

# Novel Coronavirus (2019-NCOV) Outbreak: A Mini Review

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## ABSTRACT

The SARS pandemic produces new avenues to discover and anticipate the variations made in SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus-2) and how human angiotensin converting enzyme 2 receptor ideally becomes congenial with “S” region of this virus and in consequence of its spread in human species all over the globe. At the end of 2019, the earliest wave of SARS-CoV-2 transmission was notified from Wuhan-Hubei China and thereafter spread globally. COVID-19 infection got widespread and upto now, 2,776,224 active cases, 334,058 deceased and 2,078,505-recovered cases have been reported. Morbidity and mortality rate vary in every region which pondered the researcher to look into the linkage between a different variant of the SARS-CoV-2 with disease severity along with other determining factors like climatic changes, diagnostic techniques, hospitals and laboratory quality control measures.

**KEYWORDS:** Coronavirus, COVID-19, SARS-CoV-2, Angiotensin converting enzyme 2 (ACE-2).

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## INTRODUCTION

As 2019 approached to the closure, pneumonia with unidentified etiology associated with Coronavirus disease-2019 (COVID-19) appeared in Wuhan, China. It is an extremely transmissible disease and within a short period of time it spread from China to other countries.<sup>1</sup> Now COVID-19 has become a serious pandemic issue.<sup>2</sup> Till March 2020 around 2,665,408 cases of COVID-19 and 320,192 deaths have been reported.<sup>3</sup> Its mode of spread is via person to person transmission and tentatively named 2019-nCoV that was officially declared as an

international public health emergency by WHO, on 31<sup>st</sup> January 2020.<sup>4</sup> Later on, 11<sup>th</sup> February 2020, the Coronavirus Study Group of the International Committee on Taxonomy of Viruses officially announced it as SARS-CoV-2 “severe acute respiratory syndrome Coronavirus 2”. Moreover, on the same day, the World Health Organization proclaimed the SARS-CoV-2 virus causing “COVID-19” as global pandemic.<sup>5,6</sup> In order to control and prevent its wide spread, the awareness about this new virus is needed anxiously.

## Origins of 2019-nCoV

To date, the origin of COVID-19 is still suspicious. Although it was first reported from China and so suspected that it may transfer from the Wuhan sea food market to Chinese who worked or visited there, no exported cases had any link ages to the market, indicating person to person spread or by animal sources. Social media is also reported that China’s seafood market sold marmots, birds, snakes and even bats. However, environmental isolates were positive for novel Coronavirus but no specific animal linkage has been established.<sup>7</sup> Initially on

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the basis of codon usage of snake samples drawn from the Wuhan market, it was proposed that snakes might be a possible source of spread but this proclamation has been disputed by Robertson and his colleagues.<sup>8</sup> However, research on the possible intermediate animal model is continued to identify the source of 2019-nCoV.

### Virology

Coronaviruses are enveloped, single-stranded, non-segmented positive sense RNA virus, having large genome size, with high a frequency of mutation and genomic recombination.<sup>9,10</sup> The viral genome is arranged in the order of 5'UTR (untranslated region), ORF1ab (open reading frame), Club shaped structural glycoprotein, an envelope protein (E), Membrane protein (M), Nucleocapsid protein (N), 3'UTR and nonstructural ORFs. ORF1ab encodes replicase polyprotein pp1a and pp1b; proteolytic cleavage of these two viral polyproteins produces 16nsp (nonstructural proteins) while Club shaped structural glycoprotein spikes (S) gives the virus a crown-like appearance.<sup>11</sup> Six Coronavirus species are recognized to cause human disease. Out of these six species, HCoV-NL63, HCoV-229E, HCoV-OC43 and HCoV-HKU1 are prevalent and typically correlated with common cold indications in immunocompetent patients. Remaining two strains SARS-CoV (severe acute respiratory syndrome Coronavirus) and MERS-CoV (Middle East respiratory syndrome Coronavirus) are originated from animals and have been linked to sometimes fatal illness. The seventh new human Coronavirus strain "SARS-CoV-2" is positioned within the genre Beta Coronavirus which exhibits 89.1% nucleotide sequence similarity with SARS-CoV and 60% with MERS-CoV.<sup>12</sup>

