



Review Article

## COVID-19 Outbreak in Malaysia

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### ABSTRACT

#### Article history:

Received: April 17, 2020

Revised: May 6, 2020

Accepted: May 11, 2020

#### Keywords:

COVID-19, Malaysia,  
SARS-CoV-2

In 2020 a significant threat to public health emerged. The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic outbreak emerged in December 2019 from Wuhan City, Hubei Province, China and spread to the rest of the world. This disease was named COVID-19 by World Health Organization. To date (17<sup>th</sup> April 2020) a total of 2,230,439 cases of COVID-19; 150,810 cases of deaths and 564,210 recovered cases have been reported worldwide. In this review the SARS-CoV-2 morphology, pathogenic mechanism, similarities and differences between SARS-CoV and Middle East Respiratory Syndrome and severe acute respiratory syndrome, transmission mode, diagnosis, treatment, and preventive measures were investigated. The outbreak of COVID-19 from a Malaysian perspective was explored and mental health care during the COVID-19 outbreak was explored. To date, there is no vaccine or no specific treatment for COVID-19. Therefore, preventive measures are very important to prevent and control the rapid spread of the SARS-CoV-2 virus. Preparedness should be a priority for future pandemic outbreaks.

<https://doi.org/10.24171/j.phrp.2020.11.3.08>  
pISSN 2210-9099 eISSN 2233-6052

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## Introduction

A continuous occurrence of an unknown acute respiratory tract infection was reported in Wuhan City, Hubei Province, China, since 12<sup>th</sup> December 2019, originating from the Hunan South China Seafood Market [1]. On the 7<sup>th</sup> January 2020, Chinese scientists isolated the unknown viral sample from an infected person and sequenced its genome using the next gene sequencing tool. They reported that the virus had 96.3% genetic similarity with a Yunnan bat coronavirus RaTG13 and 70% homology with severe acute respiratory syndrome coronavirus (SARS-CoV) [2]. On the 12<sup>th</sup> January 2020, the World Health Organization (WHO) announced the cause of this epidemic outbreak was a novel coronavirus discovered in 2019 (2019-nCoV) or SARS-CoV-2 and named the disease coronavirus disease 2019 (COVID-19) [3]. However, the answer to the origin

of SARS-CoV-2 remains to be determined.

The SARS-CoV-2 spread rapidly to other countries including South Korea, Taiwan, Thailand, Singapore, Japan, Italy, Iran, Spain, USA, UK and was classified by the WHO as a pandemic on 12<sup>th</sup> March 2020 [3]. As of the 17<sup>th</sup> April 2020, there are a total of 2,230,439 cases of COVID-19; 150,810 cases of deaths and 564,210 recovered cases have been reported throughout the world [4]. The USA has had the highest number of cases of COVID-19 (686,431) and number of deaths (35,578) [4]. There have been 58,179 USA patients who have recovered from COVID-19 [4]. On the 17<sup>th</sup> April 2020, a total of 8,861 new cases and 961 new deaths were reported in USA [4]. The number of cases has increased exponentially in USA, Italy, Spain, UK, Turkey, and Russia. This article describes COVID-19 and its outbreak in Malaysia.

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## 1. SARS-CoV-2

### 1.1. Morphology and pathogenic mechanism

The SARS-CoV-2 is a beta coronavirus, which is a large, spherical, enveloped, non-segmented positive-sense, single-stranded RNA virus genome of about 30 kb [5]. It consists of 4 main structural proteins which are spike glycoprotein (S), membrane (M), envelope (E) and nucleocapsid (N) proteins [6]. SARS-CoV-2 uses its spike to inhibit the activity of neutralizing antibodies. Neutralizing antibodies are mainly involved in preventing viral particles from interacting with the host cell to infect cells. S protein contains S1 and S2 domains and the interaction between the S1 domain of SARS-CoV-2 with a specific host cell receptor called Angiotensin Converting Enzyme 2 (ACE-2) promotes a conformational change in the S protein. The virus mediates membrane fusion with the host cell membrane via the S2 domain and enters the host cell (specifically alveolar epithelial cells) [7,8].

### 1.2. Similarities and differences between SARS-CoV, MERS-SARS and SARS-CoV-2

SARS-CoV-2 is different from SARS-CoV and MERS-SARS (Table 1) [3,9-13].

### 1.3. Transmission

SARS-CoV-2 spreads rapidly from person to person but it was initially hypothesized that, SARS-CoV-2 was propagated by animal to human via direct contact with an intermediary host. Consumption of infected, raw or semi-cooked meat may also lead to the transmission of the virus. COVID-19 is a zoonotic disease where an animal virus undergoes mutations that permit it to infect and replicate inside the human body where it spreads rapidly through the human population. The virus is transmitted by asymptomatic infected individuals and symptomatic individuals via oral fluid droplets, mainly airborne via coughing or sneezing [2,14,15].

