

# All you need to know about coronavirus



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## **Abstract**

Coronaviruses (CoV) that can be transmitted from animals to humans. Since it was discovered in 2002, the virus has been evolving and has caused various infections, including fatalities. In Saudi Arabia, the first case of novel coronavirus was detected in September 2012 when a man was admitted to a hospital with pneumonia and an acute kidney injury. Vaccines for preventing SARS were developed, which include virus particles (VLPs), plasmid DNA, spike (s) protein preparations, and they inactivated the whole virus. Epizootic outbreaks that involved avian influenza A were later detected in China in 2013 in what can be described as a mutation of the virus. In January 2020, the National IHR Focal point (NFP) for the Republic of Korea reported the first case of a novel coronavirus in the Korea republic. The WHO recommends that additional studies be conducted to determine how the patients are infected.

Keywords: Coronaviruses, Influenza A virus, severe acute respiratory syndrome, hemagglutinin, pneumonia

## **Introduction**

Do you own a cat or a camel? Did you know that there is a large family of viruses known as coronaviruses (CoV) that can be transmitted between animals and people? Detailed investigations indicate that there is a virus known as (SARS- CoV) that is transmitted from cats to humans and (MERS- Cov) transmitted from dromedary camels to humans. Coronavirus (CoV) has been evolving throughout the years, and the Public Health sector needs to improve the methods used to prevent and control the spread of the virus.

Coronavirus (CoV) is a new strain that has been identified in humans, and it is known to circulate in animals as it awaits to infect humans. According to the WHO China Country Office, cases of pneumonia of unknown causes were detected in Wuhan city Hubei Province of China. After close investigations, coronavirus (2019-nCoV) was noted to be the causative virus by the Chinese authorities. Illnesses that may start from a mere common cold may now lead to more severe diseases such as the Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV).

## **Background Research**

Severe acute respiratory syndrome (SARS) was first detected in Guangdong China in the year 2002. From there, it is believed to have spread to other countries in Asia and Canada in the subsequent months. There were more than eight thousand cases of infection, and more than eight hundred deaths that were reported during an outbreak in 2003 (Pearson, 2004). Increasing age and comorbidity were noted to be the risk factors for a severe infection that would lead to death. However, efforts to control the spread of the virus were successful in 2003, and fewer cases have been reported from then. Since a significant influenza A virus (IAV) infection was initially detected in China, the virus has spread over five waves causing human infections in various parts of the country. The RNA from primary clinical throat swab samples from about twenty patients who were infected with H7N9 had different clinical outcomes (Pearson, 2004).

The results of the twenty patients that were treated at a hospital in Shanghai, China, from April 2013 to 2015 were analyzed. These samples were subjected to deep sequencing, and data from sixteen samples were

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analyzed in detail. The most significant case of IAV epizootic outbreaks involved avian influenza A (Tseng et al., 2012). The virus was detected in China in March 2013. There were human spillover infections that happened later where the cases were noted in other parts of the country, and several imported H7N9 were reported in other countries. In 2017 there were about 1,566 laboratory cases of human infection with avian influenza A/H7N9 viruses that were confirmed. There were also 613 cases of fatality that were reported. In the first four waves of the epizootic clusters of human H7N9 cases, about ninety percent of the patients developed pneumonia. About two thirds needed intensive care, and forty percent of the patients had a fatal outcome (Tseng et al., 2012). The H7N9 that occurred in the fifth wave has shown indications of evolving into distinct genetic lineages. These lineages are referred to as the Pearl River Delta and Yangtze River Delta lineages.

In Saudi Arabia, the first case of novel coronavirus was detected in September 2012 when a man was admitted to a hospital with pneumonia and an acute kidney injury. Days later there were reports of another incident of an almost identical virus in a second patient that had severe respiratory syndrome and acute kidney injury (Forssman, Gupta & Burgess, 2006). Several other cases were reported after that. Novel coronavirus was at first termed as a human coronavirus- EMC (for Erasmus Medical Center), has been renamed Middle East respiratory syndrome coronavirus (MERS-CoV). In 2019, the novel coronavirus (2019-nCoV) was identified in Wuhan China city Hubei province and reported to the WHO. In January 2020, the National IHR Focal point (NFP) for the Republic of Korea reported the first case of a novel coronavirus in the Korea republic.

## **Vaccination**

A vaccine for preventing SARS was developed by several groups, which include virus particles (VLPs), plasmid DNA, spike (s) protein preparations, and inactivated the whole virus. Some studies have been conducted with a whole virus vaccine and a DNA vaccine. An early application of a SARS-CoV vaccine was the experience with coronavirus infections. These infections induced enhanced disease and immunopathology in animals when challenged with an infectious virus (Forssman, Gupta & Burgess, 2006). Reports indicated that when animals were given an alum adjuvant SARS vaccine exhibited an immunopathology lung reaction reminiscent of that described for the respiratory syncytial infection (RVs). A similar immunopathology reaction was described in mice vaccinated with the SARS-CoV vaccine. There was a Proposal that the nucleocapsid protein of SARS-CoV is the antigen in which the immunopathology reaction is directed. Concerns for proceeding to humans with candidate SARS-Cov vaccines emerged from these various observations.

