SHORT FEATURE

Novel Coronavirus-2019

Prevention is the Only Cure

Kanti Bhooshan Pandey

AN outbreak of a respiratory disease caused by a novel coronavirus, which was first identified in Wuhan, Hubei Province, China, has become a public health concern round the globe. Infection with the virus initially displays common cold-related symptoms including running nose, fever, headache, sinuses and upper throat infection. However, in the later stages it affects the respiratory system and chokes it, leading to the person's death.

A novel Coronavirus (CoV), identified by Chinese authorities between December end 2019 and early January 2020, has been named 2019-nCoV. The virus is a new strain that had not been previously identified in humans. Many people have died and thousands are suffering in China due to the 2019-nCoV infection, which is spreading in neighbouring countries as well. The World Health Organization (WHO) has declared it a health emergency in China and a matter of global concern, if not controlled.

In 1937, coronavirus was first isolated from an infectious bronchitis virus in birds that could seriously ruin the poultry stocks. At that time, it was thought that the virus was responsible for flu in birds only. However, over the last seven decades, researchers have reported evidence that coronavirus can also infect mice, rats, dogs, cats, horses, camels and pigs. It was in the 1960s when coronavirus that could infect humans was first identified from the nasal fluids of the common cold patients.

Coronaviruses were given the name based on the crown-like projections on their surfaces where "Corona" in Latin means "halo" or "crown". These projections or spikes which are structural proteins, help them to invade the host cells, the s1 region of the surface proteins binds with the receptor at the host cell and s2 region fuses and facilitates coronavirus to enter inside the cell and replicate.

A matter of serious concern for scientists is that coronavirus is so advanced that it interacts at multiple levels with other components of the host cells taking advantage of some of the cellular machinery for its replication, transcription and proliferation. In 2019-nCoV, the S2 region is identical but the difference is in s1 region of the surface protein.

Till date, seven different strains of coronaviruses have been reported to cause infections in humans, of which four are — 229E, NL63 (α coronaviruses) and OC43, HKU1 (β coronaviruses). The severity of illness caused by them is mild and sometimes gets automatically cured by the inherent immune systems of the body. However, the infections caused by two comparatively newly reported human coronaviruses, Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) are severe and lethal whereas the lethality of recently reported 2019-nCoV in China is under investigation.

The lethality of human coronavirus first drew attention in China in 2002. However, it caused a worldwide outbreak in late 2002 and 2003 when SARS-CoV infection took away thousands of lives and spread to many countries including North & South America, Europe, and Asia. After 10 years, in 2012 in Saudi Arabia, a new strain of coronavirus was reported identical but of more resistive potential than SARS-CoV, which was then identified as MERS-CoV. The infected people expressed severe acute respiratory illness with fever and cough followed by shortness of breath.

Since then MERS-CoV has shown its presence in more than 25 countries. Reports advocate that 2019-nCoV is somewhat similar to the SARS-CoV but it does have differences in the key areas that may change its ability to infect and cause the level of damage in comparison to SARS-CoV.

While the initial symptoms of coronavirus infection are quite similar to common influenza including running nose, fever, sore throat and cough, as time passes, symptoms become worse and result in lower-respiratory tract illnesses such as pneumonia and/or bronchitis. If untreated or in people with a weak immune system, the respiratory system gets choked leading to the death of the person.

Coronaviruses (CoV) are a large group of viruses that are common among animals. In rare cases, they are zoonotic (can be transmitted from animals to humans). The common hosts of coronaviruses are especially camels, pigs and bats. The rarest of the rare CoV infects humans. But now it can be assumed that they have evolved and can infect humans. Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), Middle East respiratory syndrome coronavirus (MERS-CoV) and the recent novel Coronavirus-2019 (2019-nCoV) are the current examples.

