

## REVIEW PAPER

# Wuhan Coronavirus: a fast-emerging global threat

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### ABSTRACT

A novel coronavirus known as 2019-nCoV was identified in Wuhan when people developed pneumonia-like symptoms in the Wuhan town of China in December 2019. In a brief period, it gained international prominence as it very rapidly spread to many other countries due to the movement of people from China to other countries. Coronavirus gained epidemiologic importance due to occurrence of 2 pandemics earlier in the 21<sup>st</sup> century. The latest 2019- nCoV outbreak is believed to be a zoonotic infection, transmitted to the Human from unknown animal. MoHFW, Govt. of Indian collaboration with WHO is closely monitoring the situation in India.

**Keywords:** Coronavirus; Wuhan; pandemic; respiratory infection; droplet transmission.

### INTRODUCTION

Coronavirus is a group of zoonotic viruses, derived its name from a Latin word meaning “crown” due to its typical shape as seen under an electron microscope.<sup>1</sup> It is primarily an animal. Till 2002, four strains of coronaviruses caused mild type human disease, i.e. 229E, NL63, OC43 and HKU1. However, post-2002, scenario dramatically changed with the emergence of two highly virulent strains, namely SARS (Severe acute respiratory syndrome) in 2002 and the Middle East respiratory syndrome (MERS) in 2009.<sup>1</sup> But come 2019 December, world came face to face with another virulent corona strain named 2019 novel Coronavirus or 2019nCoV (tentative preliminary name, most likely to be replaced.<sup>2</sup>

Coronaviruses are considered to be one of the larger RNA viruses and in fact, the largest known RNA virus (120-160

nm size). This is a positive sense RNA containing virus with the presence of typical features like envelopes, spikes/peplomer etc. Enveloped viruses (e.g. HIV) are amenable to killing by heat, organic solvents, common antiseptics while non-enveloped ones (e.g. Poliovirus) are relatively sturdy. Agents like Ethyl alcohol (70%) or Isopropyl alcohol, Sodium hypochlorite (0.1%), Povidone-iodine (10%), Glutaraldehyde (2%), various Quarts can very effectively destroy Coronaviruses.<sup>3</sup>

### Timeline for current outbreak from Wuhan, Hubei Province, China<sup>4</sup>

- Dec 31 2019: First report emanating that a cluster of pneumonia in Wuhan, China; Wuhan Municipal Health commission examines the outbreak and issue a notice
- Jan 1 2020: Wuhan South China Seafood market is closed and decontaminated thoroughly
- Jan 5 2020: Wuhan Municipal Health commission announces that Influenza, SARS and MERS are excluded as possible pneumonia cases.
- Jan 8 2020: China Centre for Disease Control and Prevention (CCDC) declares that a novel Coronavirus

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has been isolated from Wuhan pneumonia patients and 15 +ve cases confirmed.

- Jan 10 2020: First genome sequence released by Prof. Yong Zhen Zhang of Fudan University; First casualty.
- Jan 11 2020: five additional gene sequences released to GSAID by Wuhan Institute of Virology, CCDC, Chinese academy of medical sciences, and Peking Medical College.
- Jan 13 2020: Thailand Ministry of Public Health announces travel from China becomes positive for 2019nCoV.
- Jan 15 2020: Second fatality, associate with reported, Culture
- Jan 16 2020: Japan declares a positive case- a travel history to Wuhan elicited. Four new cases from Wuhan
- Jan 17 2020: 2<sup>nd</sup> Traveler from Thailand. 17 new cases from Wuhan
- 18-19 January 2020: Wuhan identifies 136 new cases from Wuhan and 2 new cases from Beijing and 1 from Shenzhen. 3<sup>rd</sup> death identified.
- Jan 20 2020: 15 new healthcare people infected in Wuhan. WHO convenes an emergency committee of the International Health Regulation.
- Jan 23 2020: 625 total cases, and 18 deaths in China. Quarantine in Wuhan and adjoining area (+ve cases)

### Pathogenesis and Transmission

Coronavirus family (with various members) are usually found in a wide variety of animals as a commensal or zoonotic disease-causing agent, e.g. camels, cattle, Monkeys, Himalayan palm civets, raccoon dogs, cats, dogs, bats, snakes and rodents etc. But for a reason not very clear yet, mutations occur and viral strain gets transmitted to the human being –i.e. jump the species barrier. After this, a cycle of Human to human transmission may ensue. SARS (2002), MERS (2009) and now Wuhan virus or 2019 n-CoV are strikingly similar in this respect. All three of them are believed to originate from the bat - then into a mammal and finally to human.<sup>4</sup>

In the current case, preliminary investigations lead to a link to Seafood and Animal Market in Wuhan City. However, certain other lab-confirmed cases were not linked with this place in any way - direct or indirect. Conspiracy theories are doing round, especially in social media, that the virus is manmade. But this speculation is without any proof (epidemiological nor molecular) whatsoever and cannot be endorsed in any way due to want of any evidence. Most of the facts on 2019n CoV are based on other Coronaviruses only.<sup>5</sup> Human to human transmission of the current agent is, however, is a foregone conclusion. This transmission occurs by respiratory routes (droplets, and probably aerosol) and also via a direct transmission (or fomites), i.e. touching

contaminated surfaces, nose, mouth, eye etc.<sup>5-7</sup> Sizes of infectious respiratory droplets are usually more than 5-micron size which generally cannot travel beyond 3 feet (1 meter). Hence a distance of 1 meter from an infected person is considered a safe distance.<sup>2</sup>

