International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

COVID-19 : A Global Emergency and a Common Destiny between the Nations

H Chemsi[1], S Ibnmoussa[2], Y Sekhsokh[3], N Khlil[4]

[1]Biochemistry Laboratory, "LC-BENS" Research Laboratory, Faculty of Medicine and Pharmacy of Casablanca FMPC, Hassan II University Casablanca, Morocco (Corresponding author)

[2, 4]Biochemistry Laboratory, "LC-BENS" Research Laboratory, Faculty of Medicine and Pharmacy of Casablanca FMPC, Hassan II University Casablanca, Morocco

[3] Research and Biosafety Laboratory, HMIMV, Faculty of Medicine and Pharmacy of Rabat, Mohammed V-Rabat University, Morocco

Abstract: ***Human coronaviruses (HCoV) are single-stranded RNA viruses. There are currently four so-called "classic" or "new" coronaviruses, which circulate in winter. They are the cause of moderate respiratory infections in the general population. However, infections can be more severe in susceptible populations. HCoVs are involved in 2 to 7% of hospitalizations following a respiratory infection, in particular in children and the elderly or immunocompromised. Therefore, they belong to the panel of respiratory viruses sought during the routine diagnosis of respiratory infections using molecular biology tools. These so-called circulating coronaviruses are to be distinguished from the two emerging coronaviruses, SARS-CoV and MERS-CoV and currently the pandemic caused by COVID-19, which are associated with more severe and fatal respiratory pathologies. They are distinguished from other HCoVs by their higher epidemic potential, their greater health impact and their atypical mode of circulation. Like paramyxoviruses and influenza viruses, coronaviruses should be monitored for their risk of emergence in the human population.***

Keywords: Coronavirus, COVID-19, Respiratory infection, Pandemic

1. Introduction

Human coronaviruses (HCoV) cause more or less severe respiratory infections depending on the environment and the population. They are the order of six human coronaviruses described to date. These HCoVs are generally associated with mild respiratory infections. They are to be distinguished from the two emerging HCoVs, SARS-CoV (Severe acute respiratory syndrome associated coronavirus) and MERS-CoV (Middle-East respiratory syndrome coronavirus), which are the only ones to be associated with acute respiratory distress syndrome (ARDS).

Taxonomy and General Characteristics

The coronaviruses belong to the family of Coronaviridae, to the subfamily of Coronavirinae. They infect many mammalian and avian species. According to current taxonomy, the Coronavirinae are subdivided into 4 genera named Alpha-, Beta-, Gamma- and Deltacoronavirus. HCoV-229E and -NL63 belong to the genus Alphacoronavirus. The other four human coronaviruses belong to the genus Betacoronavirus which is itself subdivided into four clades named A, B, C and D [1]. HCoV-HKU1 and –OC43 are included in clade A, SARS-CoV and MERS-CoV belong to clades B and C respectively ***(Figure 1).***

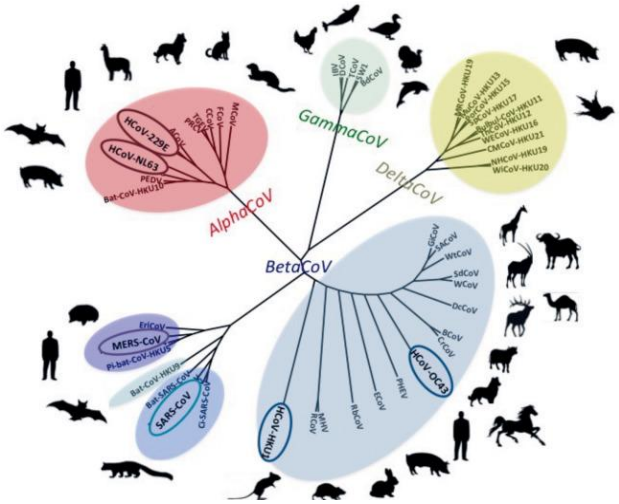

Figure 1: Taxonomy of coronaviruses

Coronaviruses are enveloped pleomorphic viruses ranging in size from 80 to 200 nm. The electron microscope makes it possible to distinguish projections of approximately 20 nm on the surface of the virion, these are the surface proteins S or Spike. This is anchored in the membrane and gives it a crown appearance. It is this aspect which is at the origin of its name "corona" meaning "crown" in Latin. The viral particle is made up of three other structural proteins : the nucleocapsid protein N, the membrane or matrix protein M and the envelope protein E. In addition, the clade A Betacoronaviruses contain a fifth structural protein, hemagglutinin HE esterase ***(Figure 2)*** [2].

