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## REVIEW ARTICLE

# The novel zoonotic Coronavirus disease 2019 (COVID-19) pandemic: Health perspective on the outbreak

M. Mazinani\*, B.J. Rude

*Department of Animal and Dairy Sciences, Faculty of Agriculture, Mississippi State University, Starkville, USA*

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### KEYWORDS

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**Abstract** During late 2019, the first cases of the Coronavirus disease-2019 (COVID-19) were observed in a Seafood Market in Wuhan. As the first cases took place in a seafood market that consumed live animals, it has been identified as a zoonotic disease. Some reports suggested snakes were the animal host, while others reported bat and pangolin were the sources of infection because coronavirus-origin of these two animals had similar genomic sequences to COVID-19. The common diagnosis method for detection COVID-19 was according to clinical manifestation, epidemiological histories, and ancillary tests, like CT scan, nucleic acid detection, immune identification technology, blood culture, Radiology, and enzyme-linked immunosorbent assay (ELISA). This review presented a perspective about current knowledge about COVID-19 in different aspects including probable zoonotic origins, and Coronaviruses classification was discussed in this context. In addition, epidemiology, clinical signs, treatment, and management strategies for controlling COVID-19 were also highlighted.

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### PALABRAS CLAVE

Coronavirus;  
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SARS-CoV

## La nueva pandemia de enfermedad zoonótica por coronavirus de 2019 (COVID-19): perspectiva sanitaria del brote

**Resumen** A finales de 2019 se observaron los primeros casos de la enfermedad por coronavirus de 2019 (COVID-19) en un mercado de mariscos en Wuhan. Como los primeros casos tuvieron lugar en un mercado de mariscos en el que se consumían animales vivos, ha sido identificada como enfermedad zoonótica. Algunos informes han sugerido que el animal huésped fue la serpiente, mientras otros han reportado que el murciélago y el pangolín fueron las fuentes de infección, ya que el origen del coronavirus de estos dos animales tenía secuencias genómicas similares a las de COVID-19. Los métodos diagnósticos comunes para la detección de COVID-19,

\* Corresponding author.

E-mail address: [mm5001@msstate.edu](mailto:mm5001@msstate.edu) (M. Mazinani).

de acuerdo con la manifestación clínica fueron los siguientes: antecedentes epidemiológicos y pruebas complementarias como TC, detección de ácido nucleico, tecnología de identificación de inmunidad, cultivos de sangre, radiología y pruebas ensayo de inmunoabsorción ligado a enzimas (ELISA). Esta revisión presentó un compendio acerca del conocimiento actual sobre la COVID-19 en diferentes aspectos, incluyendo sus probables orígenes zoonóticos, debatiéndose la clasificación de los coronavirus en este contexto. También se destacaron su epidemiología, signos clínicos, tratamiento y estrategias terapéuticas para el control de la COVID-19.  
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Tracing the history, epidemic, and transmission of HCoVs helps to understand them better and guides research conducted on intermediate and amplifying animal hosts related to these diseases. Some of the animals such as cats, dogs, bovines, and pigs are infected by some disease have similar taxonomic like coronaviruses.<sup>1</sup> One of the hypotheses is that interaction with animals are infected by coronaviruses might prepare the immune system of human against these viruses and develop protection against them.<sup>2</sup> But as husbandry animals are used for human consumption, it is worrying that the consumption of livestock products may transmit this disease, but to date, no positive livestock cases have been reported for COVID-19. There is evidence that companion animals especially cats and dogs can be infected by COVID-19,<sup>3</sup> and it can be transmitted from humans to them.<sup>4</sup> Fifteen positive cases out of 102 cats were reported after the detection of this decrease in China.<sup>5</sup> Other cases included a tiger and lions at the Bronx Zoo (New York, USA) and the disease was transmitted from a zoo employee.<sup>6</sup> Considering close contact between human and companion animals, transmission due to fecal-oral contact should be taken into consideration from an epidemiological aspect. Also, exotic animals that contain a large group of species can transmit coronaviruses to humans, especially in some areas that used live exotic animals as food.

## Health perspective of the COVID-19

The epidemics of COVID-19 have been recorded in more than 170 countries. Confirmed cases by date of report and WHO region, 30 December 2019–25 June 2020 was 9 296 202 from which 479 133 have died (Table 1). The case fatality rate of COVID-19 was 2–4% and less than the previous symptoms such as Middle East respiratory syndrome coronavirus (MERS-CoV) and severe acute respiratory syndrome coronavirus (SARS-CoV). So far, no definitive cure has been found for COVID-19.

