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Review

Coronavirus nCOVID-19: A pandemic disease and the Saudi precautions

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ABSTRACT

Now nCOVID-19 has a foothold in many countries, and the threat of a pandemic situation has risen. Recently a novel coronavirus (nCOVID-19) has first emerged in China, causing multiple symptoms in humans and closely related to those caused by SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome). The nCOVID-19 has reported in Wuhan city of China has recently infected over six million people and at least 0.4 million confirmed deaths all over the world, while 2.8 million people has recovered from this deadly virus. Many instances of this respiratory syndrome coronavirus infection have already reported in more than 216 countries and territories. In contrast, the majority of cases reported in the USA, Brazil, Russia, Spain, UK, Italy, France and many more countries. In today's context, the coronavirus is one of the significant issues faced by the world with plenty of cases. In these circumstances, rapid reviews which recommended by WHO (World Health Organization), and these recommendations are very significant, helpful and cover current data with different preventive measures developed by the Saudi CDC (Saudi Centre for Disease Prevention and Control). This review article describes the possible modes of transmission so that proper preventive actions should be taking. Importantly, this work mentioned the animal reservoir through which may infect humans, and it must be identified to break the transmission chain. In additions, this review paper briefly discussed the spread of the coronavirus in the Arabian Peninsula and what precaution measures are in place by each country to limit the spreading of this virus. Finally, since the number of infected people specifically those with close contact with nCOVID-19 patients is increasing daily and appears unstoppable, we used the preventive measures by pharmacists as part of health care professions.

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1. Introduction

nCOVID-19 is the name of a new respiratory disease, abbreviated from coronavirus disease 2019, while *n* stands for a new or novel and the causative agent of this disease is Severe Acute Respiratory Syndrome Coronavirus 2 (nCOVID-19). Coronaviruses are a group of family-based viruses containing strains that roots potential diseases in birds and mammals. It is the vast class of viruses that cause viral respiratory sickness extending from common cold symptoms to more severe lung diseases. In comparison to other members of coronaviruses, which cause humans respiratory infections, SARS-CoV (first reported in China, 2002) and MERS-CoV (first recorded in KSA, 2012), nCOVID-19 is likely to have originated from animals and have first introduced in Wuhan city, China, 2019 then it has spread to 216 different countries and territories all over the world, and it seems more deadly. However,

nCOVID-19 is a novel strain, unidentified in humans previously (Lai and Liu, 2020). Coronaviruses have zoonotic origins from animals such as dromedary camels (*Camelus dromedarius*), civet cat (*Paguma larvata*) and bats (Coleman and Frieman, 2014). From their reservoirs, coronaviruses may transmit to other animals and humans, with the transmission to humans usually needs an intermediate host. SARS-CoV-2 considering being the 3rd pathogenic virus with high mortality rates, it has established with 2494 infected cases and almost 900 deaths were recorded (WHO, who.int/emergencies/diseases/novel-coronavirus-2019). However, the SARS-CoV virus has documented 8000 cases and 800 deaths. The SARS-CoV-2 outbreak has reached 216 countries and sickened over six million people up till 31th May 2020. Total number of fatalities nearly 0.4 million of which the USA; 100,000 and UK; 39000, while around, 33000, 29,000 and 28,000 deaths reported in Italy and France and Brazil, respectively (Fig. 1).