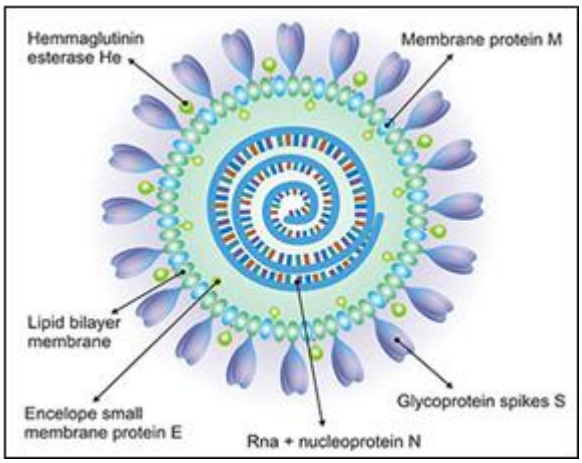

Figure 2: Structure of coronaviruses

Coronaviruses are characterized by a single-stranded, unsegmented and polyadenylated RNA genome. The genomes are about 30 kb in size. Two-thirds 5 'of the genome (≈ 20 kb) consist of two open reading frames or ORF (Open Reading Frame), named ORF1a and ORF1b [2]. ORF1ab, corresponding to the fusion of ORF1a and ORF1b, allows the translation of a polyprotein which will be cleaved by proteases into 16 non-structural proteins (nsp1 to nsp16), which are involved in the replication complex and of transcription. The 3 'third of the genome consists of at least four open reading frames encoding the structural proteins S, E, M and N. The clade A Betacoronaviruses (including HCoV-OC43 and –HKU1) contain a fifth gene encoding a structural protein, hemagglutinin esterase (HE). The different coronavirus genomes are distinguished from each other by the presence or not of additional putative ORFs encoding accessory proteins ***(Figure 3)*** [3].

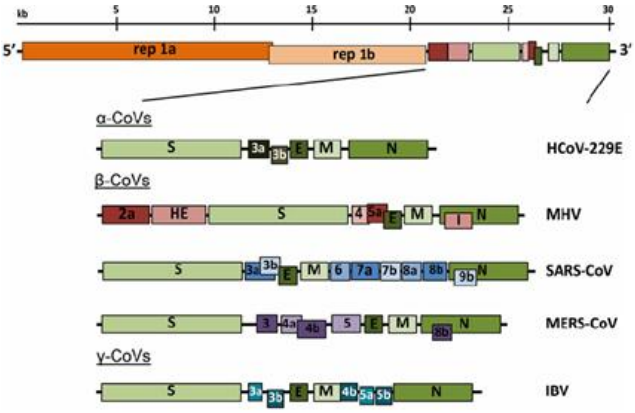

Figure 3: Genomic organization of coronaviruses

Coronaviruses have been known in the veterinary community since the 1930s. When the first human coronaviruses HCoV-OC43 and -229E were identified in the 1960s, around twenty coronaviruses infecting avian and mammalian animal species were already described. In 2003, the identification of a coronavirus as the etiological agent of Severe Acute Respiratory Syndrome (SARS), circulating in a pandemic since November 2002, generated an interest for this viral group little studied in human medicine [4]. In 2012, a new human coronavirus, MERS-CoV, emerged in the Middle East. He was at the origin of a pathology similar to SARS [5]. And currently, the spread of COVID-19 in China and exponentially in the rest of the world.

Global Health Emergency

On January 30, 2020, World Health Organization WHO declared that the COVID-19 epidemic in China was a public health emergency of international concern, posing a high risk to countries with vulnerable health systems. The emergency committee said that the spread of COVID-19 could be stopped by early detection, isolation, prompt treatment and the establishment of a robust system for tracing contacts [6]. The main goal is to fight global misinformation to minimize the psychological and economic impact of the virus. There are currently few studies that define the pathophysiological process characteristic of COVID-19, with great uncertainty as to its mechanism of propagation. Current knowledge is largely derived from coronaviruses, which are transmitted from human to human by respiratory droplets [7]. As a rule, respiratory viruses are more contagious when a patient is symptomatic. However, there is an increase in the amount of evidence to suggest that human-to-human transmission can occur during the asymptomatic incubation period with COVID-19, which has been estimated to be between 2 and 14 days [8–9]. As of March 3, 2020, 90870 cases of COVID-19 have been confirmed, of which 80304 are contained in China. Among the Chinese cases, 67217 were confirmed in Hubei province, the rest being in 34 provinces, regions and cities of China. The remaining 10566 cases have been reported in 72 countries, including Japan, the United States and Australia. 166 of these cases have been fatal (Philippines, Japan, Korea, Italy, France, Iran, Australia, Thailand and the United States). It's important to note that these numbers are likely to be an underestimate, since the data presented are only laboratory-confirmed diagnoses. ***(Figure 4)***