## Diagnosis methods of COVID-19 infection

Diagnosis is important in the early stages for managing COVID-19. The Diagnosis of COVID-19 is based on the recommendations of the World Health Organization (WHO) that is according to clinical manifestation, epidemiological history and ancillary tests like CT scan, nucleic acid

**Table 1** Areas with reported confirmed cases of COVID-19, 16 August 2020.<sup>7</sup>

	Confirmed	Deaths
Western Pacific Region	409 589	9293
European Region	3 754 649	214 092
South-East Asia Region	3 040 168	59 875
Eastern Mediterranean Region	1 723 673	45 704
Region of the Americas	11 420 860	414 326
African Region	945 165	18 476
Globally	21 294 845	761 779

detection, immune identification technology (Point-of-care Testing (POCT) of IgM/IgG), blood culture, Radiology and enzyme-linked immunosorbent assay (ELISA). Clinical signs of Infected COVID-19 patients included fever (90% or more), cough (around 75%), and dyspnea (up to 50%). Some patients experience fatigue, viral pneumonia, gastrointestinal symptoms including nausea and diarrhea. The fatality rate is about 2% and is mainly due to acute respiratory distress syndrome, acute kidney injury, and myocardial injury.<sup>8</sup> Suspected cases are patients with one exposure history and two clinical manifestations. If there is no exposure history, having three clinical signs are sufficient. According to clinical symptoms, infected patients are divided into 4 types (mild, moderate, severe, and critical).<sup>9</sup>

Chest radiology was not a good detection method for diagnosing COVID-19 at the first stages because it is not sensitive for the detection of ground-glass opacity (GGO) and sometimes demonstrated normal findings in initial stages.<sup>10</sup> Although, in severe condition bilateral multifocal consolidation can be shown, and occasionally can be observed with white lung.<sup>11</sup> As of now, a few studies and reports are conducted on chest CT Imaging as detection of COVID-19 and results lead to the conclusion that it is effective in early detection of this pneumonia<sup>12,13</sup> through a study conducted by Pan et al.<sup>14</sup> 21 patients went through repeated chest CT Imaging and negative findings were revealed in four patients on the initial stage. However, chest CT of these patients showed lung abnormalities. Another study evaluated the accuracy of the chest CT Imaging for diagnosing this disease was 95.5% ( $n = 3665$ ).<sup>15</sup> High-throughput sequencing and real-time quantitative polymerase chain reaction (RT-qPCR) are two technologies for detecting COVID-19. The reliable identification methods for COVID-19 were blood culture and

high-throughput sequencing of the genome but, RT-qPCR is more usual because high-throughput sequencing technology is expensive. Specific primers and probes in the ORF1 and N gene of the viral genome are using for the detection of COVID-19 by RT-qPCR.<sup>16</sup> Recently, ELISA kits and POCT of IgM/IgG have been developed for detecting the COVID-19 virus and although it was said they had greater detection rates compare to nucleic acid detection, there is no published output about their results.<sup>8</sup>

## Characterization

According to studies on confirmed patients, their manifestations divided into 4 types that shown different severity in symptoms (mild, moderate, severe, critical). Mild clinical symptoms were fever occasionally associated with cough, without dyspnea, gasping, and chronic disease. In this stage, no evidence of pneumonia was observed in imaging. Moderate clinical symptoms were fever, respiratory symptoms and in this type, pneumonia was observed in imaging. Severe clinical symptoms were respiratory distress, oxygen saturation more than 93% at rest, the partial pressure of oxygen/fraction of inspired oxygen was more than 300 mmHg. Critical type met clinical symptoms including respiratory failure, need mechanical assistance, shock and ‘‘extrapulmonary’’ organ failure.<sup>17</sup>

Through a study conducted by Tian et al.,<sup>18</sup> 262 confirmed COVID-19 infection patients were included in this study, who were transferred by Beijing emergency medical service to the designated hospitals, from January 20 to February 10, 2020. The most clinical symptoms of illness were fever, cough, fatigue, dyspnea and headache. The age range of patients was 6 months to 94 years and their median age was 47.5 years. Results lead to this conclusion that the characteristics of patients in Beijing were different from patients in Wuhan with a higher discharge rate and lower fatality. According to data from the Chinese center for disease control and prevention, the case-fatality rate was 2.3% among 44 672 confirmed cases of COVID-19.<sup>19</sup>

