BIOLOGY OF CORONAVIRUSES: Coronaviruses are enveloped helical viruses with large, positive sense, single-stranded RNA (+ ssRNA) genome and contain club-shaped surface proteins called spikes on their surfaces which give the virus particles the appearance of a solar corona in which the virus gets its name. Coronaviruses belong to the *Coronaviridae* family of the *Nidovirales* order. Coronavirus

virions are spherical overall but the RNA genome inside is arranged in a flexible helical structure, closely bound to a nucleocapsid protein (Gorbalenya *et al*, 2020). Most RNA viruses are deadly pathogens since they evolve rapidly in any hostile conditions and exhibit error-prone gene replication. If the virus continuously mutates, recombines or reassorts, then human health will be scourged. This is because the virus will be emerged in unexpected time with unknown "weapons" and mysterious behavior and this in turn will be new or unknown for immune cells which are our "soldiers" and as well as medication (Letko *et al*, 2020). Viruses have different mechanisms for entrance into their host. For example, enveloped viruses enter cells by inducing fusion of viral and cellular membranes, and this step is assisted or catalyzed by a specialized membrane-fusion protein expressed on their surface. Therefore, the viral infection is mainly dependent on surface structures such as spikes that determine host, cell, and tissue tropism. These widely spaced spikes found on the envelope of coronaviruses are the key structures important to species tropism, tissue tropism, pathogenesis in the host, and the ability to cross between species (Abebe, 2020). The coronavirus spike protein is a multifunctional molecular machine that mediates coronavirus entry into host cells (Letko *et al*, 2020). Generally, knowing viral structure is essential for a better understanding of the possibility of virus transfer and cross-contamination, and for formulating appropriate infection-control measures and even designing appropriate antiviral drugs and vaccines (Abebe, 2020).

EPIDEMIOLOGY: Based on the low variability exhibited among known SARS-CoV-2 genomic sequences, health authorities likely detected the virus within weeks of its emergence among the human population in late 2019. The earliest case of infection currently known is dated to 1 December 2019, although an earlier case could have occurred on 17 November 2019 (Sun *et al*, 2020). The virus subsequently spread to all provinces of China and to more than 150 other countries across the world. Human-to-human transmission of the virus has been confirmed in all these regions. On 30 January 2020, SARS-CoV-2 was designated a *Public Health Emergency of International Concern* by the WHO, and on 11 March 2020 the WHO declared it a pandemic (Lovelace, 2020). The basic reproduction number of the virus has been estimated to be around 5.7. This means each infection from the virus is expected to result in 5.7 new infections when no members of the community are immune and no preventive measures are taken. There

have been about 96,000 confirmed cases of infection in mainland China. While the proportion of infections that result in confirmed cases or progress to diagnosable disease remains unclear, Before 24 February 2020, over 95% of all deaths from COVID-19 worldwide had occurred in Hubei province, where Wuhan is located. As of 16 March 2021, there have been 120,505,974 total confirmed cases of SARS-CoV-2 infection in the ongoing pandemic (New York Times, 2020). The total number of deaths attributed to the virus is 2,665,597. Many recoveries from both confirmed and untested infections go unreported, since some countries do not collect this data, but at least 68,325,205 people have recovered from confirmed infections (Wikipedia, 2021). As of 6 May 2021, there have been at least 3,247,557 confirmed deaths and more than 155,475,984 confirmed cases in the COVID-19 pandemic (CSSE, 2021).

TRANSMISSION: it spreads from person to person through the respiratory route after an infected person coughs, sneezes, sings, talks or breathes; a new infection occurs when virus containing particles exhaled by an infected person gets into the mouth, nose or eyes of other people. It mainly enters human cells by binding to the angiotensin converting enzyme 2 (ACE-2) (Letko *et al*, 2020). Besides this, contaminated fomites that have contact with droplets from coughing or sneezing is also a source of contamination (Sanche *et al*, 2020). The novel coronavirus 2019-nCoV has an array of biological and epidemiological characteristics, making it more contagious than previously emerged SARS-CoV and MERS-CoV (Abebe, 2020). Epidemiological studies estimate that each infection results in 5.7 new ones when no members of the community are immune and no preventive measures taken (Sanche *et al*, 2020).

AT-RISK GROUP: Old aged individuals are more susceptible to coronavirus infection. The most severe and fatal infections with SARS have been in elderly persons (Sun *et al*, 2020). Similarly, WHO reported that older people, immune-compromised individuals and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely susceptible to COVID-19. Even if elderly individuals with other health complaints are more severely affected, COVID-19 is also health issue of the rest age groups (Abebe, 2020).

DIAGNOSIS: Standard method of testing for presence of SARS-CoV-2 are; nucleic acid test, which detects for the presence of viral RNA fragments and chest CT (computed tomography) scans (Li *et ai*, 2020).

SIGNS AND SYMPTOMS: These can be mild, moderate or severe; headache, fever, sore throat, breathing difficulty, nasal congestion etc. complication include viral sepsis, Pneumonia, acute respiratory distress etc (Wikipedia, 2021).

PREVENTION AND CONTROL: The best way to prevent and slow down transmission is to be well informed about the COVID-19, the disease, its cause and spread. Generally, WHO recommend the following controlling measures for COVID-19 such as isolation of patients, quarantine of exposed people, travel restriction, massive screening, Staying home, wearing of face mask, social distancing, washing hands with soap and water, disinfecting surfaces etc (Abebe, 2020).

TREATMENT: There is no specific or effective treatment, thus the cornerstone of management is supportive care which includes; treatment to relieve symptom, fluid therapy, oxygen support and prone positioning as needed etc. (Wang, *et ai*, 2020).

ROLE OF VACCINE: As of February 2021, 66 vaccine candidates are in clinical research at different phases (1,2,3), in phase 3 trials, several covid-19 vaccines demonstrate efficacy as high as 95% in preventing symptomatic covid-19 infection. As of February 2021, 10 vaccines are authorised for public use, these include 2 RNA vaccines, 3 conventional inactivated vaccines, 4 viral vector vaccines and 1 peptide vaccine (Vaccine Centre, 2021).

DEATH: Official deaths from COVID-19 generally refer to people who died after testing positive. These counts may ignore deaths of people who die without having been tested. The first confirmed death was in Wuhan on January 9, 2020, while first reported death outside China occurred on February 1, 2020 in the Philippines, and outside Asia was in the United States on February 6, 2020. Death rate of COVID-19 can be accessed using Infection Fatality Ratio (IFR) and Case Fatality Ratio (CFR) (Wikipedia, 2021).

IMPACT OF COVID-19: These are the adverse effect of covid-19 which include; economic impact, supply shortages, agriculture and food systems, education, environment and climate, other health issues and complications etc (Wikipedia, 2021).

CONCLUSION: There has been a rapid surge in research in response to the outbreak of COVID-19. During this early period, published research primarily explored the epidemiology, causes, clinical manifestation and diagnosis, as well as prevention and control of the novel Coronavirus. Although these studies are relevant to control the current public emergency, more high-quality research is needed to provide valid and reliable ways to manage this kind of public health emergency in both the short- and long-term.

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