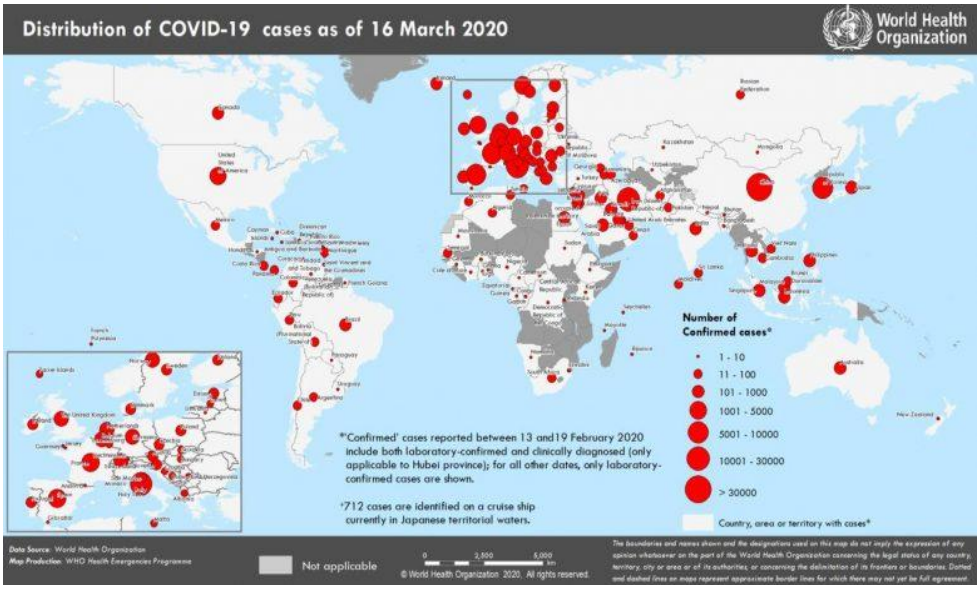

Figure 4: Illustration of the geographic distribution of confirmed COVID-19. Data as of March 3, 2020

Clinical events of Coronavirus Infections

Conventional and new coronaviruses are generally associated with mild infections of the upper respiratory tract. In the general population, HCoV infection is most often associated with more or less symptomatic rhinitis or nasopharyngitis [10]. When the infection is symptomatic, the most often described clinical signs are fever, cough, myalgia and nasal congestion. The pathologies induced by the different HCoVs are similar and the clinical picture alone does not allow them to be distinguished from each other or from other respiratory viruses, such as rhinoviruses, Influenza viruses, metapneumoviruses, respiratory syncytium virus (RSV) or para influenza viruses (PIV). In the elderly, young children and immunocompromised patients, more severe and even fatal respiratory tract infections may be seen. During an HCoV infection, moderate enteric pathology (gastroenteritis, diarrhea) is sometimes observed in addition to respiratory pathology. To date, it is not yet clearly defined whether enteric involvement is an indirect consequence of the infection or whether HCoVs have a proven enteric tropism [11].SARS-CoV is a coronavirus which emerged in November 2002 and which circulated pandemic until July 2003. Currently under the name of COVID-19, it spread in November 2019 in an exponential way to be subsequently declared a pandemic by WHO. This virus is characterized by an incubation period of 2 to 14 days. The first symptoms observed are a high fever> 38 ° C, coughs with a moderate respiratory syndrome. Headache or throat pain and general tiredness have also been reported in some patients. In a few days, the symptoms progress, causing an acute respiratory distress syndrome requiring respiratory aid in the most susceptible patients. Worsening of these symptoms can lead to severe pneumonia and death. Both the WHO and the Centers for Disease Control and Prevention (CDC) have published guidelines on the main clinical and epidemiological findings regarding infections caused by COVID-19 ***(Table 1)*** [12].