## Treatment/management

To date, there is no vaccine or antiviral treatment for COVID-19. It is recommended corticosteroids or unselective administration of antibiotics should be avoided. Proposed antibiotic treatments are chloroquine, lopinavir/ritonavir, hydroxychloroquine, and Alpha-interferon but they are not approved, yet. Some preclinical studies suggested using an inhibitor of RNA polymerase can be useful as a treatment of HCoV infections.<sup>20,21</sup> In recent days, Australian researchers stated that they are completing the in vitro tests for curing this disease. China announced about the first animal tests, and the National Institute for allergy and infectious diseases of the U.S informed that a phase 1 immunization trial has begun for COVID-19 in Washington state. The main treatments for severe infections are oxygen therapy and mechanical ventilation, or assisted ventilation, while hemodynamic support May be used for managing septic shocks. The latest WHO guidelines were documented according to the treatment of previous epidemics from CoVs. These

guidelines are about treatment, prevention and control strategies, laboratory diagnosis, possible therapy, managing sever symptom cases like septic shock or considerations for pregnant patients.<sup>22</sup>

## Association of COVID-19 with age and sex

The elderly had the highest risk for developing the disease, especially in the presence of underlying disease which lowers their resistance to disease and showed more serious outcomes. Tian et al evaluated 27 262 confirmed COVID-19 infection patients were included in this study, who were transferred by Beijing emergency medical service to designated hospitals, from January 20 to February 10, 2020.<sup>18</sup> The age range of patients was 6 months to 94 years and their median age was 47.5 years. Results lead to the conclusion that the characteristics of patients in Beijing were different from patients in Wuhan with a higher discharge rate and lower fatality. According to data from the Chinese center for disease control and prevention, the case-fatality rate was 2.3% among 44 672 confirmed cases of COVID-19. According to data obtained about the relationship of sex with this phenomenon, in the first period, the percentage of infected men was greater than women (66% vs 34%). The proportion of women increased (41%) in the second period and in the most recent period there was not much difference (men 42%, women 48%).<sup>23,24</sup>

## Epidemiology in children

Published data on COVID-19 focuses primarily on adults, and the infection rate of COVID-19 in children is relatively low.<sup>25</sup> Most of the initial reports were about the infection rate of adults, and a few data were reported about children because they were rarely tested early in the earlier phase of this pandemic. The youngest case reported so far was a 30-hours old newborn in China, till now no case of vertical transmission from mother to fetus has been reported.<sup>26</sup> Chinese Center for Disease Control stated 0.9% of confirmed cases were 0–9 years old, among them 2.5% showed severe clinical symptoms and 0.2% showed critical symptoms. Children aged 10–19 years were 1.2% of confirmed cases with one death report in this group.<sup>27</sup>

The other Pediatric cases of COVID-19 in other parts of the world were in Malaysia,<sup>28</sup> Germany,<sup>29</sup> Singapore,<sup>30</sup> and Vietnam<sup>31</sup> with an age range between 3 months and 11 years old.

## Prevention

Reproduction number (R0) means the transmissibility of a virus. It is an indication representing who many new infections generated by an infectious person for  $R_0 > 1$ , an epidemic will increase and if  $R_0 < 1$ , the transmission will die out. World health organization estimated the reproduction number of COVID-19 ranged from 1.4 to 2.5. Although, a new study found COVID-19 average R0 was 3.28.<sup>23</sup> These values indicated that COVID-19 is greatly epidemic therefore, isolation of patients must be done. Besides that, during the

diagnosis and clinical care of patients, appropriate measures must be used for healthcare worker's safety. The following are general recommendations were issued especially by WHO and other related organizations for decreasing separation of COVID-19: Washing hands frequently, for 20s. Avoid contact with patients suffering from acute respiratory and unprotected contact with wild or farm animals. Avoid touching the mouth and face after contacting with suspicious environments. People who have an impaired immune system should avoid public gatherings.<sup>22</sup>

## Conclusion

Coronaviruse disease 2019 pandemic, probably is a zoonotic origin disease. Against previous reports, recent studies on the relationship between age and sex showed that there is no significant relationship between sex and this phenomenon, but reports indicated a relationship between age and the likelihood of developing this disease. The elderly had the highest risk of developing the disease, especially in the presence of underlying medical conditions.

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## Conflict of interest

None declared.

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