### 1.4. Symptoms

COVID-19 symptoms are manifest usually as fevers, a dry cough and tiredness. Some infected individuals may have mild symptoms like headaches, muscle pains, runny nose, sore throat or diarrhea. Some COVID-19 patients may suffer from severe pneumonia, organ failure (e.g. kidney), acute respiratory tract infection and septic shock, which can lead to death [16]. However, there are some infected individuals who do not develop any symptoms and do not feel unwell. These people are called asymptomatic carriers. The people who are highly vulnerable to COVID-19 are the elderly, young children, pregnant ladies, and people with chronic diseases such as hypertension, diabetes, heart problems, kidney and liver diseases, in addition to immuno-compromised people

including patients with cancer, HIV, auto-immune disorders, and smokers.

### 1.5. Treatment

To date, there is no vaccine or specific antiviral therapy confirmed by the WHO to be effective against COVID-19. However, there are a number of medicines which could potentially be repurposed to treat COVID-19 (Table 2) [14,17-20].

### 1.6. Preventive measures

Since there is no safe and effective medicine against COVID-19, the WHO has developed a strict guideline to adhere to during the pandemic. Standard precautions are very important to set out and adhere to in an effort to curb the spread of SARS-CoV-2 worldwide. Preventive measures such as regular hand washing with soap or sanitizer, avoiding handshaking, wearing masks and gloves, social distancing of 1-2 m apart, coughing into disposable tissues or into a flexed elbow and self-isolating if symptomatic, avoidance of gatherings and unnecessary travel to affected areas can suppress the spread of viral infection.

## 2. COVID-19 in Malaysia

As of the 17<sup>th</sup> April 2020, there were 5,251 COVID-19 cases including 86 deaths and 2,967 cases of recovery reported by the Ministry of Health (MOH) in Malaysia [21]. Selangor, in Malaysia had recorded the highest number of confirmed COVID-19 cases (1,338) to date (17<sup>th</sup> April 2020). The government announced 27 districts as red zones including Lembah Pantai (592), Hulu Langat (446), Petaling Jaya (366), Seremban (288), Kuching (255), and Kluang (221), because of the large cumulative number of positive cases detected in those areas [21].

On the 25<sup>th</sup> January 2020, the first case of COVID-19 was detected in Malaysia and traced back to 3 Chinese nationals who previously had close contact with an infected person in Singapore [22,23]. They had travelled into Malaysia via Singapore on the 24<sup>th</sup> January 2020. They were treated at Sungai Buloh Hospital, Selangor, Malaysia [22,23]. The MOH quickly devised standard guidelines for the management of COVID-19 and 34 hospitals and screening centers were specifically designated in each state of Malaysia [including Kuala Lumpur Hospital (Kuala Lumpur), Sungai Buloh Hospital (Selangor), Tuanku Jaafar Hospital (Negeri Sembilan), Sultanah Aminah Hospital (Johor Bahru), Miri Hospital (Sarawak), Tawau Hospital (Sabah) [21]].

The first Malaysian was confirmed with COVID-19 on the 4<sup>th</sup> February 2020. The 41-year old man had recently returned from Singapore when he started to develop a fever and a

Table 1. The similarities and differences between the severe acute respiratory syndrome coronavirus (SARS-CoV), the Middle East respiratory syndrome coronavirus (MERS-CoV) and the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