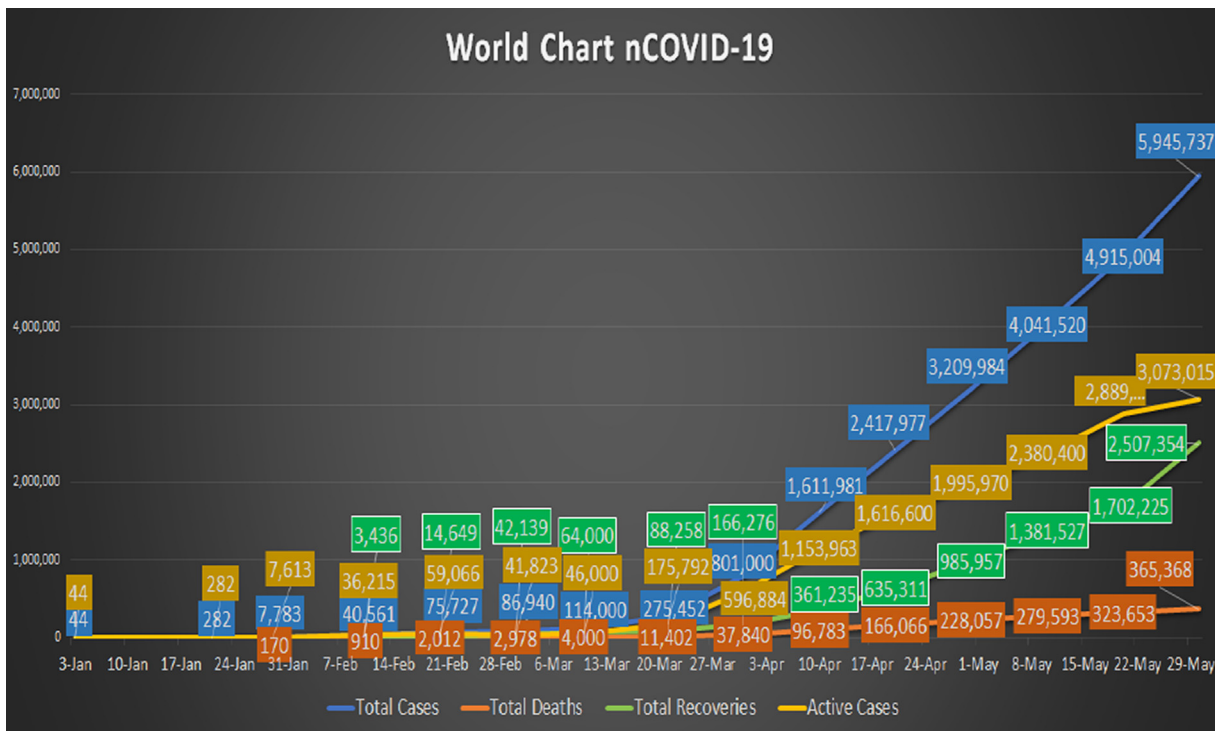


Fig. 1. Cumulative number of totals, active, recovered cases and death of nCOVID-19 from 3rd Jan till 30th May.

The incubation period of this virus ranges from 2 to 14 days (<https://www.worldometers.info/coronavirus/coronavirus-incubation-period/>) and common signs and symptoms are cough, running nose, sneezing, fatigue, fever, sore throat and breathing difficulty (Fig. 2). In a few cases, viruses can cause pneumonia and bronchitis. The complications are acute respiratory distress syndrome (ARDS), secondary infections, failure of kidney and sepsis may lead to death. nCOVID-19 puts the Public Health Emergency of International Concern (PHEIC) and worlds alarming alert, and the emergency among different countries, especially Europe, America and Asian countries draw the attention of almost every human across the globe (Fig. 2). This review paper shows aggregate and consolidates the most critical issues related to the virus outbreaks' origin, sources of virus transmission, signs and symptoms as well as the radiographic features from affected subjects. Additionally, it illustrates some preventive measures taken by the Saudi government that can control further spread of the SARS-CoV-2.

2. Origin

The first coronavirus case reported in China, Wuhan city among people who had visited a seafood and meat market, and it was highly suspected to be transmitted from animal to human and then transmitted from human to human or to pets or vice versa. Based on different studies, the virus might be originated in bats (Zhou et al., 2020; Wu et al., 2020). However, no bats were found for sale

purpose at the market, which confirmed that another unknown animal might help in the transmission of the virus to humans. Many of these coronaviruses primarily infect the individual workers in direct contact with animals, as reported previously. One study recommended pangolin or snake as maybe the transitional animal as there were sold in the seafood and meat market (<https://www.who.int/csr/sars/en/>; Ji et al., 2020; <https://www.businessinsider.com/wuhan-coronavirus-chinese-wet-market-photos-2020-1>). Many studies explore the potential virus reservoir by comparing the sequence analysis of Relative Synonymous Codon Usage (RSCU) among different animal species based on the SARS-CoV-2 genome sequence. Results suggested that SARS-CoV-2 is a recombinant virus between the bat coronavirus and unknown origin coronavirus that located within the viral glycoprotein spikes presented on cell surface (Ji et al., 2020). One more research team applied algorithm for analysis of nCOVID-19 nucleotide sequencing to recognize other viruses' origins, and the results appeared that both bats and minks could be the latent host for nCOVID-19. Additionally, a study revealed that nCOVID-19 has most homogeneous genetic information with bat coronavirus and resembling snake codon usage bias (Guo et al., 2019).