One very alarming aspect of 2009 nCoV is that the virus can be transmitted by asymptomatic individuals. This characteristic was not present in the previous outbreak avatars of Coronavirus (SARS & MERS).<sup>8</sup>

### Clinical presentation

Based on whatever data available till date, the incubation period of 2019 nCoV is believed to be from 2 days to 2 weeks. This includes fever, cough and shortness of breath. Chest X-ray may present bilateral infiltrates.<sup>8</sup> The disease may range from mild to severe with ARDS (acute respiratory distress syndrome) and death.<sup>7</sup>

Recent case studies reported the most common symptoms at the onset of disease were fever, cough, myalgia or fatigue and shortness of breath among 83-98%, 46-82%, 11-44% and 31% patients respectively. Some patients also reported sore throat in early stage of illness while expectoration, headache, hemoptysis, and diarrhoea were reported less commonly.<sup>9,10</sup> Surveillance case definition mentioned about 3 types of clinical cases, i.e. Suspected case (lab confirmation not available/pending), Probable Case (Lab confirmation not explicit), Confirmed case (Lab confirmed case).<sup>9</sup>

### Laboratory diagnosis

World Health Organization (WHO) has earmarked a network of labs in collaboration with the Centre for Disease Control and prevention in USA (CDC) and China. In India, Indian Council of Medical Research (ICMR) came out with the SOP for Specimen Collection, Packaging and Transport Guidelines for 2019 Novel Coronavirus (2019-nCoV) and NIV Pune is designated as the apical centre for diagnosis. As per ICMR guidelines, in India lower respiratory samples (Sputum, BAL) upper respiratory samples (Nasopharyngeal swab, Throat swab & nasal swab) EDTA blood and Serum (in clot activator) is needed to collect from all suspected cases with a direct or indirect link with Wuhan or affected area of China. However, with progress (or regress) of the outbreak with time, this advisory may change. Currently only prescribed test for laboratory diagnosis is real-time reverse-transcriptase polymerase chain reaction as per protocol devised at CDC. Cell culture virus isolation is being tried for research purpose only.<sup>9,11</sup>

**Management:** Management of suspected and confirmed cases are primarily for symptomatic support and prevention of further spread. We do not have any effective drug nor any vaccine till now. As per ICMR interim guidelines, suspected cases with clinical features linked epidemiologically to Wuhan or other affected areas need to be isolated in quarantine facilities for at least 14 days or till results (RT-

rt PCR) results came negative. Such lab negative cases are to be quarantined at home and retested if needed under the supervision of State IDSP (integrated disease surveillance Project) officials. There is the provision of screening at major airports, especially for symptomatic subjects. But with the evolution of the outbreak, depending on the trend of infection spread, national guidelines will also evolve.<sup>9</sup>

#### **Prevention and control of the outbreak**

Scientific details and facts on 2019 nCoV outbreak are still very limited; most of the information are derived from other members of the coronavirus family. Case fatality rate (number dying per hundred affected people) in the current outbreak is believed to be between 2-3% which is way less considered to SARS (9.5%) and MERS (34.4%). Same for Ebola virus is 63%, and H1N1 is at 0.01-0.02%. Nosocomial transmission rate (infection occurring in hospital - to next patients, doctors, nurses or other health care workers) in SARS and MERS were high at 58% and 70% respectively. Same for the current agent is not known yet.<sup>12</sup>

In the absence of any effective drug or vaccine outbreak, management is based on the prevention of infection and control of disease transmission. Transmission based precautions (contact precautions, droplet precaution and airborne transmission precautions) along with patient isolation are the backbone of the global effort going on.<sup>12</sup>

**Preparedness:** Clear understanding on adopted standard operational procedures (SOPs), as advised by national agencies, and dissemination of information to HCWs (Health care workers) in respect to PPE (personal protective equipment) use- i.e. how to don, doff and store PPE etc. are must. Isolation wards are to be prepared as per national guidelines. It is to be designated as airborne Infection Isolation Room (AIIR) with negative pressure (minimum 0.006 water column) having a minimum of 12 air change/hour. Sufficient and appropriate supplies of N-95 respirators, gloves, full-sleeved, disposable gown, eye protection, biomedical waste bins, hand wash material, a natural detergent and chlorine-based solution for disinfection etc. need to available. All HCWs should be well trained on the proper use of these.<sup>13</sup>

**Standard precaution:** Standard precautions is based on the presumption that each individual is likely to have the infection leading to widespread dissemination in the healthcare facility. Components for standard precaution include Hand hygiene, Respiratory hygiene and cough etiquette and injection safety.<sup>6,8</sup>

Liaison with State and National authorities: In India, IDSP (Integrated Disease Surveillance Project, Govt. of India), ICMR and NIV Pune etc. are the relevant liaison agencies between various stakeholders in the current outbreak. Hence a consistent and continuous interaction with nodal officer State/District IDSP is beneficial for all concerned.<sup>9,13</sup>

## **CONCLUSION**

Whatever may be the source of the current agent (2019 n-CoV), it is a fact that the outbreak is spreading and fast-evolving into a pandemic affecting multiple countries globally. Efficient Human to human transmission is a reality now with the possible (not conclusive yet though) asymptomatic transmission. There is no effective drug, neither any vaccine with least likely hood any of them being available in the near future. Concerted effort to control and contain the outbreak by the global community is already in place, and it is expected to bring good result within the next few weeks or months. This is more so given the fact that we exactly achieved this target successfully in past that too in another Corona Virus outbreak (SARS outbreak) without any vaccine nor any drug. Corona being a temperature-dependent virus, it is expected infection will dwindle with the onset of summer.

**Conflict of interest:** None declared.

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