Table 1: Main epidemiological and clinical characteristics of infections caused by COVID-19

	CDC	OMS
Clinical features	• Fever • Lower respiratory tract infection (possibly requiring hospitalization)	• Acute respiratory infection (ARI) • Fever or measured temperature ≥38C° • Cough • Onset within the last ~10 days • Requires hospitalization
Epidemiological Risk	• History of travel from Hubei Province • History of travel from mainland China • Close contact with laboratory-confirmed COVID-19 patients within 14 days of symptom onset	• History of travel from Hubei Province • Healthcare workers who have worked in an environment where patients with ARI are being cared for • Unexpected clinical course follows despite treatment, including rapid deterioration • Close contact (within 2 meters for over 15 minutes) with confirmed SARSCoV-2 infection • Present in healthcare facilities and hospitals in countries where COVID-19 has been reported • All of the above occurring within 14 days prior to symptom onse

2. Diagnosis of Coronavirus Infection

The diagnosis of coronavirus infections involves direct diagnostic techniques, allowing the detection of the pathogen and not of the host response by the production of antibodies. These viruses are responsible for acute respiratory infections for which serology is not relevant. Human coronaviruses being characterized by respiratory tropism, the diagnosis is carried out on respiratory samples by RT-PCR techniques. According to the recommendations of the WHO, CDC and the European Center for Disease Prevention and Control (ECDC), the handling of samples in

a biosafety level 2 laboratory (BSL2) respecting good working practices, putting in provides a procedure to be followed in the event of an incident. Only the culture of the virus must be done in an BSL3.The specific diagnosis of COVID-19 is currently carried out by a specific RT-PCR on a nasopharyngeal swab, the result of which can be obtained in a few hours (4h). No commercial test is currently available. In case of parenchymal involvement, removal of the lower respiratory tract (sputum, LBA, ATB) is mandatory. Samples intended for the detection of other microbiological agents other than SARS-CoV-2 should not be sent to the recipient laboratories before the raising of doubt on a COVID-19 infection. They should be kept in the service at + 4 ° C if possible. The clinical service immediately notifies the laboratory of the suspected COVID-19 infection. Biological samples intended for the laboratory must be limited to what is strictly necessary (diagnosis of COVID-19 infection and urgent analyzes related to patient care). Respiratory samples must be sent to the laboratory by a dedicated transporter or caregiver on foot, using category B packaging (UN 3373 standard) / triple packaging. The outside of the tubes are disinfected before dispatch according to the procedures in force in the department. The outermost part of the package never enters the patient's room to ensure the safety of downstream staff. The triple packaging containing all diagnostic samples intended for microbiology will only be opened in level 2 microbiological safety laboratory. Blood samples intended for biochemistry, hematology, hemostasis and others, are put in a packaging classic after disinfection of the tubes. The routing is also ensured by pedestrian route at the same time as the samples intended for microbiological diagnosis. It is important to note the ban on the use of tires. On arrival at the laboratory or at the sorting center, the samples are unpacked, saved and numbered. It is not useful to redecontaminate them because there is a risk of delayed treatment and therefore loss of chance for the patient [13, 14].

COVID-19: Situation in Morocco

The Ministry of Health has announced the official launch of an interactive digital portal dedicated to COVID-19 news. This portal provides all the data and statistics relating to the epidemiological situation in Morocco, via an interactive map showing the results of new confirmed cases of contamination by this virus, distributed according to regions and cities. These data are continuously updated according to the evolution of the situation in the country, as well as a presentation of the medical consultation sites and the hospital services located on the national territory.

During the week of March 09 to 15, 2020, Morocco implemented measures to contain the spread of the epidemic. Thus, flights to several countries are suspended as well as maritime links with Spain and France.

On March 13, the Ministry of National Education, Vocational Training, Higher Education and Scientific Research announces the closure of nurseries, schools, colleges, high schools and universities, from March 16 and "until further notice".

On March 16, the Interior Ministry ordered the closure of many public spaces and public domain facilities. This decision concerns cafes, restaurants, cinemas and theaters, party rooms, clubs and sports halls, hammams, games rooms and nearby grounds.

On March 19, the interior minister declared a state of health emergency and restricted traffic in Morocco from Friday at 6 p.m. until further notice, and declared this as the only inevitable way to keep the coronavirus under control.

Currently, no effective antiviral treatment or vaccine is available for COVID-19. First line treatment for fevers includes antipyretic therapy such as paracetamol. Patients with severe acute respiratory infection, respiratory distress, hypoxemia or shock require oxygen therapy. There is currently no vaccine against COVID-19 and no natural health product authorized to protect against this infection. Prevention remains the best way to protect yourself from COVID-19 contamination, namely:

Social distancing- Maintain a certain physical distance between us and others. Social distancing has been shown to be one of the most effective ways to reduce the spread of the disease during an epidemic (avoid non-essential gatherings, avoid greetings like handshakes, avoid crowded places like concerts, arenas, conferences and festivals, limit contact with people at higher risk such as the elderly and people in poor health, keep as much as possible a distance of at least 2 arm lengths about 2 meters with others).