3. Epidemic: SARS, MERS, EBOLA, influenza and nCOVID-19

SARS first recognized in Guangdong, China, November 2002, and then spread to more than thirty countries which began with 8000 cases and 774 deaths. It was the first new epidemic disease

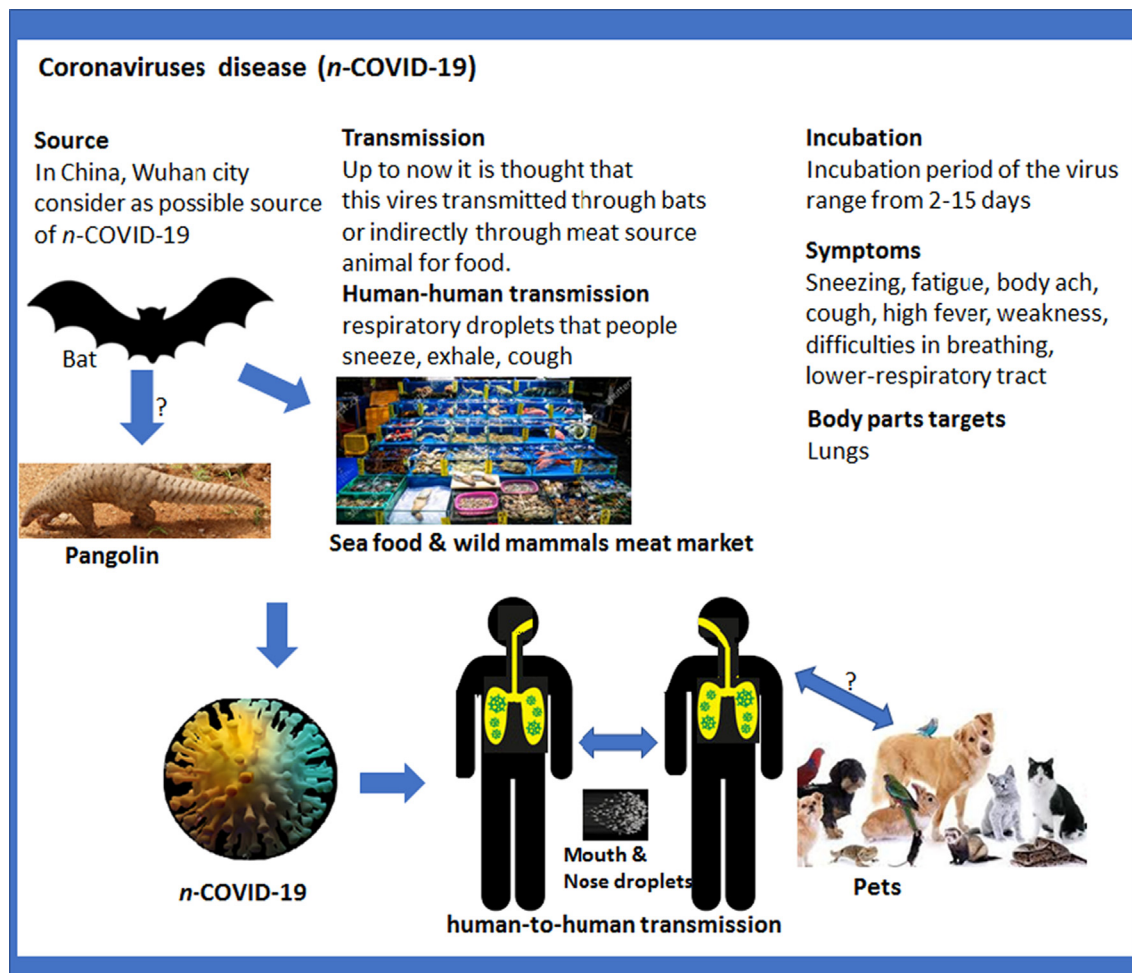


Fig. 2. Key reservoirs and mode of transmission of nCOVID-19.

in the 21st century. The host of this epidemic disease was considered a civet cat; however, during seven months since the occurrence, it was under controlled (Cherry and Krogstad, 2004). The SARS global outbreak period began in 2003 up till 2004. After the emergence of SARS, the second coronavirus MERS was resulting in a significant global public health crisis. It first emerged in June 2012 in Saudi Arabia when a sixty years old man admitted with severe pneumonia and acute kidney injury at Jeddah, Saudi Arabia. Many researches confirmed that MERS transmit to humans from the infected Arabian camel. Maximum MERS cases were observed in the Middle East, North Africa regions, Europe, East Asia and the USA (Table 1) (Bauerfeind et al., 2016; McIntosh et al., 2017). Spanish influenza was also an epidemic which its outbreak from 1918 to 1919, and it was the most devastating epidemic on record, which killed between 50 and 100 million people around the world. Several measures applied during that era, such as fresh air, sunlight, standards hygiene and face masks in order to reduce mortality rates. Ebola virus was also an epidemic disease which first outbreaks in Ebola River, Zaire 1976. The 2013–2016 outbreaks were in Guinea then rapidly extend to West Africa with more than 10,000 deaths (Table 1).

3.1. Spreaders

All over the world scientists are working to find out the different spreading routes of these viruses. In general, the common way is through respiratory droplets which may transfer from the patient through coughing and sneezing. Further tests have also confirmed the presence of these viruses in patients' stool, suggesting that it can be spread through the excretory product. Currently, it is entirely unclear whether people can be infected by touching contaminated surfaces or objects.