	SARS-CoV	MERS-SARS	SARS-CoV-2
Coronavirinae Genera	b-coronavirus, lineage B	b-coronavirus, lineage C	b-coronavirus, lineage B
Virus type	RNA virus	RNA virus	RNA virus
Total length of DNA sequence	29,751	30,111	29,903
Discovery (y)	2003	2012	2019
Origin	Guangdong province, China	Arabian Peninsula	Hubei province, China
Total No. of cases worldwide (WHO report)	> 8,000	2,494	2,230,439 (Till 17 <sup>th</sup> April 2020)
Total No. of affected countries (WHO report)	26	27	210
Total number of death cases (WHO report)	916	858	150,837 (As of 17 <sup>th</sup> April 2020)
Mortality	>10%	34.4%	2.10%
Transmission mode	-Droplets (coughing and sneezing) -Close contact with an infected person	-Droplets (coughing and sneezing) -Close contact with an infected person	-Droplets (coughing and sneezing) -Close contact with an infected person or even asymptomatic ones
Transmission medium	Animal to human Human to human	Animal to human Human to human	Animal to human Human to human
Transmission region	Globally	Regionally	Globally
Cellular receptor	Angiotensin-Converting Enzyme 2 (ACE 2)	Dipeptidyl peptidase 4 (DDP4)	Angiotensin-Converting Enzyme 2 (ACE2)
Reservoir	Palm Civets and Bats	Bats and Camels	Bats
Receptor binding domain (RBD)	C-domain	C-domain	C-domain
IFN- $\gamma$ inhibitor	Yes	Yes	Unknown
Viral replication efficiency	High	Higher	Higher
Pathogenicity	Higher	High	High
Clinical symptoms (WHO report)	Fever, malaise, myalgia, headache, diarrhea, and shivering (rigors)	Fever, cough, and shortness of breath	Fever, tiredness, and dry cough
Prevention	-Hand wash -Wear mask and gloves -Physical distancing	-Hand wash -Wear mask and glove -Physical distancing	-Hand wash -Wear mask and gloves -Physical distancing
Treatment	Glucocorticoid and interferon	No vaccine or specific treatment	No specific antiviral treatment

MERS-CoV = Middle East respiratory syndrome coronavirus; SARS-CoV = severe acute respiratory syndrome coronavirus; SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2; WHO = World Health Organization.

Table 2. Drugs and their potential mechanisms for inhibiting SARS-CoV-2 infection in humans.

Drugs	Mechanism
Remdesivir	Blocks viral RNA-dependent RNA polymerase activity (inhibits RNA replication from the RNA template)
Chloroquine and hydroxychloroquine	Inhibits endocytosis by increasing the acidity in endosomes and prevents the entry of virus into the host cell.
Lopinavir and ritonavir	Inhibits RNA translation process
Lopinavir and ritonavir plus interferon-beta	Inhibits viral replication
Camostat mesylate	Inhibits enzymatic activity of type II transmembrane serine protease (TMPRSS2) which is important for infectious viral entry into the host cell
Darunavir	Blocks viral replication
BCR-ABL kinase inhibitor imatinib	Inhibits fusion of virions with the endosomal membrane
Arbidol	Inhibits membrane fusion of the viral envelope
Ribavarin	Inhibits viral RNA synthesis and mRNA capping
Ribavirin plus interferon-beta	Shuts down viral replication
Umifenovir	Inhibits fusion of virions with the endosomal membrane
Oseltamivir	Inhibits RNA translation process
Interferon-beta	Triggers the activation of innate antiviral immunity
Favipiravir	Blocks viral RNA-dependent RNA polymerase activity (inhibits RNA replication from RNA template)
Monoclonal antibodies	Inhibits viral infection via binding to the virus

SARS-CoV-2 = severe acute respiratory syndrome coronavirus 2.

cough. He was quarantined at Sungai Buloh Hospital, Selangor [24]. On the same day, a 4-year-old Chinese national girl who had been isolated at Sultanah Maliha Hospital, Langkawi, since the 29<sup>th</sup> January 2020, had recovered, been discharged and was allowed to return to China [25]. In Malaysia, this was the first patient who had recovered from COVID-19 since the outbreak began.

A 40-year old female Malaysian was reported positive for COVID-19 on the 6<sup>th</sup> February 2020. She had no travel history to infected areas, however, she was the younger sister of the 41-year old man confirmed as positive with the virus on the 4<sup>th</sup> February 2020. She was the first COVID-19 patient in Malaysia who contracted the virus via local transmission. She developed a fever and a sore throat on 1<sup>st</sup> February 2020 and developed a cough the following day. She was isolated at Sultanah Bahiyah Hospital, Alor Setar, on the 3<sup>rd</sup> February 2020 [26]. On 12<sup>th</sup> March 2020, Malaysia reported its first sporadic case of COVID-19 where the infected person neither travelled to an affected area nor had contact with an infected person [21].

In March 2020, the number of reported COVID-19 cases grew relatively slowly until a religious event took place at Sri Petaling, Kuala Lumpur, which led to an exponential rise in cases [27]. A few weeks after the event, Malaysia recorded the highest number of positive cases of COVID-19 in South East Asia. The religious mass gathering was a 4-day event with 16,000 people participating, including 1,500 from outside Malaysia [27]. The spread of COVID-19 to other states of Malaysia and neighboring countries such as Brunei, Cambodia, Indonesia, Thailand, Singapore, Philippines and Vietnam was propagated [28-31]. Sporadic cases of transmission within the local community were reported. A 53-year-old man who attended the religious event was confirmed as positive after returning Brunei. He was the first positive case of COVID-19 that was detected in Tutong, Brunei on 9<sup>th</sup> March 2020. His symptoms began to develop on 7<sup>th</sup> March 2020, and he was isolated at the National Isolation Centre in Tutong for treatment [32].