### Transmission Dynamics

The preliminary estimation of the basic reproductive rate ( $R_0$ ) for COVID-19 is 2.2 (95% CI, 1.4 to 3.9).<sup>13</sup> Despite the fact there remains some uncertainty; fomites are thought to be the principle source of viruses. Different strains of Coronaviruses remain viable for days on uncleaned surfaces.<sup>14</sup> Recently, a Chinese researcher reported the presence of the virus in a fecal sample of COVID-19 confirmed patient; however, the SARS-COV-2 virus

was also detected within the fecal sample of symptomatic COVID-19 patients while the blood sample tested negative.<sup>15</sup> Several studies have shown effective person to person transmission of SARS-CoV-2 virus even in the presence of isolation facilities.<sup>16,17</sup> Health care facilities are very severe threat for the transmission of virus. Recently 41% of patients acquired infection from hospitals including 29% medical staff. So, it seems that asymptomatic individuals have the potential to spread COVID-19 infection.<sup>18</sup>

### Clinical Manifestations and Lab Diagnosis

The most commonly observed signs and symptoms of COVID-19 are headache, cough, fatigue, fever, dyspnea, myalgia and sputum production, while sore throat, nausea, vomiting, diarrhea, rhinorrhea, hemoptysis, chest pain and conjunctival congestion are less common. But one study showed 39.6% of COVID-19 confirmed patients had gastrointestinal symptoms.<sup>19</sup> Patients with COVID-19 showed lymphopenia, thrombocytopenia, and leucopenia. Additionally, C-reactive protein, erythrocyte sedimentation rate (ESR) and D-dimers were raised prominently.<sup>20</sup> Significantly elevated levels of cytokines and chemokines were recorded in COVID-19 patients which include IL1- $\beta$ , IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFN $\gamma$ , IP10, MCP1, MIP1 $\alpha$ , MIP1 $\beta$ , PDGFB, TNF $\alpha$ , and VEGFA. A few of the serious patients exhibited elevated quantities of pro-inflammatory cytokines which include IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1 $\alpha$ , and TNF $\alpha$  which cause stimulation of disease severity.<sup>21</sup>

### Treatment Options

It has been reported that remdesivir (antiviral drug) and Chloroquine (old antimalarial drug) inhibits the development of SARS-CoV-2 *in vitro*.<sup>22</sup> The clinical trial performed on COVID-19 Chinese patients revealed that Chloroquine considerably affects the clinical outcomes and viral clearance.<sup>23</sup> Chinese specialists suggest that patients identified from mild to severe instances of COVID-19 pneumonia be cured with 500 mg Chloroquine twice daily for ten days.<sup>24</sup>

Hydroxy Chloroquine (an analogue of Chloroquine) has been confirmed to have antiviral activity for SARS-CoV-2 *in vitro*.<sup>25</sup> During long-term use, Hydroxychloroquine clinical safety profile is superior to that of Chloroquine and permits higher daily dose<sup>26</sup> however fewer concerns about drug-drug interactions.<sup>27</sup>

### Guidelines to Prevent the Expansion of Disease

In order to curb the human to human transmission of SARS-CoV-2, the substantial policies and measures need to be taken to govern the ongoing epidemic outbreak. Specific SOPs and guidelines especially for hand washing and sanitization should be practically applied in most susceptible individuals together with children, elderly peoples and hospital staff. Guideline literature was published for medical and health care staff, scientists, researchers, and the public.<sup>28</sup> All affected countries including Pakistan have implemented major preventive measures by travel screening to control the spread of SARS-CoV-2.<sup>29</sup> The COVID-19 early death rate increased in elderly people especially the immunocompromised individuals that cause fast progression of virus infection. Sanitizers for cleaning hands and surfaces should meet the WHO criteria in public service station.<sup>30</sup> Physical contact with wet contaminated items can potentially serve as an alternate mean of the virus transmission.

### LIMITATIONS OF STUDY

The manuscript is a narrative review. Protocols and guidelines pertaining to systematic review are not applicable.

### CONFLICT OF INTEREST

None to declare.

### FINANCIAL DISCLOSURE

None to disclose.

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#### ***Author's Contribution***

**SM, RAR, SI:** Conception, design and acquisition of data, article drafting.

**SP, AR:** revising it critically for important intellectual content and final approval of the version to be published.