3.2. High-risk people

Older people and people with long term medical issues are more susceptible to be infected with this virus. These critical chronic health problems such as lungs diseases, sickle cell disease, liver disease, heart problems, kidney disease, cancer, high blood pressure, HIV and diabetes are more likely to get the risk of serious sickness. Pregnant women (current or recent) and the person with weak immunity are also at a higher risk of severe illness due to this

virus. Additionally, smokers are at great risk of disease because smoking reduces the natural protection against this type of viruses.

3.3. Social distancing

Social distancing or self-quarantine is one of the best tools to mitigate the spread of the nCOVID-19. In 1918, two different states of America detected a few cases of influenza among civilians of Philadelphia and Saint Louis. Both of the cities were planning for a massive military parade, which was the city's largest parade ever. The head of Philadelphia city decided to continue the events which were the big reason for quickly spreading the virus and made it a worldwide pandemic. After three days, every bed in Philadelphia's hospitals were filled with sick and dying patients, infected by this deadly virus. While the head of the St. Louis city decided to cancel its parade, closed all schools, playgrounds, libraries, courtrooms and churches around the entire city; the public gathering was also banned. After a month, more than ten thousand people in Philadelphia passed-away due to flu while deaths toll at Saint-Louis was not exceed 700 cases. These precautions demonstrate the advantage of cancelling events, mass-gatherings and distancing social dissociation routines.

3.4. Case fatality rate CFR

The fatality cases rates are intended by dividing total deaths from a disease by the number of cases. It is expressed as a percentage (%) and used as a measure of disease severity.

$$CFR = \frac{\text{Number of deaths from nCOVID-19}}{\text{Number of diagnosed cases}} \times 100$$

According to the WHO (December 2019 to May 2020) 6,200,000 laboratories confirmed cases of nCOVID-19 were reported, of which 1,800,000 cases were in the USA with deaths 100,000 resulting 5.55% of CFR. The incidence of nCOVID-19 continues to rise, with 275,000 cases reported till 31st May 2020 alone from UK with 39,000 total deaths resulting CFR of 14.2%, while 232,664 cases in Italy with 33,340 deaths having CFR of 14.3%. The case of the fatality rate of the Spain and France are 9.5 and 15.2%, respectively. Currently, after the closed view of the data, it can be confirmed that Italy, France and the UK have the highest CFR among all affected countries. There are 85,000 cases reported from Saudi Arabia with 503 deaths, which indicated that Saudi Arabia is the most affected

Table 1
Comparison of different epidemic diseases through 1918–2020.

Epidemic	SARS	MERS	nCOVID-19	Ebola	Influenza
Origin	Guangdong, China	Saudi Arabia, Eastern Region	Wuhan, China	DR Congo	New York, United States
Identified year	2002	2012	2019	Firstly in 1976 and then 2013	1918
Total cases	8098	2494	1,593,515	About 2800	500 million
Deaths	714	858	95,047	11,300	at least 50 million
High mortality age	60*	45*	60*	60*	Younger than 5, 20–40, 65 years and older
Affected # of countries	26	27	209	Mainly 3	USA, many countries in Europe and Asia
CFR	9.5%	34.4%	6.12%	40%	Between 1% and 3%.
Incubation period	2–7 days	2–14 days	2–14 days	2–21 days	2–7 days
Natural reservoir	Bat or cat	Dromedary camel	Bat, sea food animals	Wild animals (such as fruit bats, porcupines or non-human primates)	Wild waterfowl
Human to human transmission	Yes, Patient droplet spread	Yes, Patient droplet spread	Yes, Patient droplet spread	Yes	Yes
Distance from infected person	up to 3 feet	up to 3 feet	6 feet	Contact with body fluids	3–6 feet
Symptoms	Fever, dry cough, breathing problem	Fever, cough, breathing problem	Fever, dry cough, breathing problem	Fever, muscle pain, sore throat, severe diarrhoea, bleeding, abdominal pain	Fever, runny nose, sore throat, muscle pain, cough,
Treatment	No medication has been proven yet	No medication has been proven yet	No medication has been proven yet	rVSV-ZEBOV vaccine	A nasal spray, vaccine (LAIV, Q/LAIV)

country among the Arabian Peninsula, having 5.9% of CFR. Globally, total CFR of nCOVID-19 is 6.0% which is much lower than SARS and MERS. According to WHO, the total number of laboratory-confirmed cases of MERS was 2494 up till November 2019 with 858 deaths, and it resulted in 34.4% CFR. Among these 2102 cases reported from Saudi Arabia, it had 780 deaths with 37.1% CFR. Based on the WHO, during November 2002 up till July 2003, total 8,098 people became sick due to SARS globally, and 774 were died. Therefore, the total CFR due to SARS is 9.55% which is higher than the current nCOVID-19 and MERS. Most nCOVID-19 cases occurred in health care facilities; however, the routes of direct or indirect transmission of these remain unclear. Up till now, not any specific treatment or any vaccine is available. However, serious attempts to develop preventive therapy and different researches in many laboratories are ongoing with the hope of some great findings (<https://www.worldometers.info/coronavirus/>).