The number of positive cases increased beyond 553 cases

on the 16<sup>th</sup> March 2020, and the Prime Minister of Malaysia announced a Movement Control Order (MCO). Social distancing was to be in place for 14 days (18<sup>th</sup> March to 31<sup>st</sup> March 2020) to reduce the rapid spread of COVID-19 [33-35]. Since the 18<sup>th</sup> March 2020, the government restricted people from travelling to other states or COVID-19 affected areas. Only 1 person from 1 family could leave the home and go out to buy essential goods.

On the 17<sup>th</sup> March 2020, Malaysia confirmed 2 COVID-19 related deaths, a 60-year-old man from Kuching, Sarawak, who had a history of chronic disease, and a 34-year-old man from Johor Bahru, Johor, who participated at the religious gathering in Sri Petaling, Kuala Lumpur [36]. As the number of positive cases remained relatively high, on the 25<sup>th</sup> March 2020, the MCO was extended a further from 14 days to the 14<sup>th</sup> April 2020 [37].

Two more cluster groups were detected on 6<sup>th</sup> April 2020, originating from a religious gathering at Kuching, Sarawak, which led to 83 COVID-19 confirmed cases, and a wedding at Bandar Baru Bangi, Selangor, which resulted in 88 positive cases [38,39]. A new subcluster of COVID-19 cases was identified in Rembau, by the MOH on 8<sup>th</sup> April 2020. This subcluster was linked to the religious gathering at Sri Petaling, Kuala Lumpur. There were 27 people infected with SARS-CoV-2 virus [40].

As of the 10<sup>th</sup> April 2020, there were a total of 4,346 COVID-19 cases reported by the MOH Malaysia, including 70 deaths and 1,830 recovered cases [21]. Furthermore, the WHO estimated that the number of COVID-19 cases in Malaysia would grow exponentially and peak in mid-April and so the government extended the MCO a further 14 days until 28<sup>th</sup> April 2020 [41,42].

The government implemented an “Enhanced Movement Controlled Order (EMCO)” for specific areas in Kuala Lumpur including Kluang, Hulu Langat, Menara City One, Selangor Mansion, and Malayan Mansion effective until 28<sup>th</sup> April 2020 [43]. Residents who were under the EMCO were not permitted to leave their houses (the government provided food to the affected residents), receive visitors, or enter COVID-19 affected areas. All the residents had to be screened for COVID-19 by health officials. The MOH identified a new cluster of COVID-19 cases in Sendayan, Negeri Sembilan, on the 14<sup>th</sup> April 2020 where 39 people were identified as COVID-19 positive [44]. The MOH to date has reported 29 virus clusters throughout Malaysia. There were 69 COVID-19 positive cases reported by the MOH on 17<sup>th</sup> April 2020 [21] and this was the first time that the number of cases was less than 100 since the 14<sup>th</sup> March 2020.

### 2.1. Treatment of COVID-19 in Malaysia

A person was “suspected” of having COVID-19 based on the

criteria below [21].

- 1) Has acute respiratory infection (either with difficulty in breathing, sore throat, or dry cough) with or without fever AND
- 2) Had a history of travel to or resided in a foreign country within 14 days before onset of disease OR
- 3) Had close contact with an infected person in the last 14 days before the onset of symptoms
- 4) Attended a gathering or event linked to a COVID-19 outbreak

A person was “confirmed” COVID-19 positive after performing laboratory tests.

COVID-19 patients can be diagnosed using diagnostic testing kits for the presence of the virus. Imaging techniques such as chest X-ray and pulmonary CT scans can be used to diagnose pneumonia in COVID-19 patients. There are 5 clinical stages of COVID-19 [21].

- Stage 1. asymptomatic,
- Stage 2. symptomatic and no pneumonia,
- Stage 3. symptomatic and pneumonia,
- Stage 4. symptomatic, pneumonia and supplemental oxygen required,
- Stage 5. critically ill with multiorgan failure

Currently, there is no vaccine or specific treatment for COVID-19 that has been approved for use in humans.

In Malaysia, hydroxychloroquine has been proposed as a drug to treat patients with COVID-19. Hydroxychloroquine inhibits endocytic pathways by elevating the pH of the endosomes to block the pH-dependent entry of the virus into the host cell [45]. The suggested treatment regime using hydroxychloroquine is

- Stage 1. No treatment required
- Stage 2. Hydroxychloroquine only
- Stage 3/4. Hydroxychloroquine combined treatment with Lopinavir/Ritonavir
- Stage 5. Hydroxychloroquine combined treatment with Lopinavir/Ritonavir, Ribavirin or Interferon Beta [21].