## **Methods that need to be improved to prevent and control the spread of the virus**

According to Pearson (2004), zoonotic infectious diseases are a challenge. An avian influenza A (H7N9) virus emerged ten years after the severe acute respiratory syndrome (SARS) was detected in China and caused several cases of infections. Human infections were the first reported cases that were caused by an H7N9 virus subtype. Scientists identified the haemagglutinin and neuraminidase gene to have been derived from H7N3 and H7N9 viruses. Their sixth internal genes may have been derived from an

H9N2 virus. China is now on a high alert to potential influenza pandemics and other emerging infectious diseases. Increased demand for animal products has resulted in increased measures in animal husbandry and animal interactions (Tseng et al., 2012). The rate of infections that were caused by animal pathogens has, however, increased, and new infections from diseases have emerged. H5N1 influenza virus has created a total of forty-five cases of illnesses and about thirty deaths in humans in China since the year 2003. The pandemic in 2009 that was caused by the influenza virus (A/H1N1pdm) may have originated from swine. The novel avian influenza A (H7N9) virus had created a number that was higher than that caused by H5N1 (Forssman, Gupta & Burgess, 2006). The Chinese government then became aware and raised the capacity to respond to health emergencies caused by SARS.

The pandemic potential of novel avian origin viruses should not be underestimated as it is associated with high morbidity and mortality in humans. One of the concerns of this project is that the evolution of the novel virus might eventually lead to human-to-human transmission and possible epidemics (Wang, 2013). Since the infections with the virus are asymptomatic in the avian population, the distribution of poultry can expand the human-animal interface and hence increase the risk of dissemination to human infections. Clinical treatment in such cases may, therefore, be less effective in patients with H7N9 diseases and have developed severe pneumonia. The proposal in this project is that there should be evidence-based intervention strategies that can be used together with the new methods to address the evolving disease (World Health Organization, 2010).

Since it is not possible to enable all township hospitals to undertake to test, the country should consider increasing the number of hospitals that do it for suspected cases of coronavirus (CoV).

In 2019 a fourth internationally exported case was reported in Wuhan city by Chinese travelers. Since the first case was published on Dec 31, 2019, and January 2020, there were 278 cases of 2019-nCoV infections that were confirmed in laboratory tests. Of the six deaths that were reported to WHO globally, one example was from Japan, two from Thailand and one from the Korea republic (World Health Organization, 2010). There were about 51 cases in China that were severe, and 12 patients were noted to be critically ill. All the patients were under isolation at designed medical institutions in Wuhan. The source of the outbreak was still under investigation in Wuhan city. Preliminary studies had identified environmental samples to be positive for nCoV in Huainan seafood wholesale markets in Wuhan City.

Nevertheless, some of the patients confirmed that they had visited the market. Some cases were reported from other provinces in China other than Wuhan city (World Health Organization, 2010). According to the WHO, additional investigations should be conducted to determine how the patients were infected, the clinical spectrum of the disease, the extent of human-to-human transmission, and the geographic range of infection.

## **Scope**

The focus of this project is to examine how coronavirus (CoV) has changed throughout the years up to today. The main research will use the information that is provided on the WHO website to explore the methods used to

investigate the spread of the virus and the number of infections that were reported (Wang, 2013). The research will also rely on laboratory reports that have been presented for analysis from various recognized hospitals in China regarding the outbreak. There are also reports of analyzed patient samples that have been selected for comparison.

## **Analysis**

Acute respiratory syndrome (SARS) was first detected in Guangdong China in the year 2002. In 2003 there were more than eight thousand cases of infection and more than eight hundred deaths that were reported during an outbreak of the virus. Efforts were made to control the spread of the virus and were successful in 2003, and fewer cases have been reported since then. Epizootic outbreaks that involved avian influenza A were later detected in China in 2013 in what can be described as a mutation of the virus (Forssman, Gupta & Burgess, 2006). Since the influenza A virus (IAV) infections were initially detected in China, the virus has spread over five waves causing human infections in various parts of the country. Human spillover infections happened later, and cases were reported in other parts of the country, and a number of imported H7N9 were reported in other countries. A vaccine for preventing SARS was developed by several groups, which include virus particles (VLPs), plasmid DNA, spike (s) protein preparations, and inactivated the whole virus.

## **Discussion**

When the SARS emerged, it was identified as a severe and high-risk disease. It required a rapid mobilization for control at the major areas of its occurrence, including the international level. Part of this response was to

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develop a vaccine that would be potentially used in its control. The causative agent was identified as coronavirus, and it became easy to create the vaccine then. The infection control brought down the epidemic (Tseng et al., 2012). However, there were concerns about the reemergence, so there was a need to support the continuation of vaccine development. The new vaccine would be prepared so that it would be used in case the need arises. The national institute of allergy and infectious diseases was tasked with the preparation of the vaccine for the evolved virus and potential use in humans. Children with Th2 -type immunopathology reactions were given an inactivated RSV vaccine. The results indicated that the children became infected with naturally occurring RSV (Tseng et al., 2012). Most of these children experienced severe disease with an infection that led to a high frequency of hospitalization. Reports indicated that two of the children died from these infections. Conclusions from these experiments showed that the previous vaccination heightened RSV lung disease (Wang, 2013). Studies that were conducted in animal models in an attempt to mimic the human experience indicated that RSV inactivated vaccine induces an increased CD4+T lymphocyte response. The Th2 cell and the occurrence of complex immune depositions in lung tissues.

## **Conclusion**

In conclusion, Coronavirus (CoV) has been evolving throughout the years since it was first detected Guangdong China in the year 2002. In Saudi Arabia, the first case of novel coronavirus was discovered in September 2012 when a man was admitted to a hospital with pneumonia and an acute kidney injury. Success has been made in the efforts to control coronavirus (CoV)

since scientists have developed a vaccine. The virus is known to have spread in over five waves causing human infections in various parts of China. After careful analysis of the germs that were reported, the WHO recommended that additional investigations be conducted to determine how the patients were infected, the clinical spectrum of the disease, the extent of human-to-human transmission, and the geographic range of infection.

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