3.5. nCOVID-19 or flu

nCOVID-19 has similarities and differences with flu in terms of effects and symptoms. But it is a contagious viruses which can spread rapidly and usually caused high fever and shortness breath (Table 2).

4. Epidemiology

nCOVID-19 is an enveloped, positive-sense RNA virus, which are known to cause different respiratory tract diseases in many animals and humans. Human coronavirus circulates the globe, of which some are promoters of the common cold and flu. In 2019, as discussed above, many cases in China of severe infections were notified, which caused by a novel virus. Then the number of infected people rises day by day in Wuhan city of China. Due to the danger/hazards of infections, foreigner people, and many residents tried to walk/fly away from the infected places, which became a big reason for this epidemic disease transmission. Although the epidemic is still ongoing, initial lessons from its spread can help, inform public health officials and medical practitioners in efforts to combat its progression. One of the best precautions for putting an end to these viruses is not to leave the place where you present and not to enter the place where these epidemics are raised. Few famous and well-known hadith of our Last Prophet Muhammad (P.B.U.H. ﷺ) about the epidemic situation mentioned in the book of Hadith:

Allah's Messenger (ﷺ) said: "If you hear of an outbreak of plague in a land, do not enter it; but if the plague breaks out in a place while you are in it, do not leave that place." (Sahih al-Bukhari 5728)

Allah's Messenger (ﷺ) said: '(There is) no 'Adwa (no contagious disease is conveyed without Allah's permission), nor is there any bad omen (from birds), nor is there any Hamah, nor is there any bad omen in the month of Safar, and one should run away from the leper as one runs away from a lion.'" (Sahih al-Bukhari 5707)

However, it is one of the fundamental facts for preventing these viruses from spreading further. This assessment proved the scientific evidence that supports the restriction on travelling during the

expansion of epidemic diseases mentioned in the Hadith. Carriers of this virus travelled to anywhere without any clinical check-up or incubation stay during the last three months from China, Iran and Italy to the globe, which made an alarming situation of spread, severity and inaction for the world. Shortly after that, more than one hundred twenty thousand cases were reported; among these eighty thousand found only in China.

5. n-COVID19 outbreaks in Arabian Peninsula

The Arabian Peninsula is the largest peninsula on earth and located in western of Asia continent. It occupies an area of about 1,250,000 square miles. The peninsula consists of nine countries: Kuwait, the United Arab Emirates, Saudi Arabia, Jordan, Bahrain, Qatar, Oman, Yemen, and Iraq. The Arabian Peninsula is bordered by the Persian Gulf, the Red Sea, the Indian Ocean and the Levant. The peninsula occupies a critical geopolitical role in the Arab world due to its vast reserves of natural gas and oil as well it shows significant religious importance.

The novel coronavirus, has sounded global alarms, with USA, the epicentre of an outbreak, reporting over 370,870 deaths worldwide and health experts grappling to find a cure. All Arabian Peninsula countries have been subject to coronavirus outbreaks (Table 3 & Fig. 3). The nCOVID-19 disease outbreak in Arabian Peninsula, since 29th January when the first 4 cases were published in UAE and affected males and females with different ages. A total of more than 227,173 confirmed cases have been reported in all Arabian Peninsula countries, Saudi Arabian nationals accounted for a majority of total active cases, death and recovered cases.

As most of these countries constantly experience a uniquely dynamic population influx in the form of expatriate workers, tourists, or pilgrims, which are facilitate coronavirus outbreaks. Most of these countries have a well-established public health program of surveillance of virus outbreaks, and an effective system of preventing introduction of coronaviruses infections. The veterinary services and ministries of health within the Arabian Peninsula and bordering countries can work together to sharing expertise in this field where many infections are zoonotic and mutual advantage to prevent the coronavirus spread (Sahih al-Bukhari 5707; Scrimgeour, 2003; <https://www.devex.com/news/coronavirus-impacts-grow-aid-blocked-in-yemen-and-u-k-aid-reshuffle-this-week-in-development-96611>).

6. Role of radiology

Radiological modalities are one of the critical resources that help in reaching the diagnosis of nCOVID-19 and excluding other infections or other pulmonary pathologies. Recently, many researchers and doctors, including radiologists, are working finding out pertinent features by the help of all modalities, particularly High-Resolution Computed Tomography (HRCT) which is a type of computed tomography (CT) with specific techniques to enhance image resolution.