As of the 17<sup>th</sup> April 2020, the government reported that out of the 5,251 COVID-19 positive cases in Malaysia, 56.5% recovered [21].

### 2.2. Preventive measures in Malaysia

- ✓ Wash hands frequently with soap and water or an alcohol-based hand sanitizer
- ✓ Wear face mask and gloves
- ✓ Maintain physical distancing of 1metre
- ✓ Mass gatherings have been stopped
- ✓ Cover mouth and nose with a disposable tissue or flexed elbow when coughing or sneezing

- ✓ Avoid touching eyes, mouth, or nose
- ✓ Avoid handshaking
- ✓ Stay at home if immunocompromised or has comorbidities
- ✓ Avoid traveling to COVID-19 affected areas or countries
- ✓ Self-isolate at home for 14 days upon return from overseas if symptomatic
- ✓ Screen for COVID-19 after a person returns from a foreign country
- ✓ Avoid spreading false information regarding COVID-19

### 2.3. Movement Control Order (MCO) in Malaysia

In Malaysia, the Movement Control Order (MCO) was implemented on the 18<sup>th</sup> March and was in place until the 28<sup>th</sup> April to control the spread of COVID-19 nationwide. The government imposed 6 restrictions [46].

- ✓ People were prohibited from attending mass gatherings such as religious, sports, social, and cultural events. All places of worship and businesses were closed temporarily. However, people could buy essential goods at markets, supermarkets, grocery shops and convenience stores.
- ✓ People were required to undergo health screening for the detection of COVID-19 and self-isolate after returning from overseas.
- ✓ Foreign tourists and visitors were forbidden entry to Malaysia.
- ✓ Kindergartens, government, and private schools including daily schools, boarding schools, international schools, tahfiz centers, other primary, secondary and pre-university institutions were all closed.
- ✓ Public and higher education institutions and skill training institutes nationwide were closed.
- ✓ Government and private premises were closed except for essential services (water, electricity, energy, telecommunications, postal, transportation, irrigation, oil, gas, fuel, lubricants, broadcasting, finance, banking, health, pharmacy, fire, prison, port, airport, safety, defense, cleaning, retail and food supply).

### 2.4. Psychological stress during pandemic outbreak of COVID-19 in Malaysia

Anyone can be affected emotionally during an outbreak like COVID-19. Everyone reacts differently to critical scenarios. Fear, worry, and anxiety regarding COVID-19 can cause strong emotions such as stress and depression in a person. For example, a 62-year old patient under investigation for COVID-19, committed suicide in Serdang Hospital, Selangor, apparently due to depression [47,48]. The MOH has published well-described guidelines on "Mental Health and Psychosocial Support in COVID-19 [21]." They included the mental health and psychosocial support services for individuals under COVID-19 investigation and those health care workers/response

workers involved. A concise flow chart of mental health and psychosocial support activities for COVID 19 were described in the guideline [21]. Some mental health care tips are listed below:

- ✓ Eat healthy food
- ✓ Drink lots of water
- ✓ Do regular physical exercise indoors
- ✓ Perform deep breathing exercises
- ✓ Practice yoga/meditation
- ✓ Listen to music
- ✓ Be artistic and expressive
- ✓ Read books
- ✓ Cook and bake (new recipes)
- ✓ Spend quality time with family members
- ✓ Talk with friends

## **Conclusion**

This COVID-19 pandemic outbreak continues to have a strong impact on the economy, trade, and tourism industries. It has also affected sports activities such as the 2020 SUKMA Games, squash's Asian Team Championship, and the 2020 Summer Olympics was postponed until 2021. To date, there is no specific treatment for COVID-19. Worldwide, many clinical trials are being carried out to find medicines and vaccines for COVID-19. At the same time, the experience gained from the global efforts in dealing with COVID-19, should propel countries globally to be prepared for disease control for novel disease outbreaks, epidemics and pandemics of the future.

## **Conflicts of Interest**

The author has no conflict of interest to declare.

## **Acknowledgments**

I would like to thank the MOH in Malaysia and many professions including doctors, nurses, police officers, soldiers, garbage collectors, and cleaners who have been at the forefront in responding to the pandemic COVID-19 outbreak. I would like to thank specifically Dato Dr. Noor Hisham Abdullah who is the Director-General of Health Malaysia. Every day, Dato provides the necessary information and updates of COVID-19 to the country. Lastly, I greatly appreciate the COVID-19 cases whose information was used for this review.

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