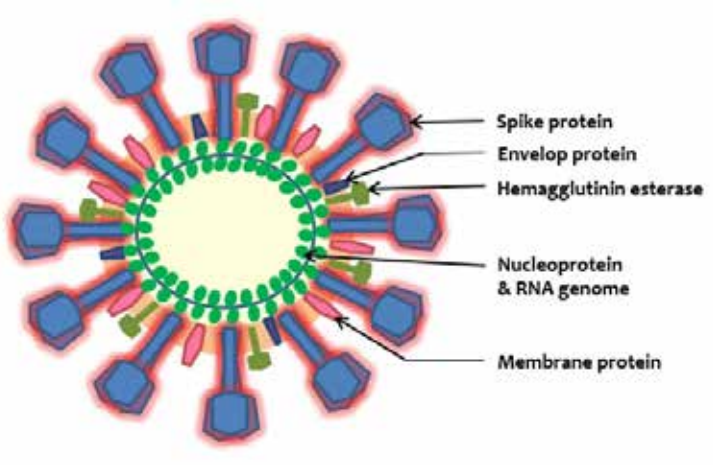
2019 Novel Coronavirus (2019-nCoV): At a Glance

Family	Coronaviridae
Other family members	229E, NL63, OC43, HKU1, SARS-CoV, MERS-CoV
Possibility to transmit	Animals to humans; human to human
Media of transmission	Air, personal contacts, faecal transmission (all under investigation)
Proposed incubation period	10-14 days
Symptoms	Fever, headache, running nose, sore throat, difficulty in breathing. In more severe cases, it can lead to pneumonia, severe acute respiratory syndrome, kidney failure and finally death.
Lethality/death rate	20-30%
Treatment	No vaccine; only symptoms can be treated
Preventive measures	Proper hygiene, frequent hand washing, avoiding personal contacts, using a mask and healthy food

Reports say that the incubation period of coronavirus remains unknown, but it is supposed to be between 10 to 14 days. The mortality rate of 2019-nCoV infections may be quite high; about 2-3 persons out of 10 are reported dead. The severity of 2019-nCoV infection is more in persons with weak immune systems, infants, pregnant women, elderly and people with cardiopulmonary diseases.

Although detailed information about 2019-nCoV is still under laboratory investigation, the proposed transmission of coronaviruses from human to human is assumed to be through the air by coughing or sneezing and close personal contacts such as touching nose, eyes and shaking hand with an infected person. Currently, there is no scientific evidence about the transmission of 2019-nCoV from animals to humans.

There are only speculations that since China is one of the largest seafood markets, the primary hosts maybe sea animals such as snakes, etc. Recent investigations have raised concerns that coronavirus infected persons might be able to spread it even if they do not have flu-like symptoms.



Structural organisation of human coronavirus

Prevention is the only Treatment

Currently, no vaccine is available against coronavirus infections. Preventive measures are the only way to treat this life-threatening pathological event. Proper sanitation, frequent hand washing with soap and disinfectants at least for 20 seconds, using the appropriate category mask and avoiding direct contact with suffering/suspected people are some preventive measures that can be taken to prevent the coronavirus infections.

A person with 2019-nCoV infection can only be treated for their symptoms. Since 2019-nCoV infection is a concern with immunity, immune booster healthy foods, consuming plenty of water, and enough rest are other lifestyle behaviours which can be helpful in combating the situation. Young individuals are most likely to contract coronavirus. In fact, people can contract more than one infection over the course of a lifetime.

Many questions related to 2019-nCoV are yet to be answered including the period of propagation when humans are most at risk, the symptomatic difference from the common flue, its complete genome sequences to develop vaccines and thresh hold a quantity of infection to express. Besides, the exact mode of transmission of 2019-nCoV is also a matter of investigation to prevent its spread.

Some researches are also claiming that 2019-nCoV can live in the urine and saliva samples of an infected person. However, no scientific evidence has been provided yet. The mingling of symptoms, lack of proper information and unavailability of both vaccine/medication and reliable rapid diagnostic tests raises the concern that 2019-nCoV infection may spread globally.

Dr Kanti Bhooshan Pandey, Scientist, CSIR-Central Salt & Marine Chemicals Research Institute (CSMCRI), Bhavnagar-364002, Gujarat.
Email: kantibiochem@gmail.com; kbpandey@csmcri.org