Multiple studies are showing a normal chest X-ray in nCOVID-19 patients or pneumonic consolidation. The final results of chest CT, depending on the severity and days of illness (Pan et al.,

Table 2
Common symptoms of air pollution/common cold/Flu Vs nCOVID-19.

Disease	Dry cough	Cough	Sneeze	Runny nose	Light fever	High fever	Body ach	Weakness	Breath problem
Air pollution	✓	×	✓	×	×	×	×	×	×
Common cold	×	✓	✓	✓	×	×	×	✓	×
Flu	×	✓	✓	✓	✓	×	×	×	×
nCOVID-19	✓	×	✓	×	×	✓	✓	✓	✓

Table 3
Coronavirus outbreaks in Arabian Peninsula.

Country	First reported case	Cause of virus transmission	Total case [1]*	Death case [1]*	Recovered Case [1]*	Precautionary measures
Iraq	On 22 February.	Travelers transmission (from Iran)	6,179	195	3,110	Iraq banned people entering from Iran and by telling citizens to avoid mass gatherings while also telling visitors from certain countries to remain in quarantine (ordered the closure of Najaf province, home to holy Shiite sites), shut down schools and universities and impose a curfew.
Kuwait	On 24 February	Travelers transmission (from Iran)	26,192	205	10,156	Kuwait announced the school closures in the country, screening of passengers coming to its airports, shutdown also includes theme parks, barber shops, hairdressing salons and mosques and impose a curfew in the country.
Qatar	On 27 February	Travelers transmission (from Iran)	55,262	36	25,839	Qatar announced a closure of all schools and universities a day after banning travellers from 14 countries including Bangladesh, China, Italy, and Iran. Establishing a curfew nationwide. Restaurants and coffee shops were also banned from serving food and only allowed takeaway services.
Saudi Arabia	On 2 March	Travelers transmission (from Iran)	83,384	480	58,883	Saudi Arabia announced temporary suspension of entry for individuals wanting to perform the umrah pilgrimage in Mecca or to visit the Prophet's Mosque in Medina, as well as tourist, suspends movement in and out of Qatif to prevent coronavirus spread, monitoring all passengers arriving from infected countries and has temporarily suspended travel of citizens and residents to and from coronavirus affected countries, suspends schools, universities, games and film festivals and impose curfew over the country to curb coronavirus.
Oman	On 24 February	Travelers transmission (from Iran)	10,423	42	2,396	Oman bars entry to travellers from coronavirus-affected countries and suspend all classes in schools, universities and other educational institutions and closed all worships, mosques, cinemas, gyms, sport clubs and barber. As well all gatherings, events and conferences were suspended.
Jordan	On 2 March	Travelers transmission (from Italy)	734	9	507	Jordan temporarily banned people entering from China, South Korea, and Iran, screening everyone who enters Jordanian border crossings and airports, with mandatory chest and throat examinations as well as temperature checks. Jordanians who test positive will be quarantined for 2 weeks and imposed a curfew nationwide.
Bahrain	On 21 February	Travelers transmission (from Iran)	10,793	17	5,826	Bahrain closed schools and a travel bans from Iran. The activities of all restaurants, tourist facilities and places for serving food and beverages are limited to external orders and delivery. Testing all incoming passengers and impose partial curfew in the major cities.
UAE	On 29 January	Travelers transmission (from China)	33,896	262	17,546	UAE suspended all flights to and from Iran, suspends schools, universities, games and film festivals. Avoid public places and practice social distancing during family gatherings and screening all incoming passengers.
Yemen	On 10 April	An international employee working for a United Nations Organization and he arrived in the Yemeni capital Sana'a recently and was infected with the virus.	310	77	13	Yemeni politicians warned that without sharing information and capabilities between health offices across Yemen, none of the Yemeni warring factions would be able to stem the spread of the disease in their territories. However, the city of Aden in the south has begun to build quarantine facility, though protests and infighting are hindering their efforts. Yemen suspended all flights over coronavirus fears. The Oxford Committee for Famine (OXFAM) Organization team trained community health volunteers to raise awareness of the virus and help prevent the spread of the pandemic.
Total			227,173	1,323	124,276	

* The reported data until 30-05-2020

2019; Wang et al., 2020). In most cases, it includes bilateral lung involvement, rounded ground-glass opacities and peripheral distribution. Also, it may include bronchial wall thickening, consolidation, linear opacities and crazy paving pattern. However, there is no evidence of cavitation, or pleural effusion observed in any patient (Fig. 4).