Hygiene- Wash your hands regularly with an alcohol-based cleaner or wash them with soap and water. Touching your face after touching contaminated surfaces or sick people is one of the ways the virus is transmitted. Washing your hands can reduce the risk. Regularly clean surfaces with a disinfectant, for example the kitchen and office worktop (doorknobs, electronic devices, etc.) Cough or sneeze into your sleeve or use a tissue that must be immediately thrown into a closed bin, then wash your hands.

Wearing a mask- If you are healthy, the use of a mask is not recommended to prevent the spread of COVID-19. Wearing a mask when you are not sick can give you a false sense of security. There is a potential risk of infection associated with improper use and disposal of the mask. It must also be changed frequently.

3. Conclusion

Coronaviruses, like other respiratory viruses, are pathogens whose impact must be taken into account in public health. Their surveillance is particularly necessary among the most susceptible populations such as the elderly, children and immunocompromised people because the consequences of an HCoV infection are greater, even fatal. In addition, coronaviruses are characterized by a high evolutionary potential and by a risk of emergence in the human population from a significant reservoir.

4. Conflicts of Interest

The Authors declare no conflict of interest

References

[1] Woo PCY, Lau SKP, Lam CSF, Lau CCY, Tsang AKL, Lau JHN, et al. Discovery of Seven Novel Mammalian and Avian Coronaviruses in the Genus Deltacoronavirus Supports Bat Coronaviruses as the Gene Source of Alphacoronavirus and Betacoronavirus and Avian Coronaviruses as the Gene Source of Gammacoronavirus and Deltacoronavirus. J Virol 2012 ;86 :3995–4008. doi:10.1128/JVI.06540-11.
[2] Siddell S, Wege H, ter Meulen V. The structure and replication of coronaviruses. Curr Top Microbiol Immunol 1982 ;99 :131–63.
[3] Peiris JSM, Guan Y, Yuen KY. Severe acute respiratory syndrome. Nat Med 2004 ;10 : S88–97. doi :10.1038/nm1143.
[4] Drosten C, Günther S, Preiser W, van der Werf S, Brodt H-R, Becker S, et al. Identification of a Novel Coronavirus in patients with Severe Acute Respiratory Syndrome. N Engl J Med 2003 ;348 :1967–76. doi :10.1056/NEJMoa030747.
[5] Zaki AM, van Boheemen S, Bestebroer TM, Osterhaus ADME, Fouchier RAM. Isolation of a Novel Coronavirus from a Man with Pneumonia in Saudi Arabia. N Engl J Med 2012 ;367 :1814–20. doi :10.1056/NEJMoa1211721.
[6] World Health Organization, Novel Coronavirus(2019-nCoV), Situation Report – 12 (2020)
[7] Centers for Disease Control and Prevention, 2019 Novel Coronavirus, (2020) https://www.cdc.gov/coronavirus/2019-ncov/about/transmission.html.
[8] C. Rothe, M. Schunk, P. Sothmann, et al., Transmission of 2019-nCoV infection from an asymptomatic contact in Germany, N. Engl. J. Med. (2020) NEJMc2001468. Epub ahead of print.
[9] Q. Li, X. Guan, P. Wu, et al., Early transmission dynamics in wuhan, China, of novel coronavirus–infected pneumonia, N. Engl. J. Med. (2020) NEJMoa2001316. Epub ahead of print.
[10] Walsh EE, Shin JH, Falsey AR. Clinical Impact of Human Coronaviruses 229E and OC43 Infection in Diverse Adult Populations. J Infect Dis 2013 ;208 :1634–42. doi :10.1093/infdis/jit393.
[11] Cabeça TK, Granato C, Bellei N. Epidemiological and clinical features of human coronavirus infections among different subsets of patients. Influenza Other Respir Viruses 2013 ;7 :1040–7. doi :10.1111/irv.12101.
[12] Elsevier, Novel Coronavirus Information Center, (2020) https://www.elsevier.com/ connect/coronavirus-information-center
[13] C. Huang, Y. Wang, X. Li, et al., Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China, Lancet 395 (2020) 497–506.
[14] N. Zhu, D. Zhang, W. Wang, et al., A novel coronavirus from patients with pneumonia in China, 2019, N. Engl. J. Med. (2020) NEJMoa2001017. Epub ahead of print.