A study, of the temporal progression of the CT appearances in nCOVID-19, performed on 18 of 21 patients (86%) with noncomplicated nCOVID-19 pneumonia showed that the severity of lung abnormalities peaked at 10 days post symptom onset, with a gradual tail-off after this time (Pan et al., 2019). In another study of thirty-six patients, HRCT showed rapid changes over time with fibrous stripes appearing upon improvement in the disease course (Wang et al., 2020). Another study represented different stages of disease processes on chest CT scan from days of symptom onset. Accordingly, the disease divided into three categories, includes;

early stage (0–2 days) demonstrating the normal chest CT scan 56 out of 123 with zero linear opacities at the early stage. Intermediate time course (3–5 days) demonstrates bilateral lung involvements including, peripheral distribution and consolidation. Finally, late stage (6–12 days) showed the findings of intermediate stage with a slight increase in same findings with predominant finding of linear opacities amongst rest of the stages like 20 out of 29 findings of linear opacities occurred in the late stage (Pan et al., 2020; Bernheim et al., 2020).

7. Preparing for nCOVID-19 by different Saudi sectors

According to China and Italy experiences in the worldwide pandemic nCOVID-19 crises, several sectors in Saudi Arabia developed strict regulations to prevent the virus from spreading in the King-

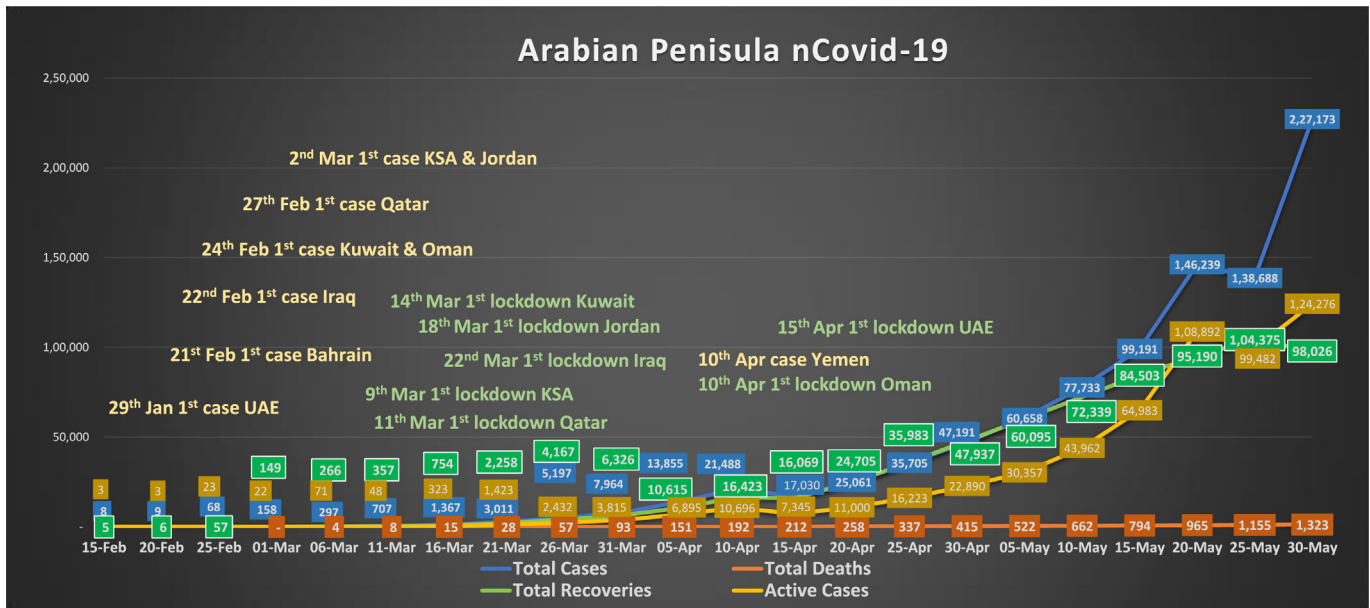


Fig. 3. nCOVID-19 outbreaks in the Arabian Peninsula.



Fig. 4. A. An axial CT image showing rounded ground-glass opacities, peripheral in the distribution in both upper lobes. B. CT scan chest axial image shows bilateral large rounded ground glass opacities in both lower lobes. C. Another an axial CT chest image is showing peripherally distributed large ground-glass opacities along with surrounding consolidation in bilateral lungs.

dom. These sectors including MOH (Ministry of health), MOE (Ministry of Education), MOI (Ministry of Interior) and MIA (Ministry of Islamic Affairs) are collaborating very well according to the guidelines listed by the Saudi CDC of MOH. One of the initiatives is the Tawakkalna (Covid-19 KSA) official app. In approved by the Saudi Ministry of Health and the Ministry of Interior to prevent the spread of coronavirus, and was developed by the National Information Centre.

The app. give an idea about the number and the most abundant area infected with the coronavirus in the Kingdom, and helps to detect the possible infections once users suspect with coronavirus symptoms. One more important thing it allows citizens and residents to request movement permission in cases of necessity during curfew; follow-up on their permission request status during curfew; and notify them when they are close to infectious or isolated areas.

7.1. Saudi CDC

The Saudi Centre for Disease Prevention and Control plays an essential role in preventing the spread of nCOVID-19 by continuous monitoring the number of cases by assisting the risks, develop awareness programs and plans to eradicate nCOVID-19.

The centre develops certain measures for communities, and the public to prevent the disease from spreading in schools, colleges, workplace and mosques (Table 4). The centre took the responsibility

of reducing the death and disability rates by spreading awareness and positive impact on the health behaviours of individuals and societies. Also, to enable all society segments to control their health, prevent all causes of nCOVID-19 through the guidance they developed on nCOVID-19 surveillance in healthcare and community settings (<https://www.moh.gov.sa/CCC/healthp/regulations/Documents/Coronavirus%20Disease%202019%20Guidelines%20v1.1..pdf>).

7.2. Standard precautions for nCOVID-19

In order to control further spread of the nCOVID-19 virus, people who are infected or suspected to carry the disease should be isolated from others and follow up on their treatment course under restricted infection-controlled precautions.

The Saudi CDC listed guidelines for standard measures established by the WHO for nCOVID-19, which mainly concern on hand, respiratory and food hygiene practice:

1-Frequently hand hygiene using alcohol-based hand rub or detergents and water.

2-Covering mouth and nose are essential when coughing and sneezing. Take on consideration to dispose of any used tissue, immediately.

3-If you have respiratory problems, wear a medical mask and clean your hands after disposing of the face mask.

Table 4
Saudi CDC recommended preventive measures for the public and communities.

Type of Pharmacy	Target personnel in setting	Type of activity
In house	For suspected or confirmed cases of (nCOVID-19) but not require hospitalization	<ul style="list-style-type: none"> • Isolation • PPE required (medical mask and gloves) • Wash hands with soap and water 20 s • Avoid sharing personal household items • Monitor symptoms constantly
	For family members in the event of a suspected or confirmed cases of (nCOVID-19) but not require hospitalization	<ul style="list-style-type: none"> • Isolation • Wash hands with soap and water 20 s • Medical mask • Avoid sharing personal household items
In workplaces	Cleanliness of workplaces	<ul style="list-style-type: none"> • Sterilized desktops, phones and keyboards • Regular hand washing • The availability of hand sanitizers.
	For employee Rising respiratory issues	<ul style="list-style-type: none"> • Availability of masks • Awareness regarding hand washing • Stickers on sneezing etiquette • Stay at home and work remotely
In communities	In gathering placing	<ul style="list-style-type: none"> • Stay at home • Avoid crowded places • Cover mouth and nose when coughing and sneezing • Wash hands with soap and water 20 s • Avoid sharing mobile phone • Avoid hands shaking
In Taxies and transportations	The driver	<ul style="list-style-type: none"> • Open windows • Sterilize the surfaces frequently • Sterilize hands after payment • Cover mouth and nose when coughing and sneezing • Stay at home when you are sick
	The rider	<ul style="list-style-type: none"> • Avoid touch surfaces • Avoid hands shaking • Use electronic payment • Cover mouth and nose when coughing and sneezing • Stay at home when you are sick
In restaurants	Food servers	<ul style="list-style-type: none"> • Wash hands with soap and water • Avoid suspected employee from work, till symptoms disappear • Cover mouth and nose when coughing and sneezing • Wash hands with soap and water 20 s • Sterilize the surfaces in (kitchen, counters, computers, and WC) frequently • Serve food in disposable eating ware • Availability of sterilizers near the entrance and exit of the restaurants
In schools and collages	Students and Academics	Close schools and collages since March and use eLearning.
In Mosques	Imam and prayers	Close all mosques since 17th March

4-If you have fever, cough and difficulty breathing, directly seek medical care or contact the Saudi MOH (Ministry of health) hot line 937 and share previous travel history.

5-When visiting crowded area, maintain social distance (not less than 1 m) from individuals with respiratory problems (e.g. sneezing and coughing).

6-Before touch your nose, mouth and eyes wash your hands.

7-When visiting animal and meet markets, especially in places currently recorded cases of a novel coronavirus; avoid direct contact with live animals.

7.3. Preventive measures for pharmacy workers

The Saudi CDC guidelines, mainly concern on health workers who are in close contact with nCOVID-19 patients. According to the WHO findings on this virus. It transmitted between people through close contact and droplets; not the airborne transmission. Therefore, additional precautions for those workers should be taken includes gloves, medical masks, goggles/face shield, gowns, as well as respirators (e.g. N95 or FFP2) and the way how to put on, how to remove and how to dispose of it properly. Pharmacists play a great role in the health society with their different responsibilities. In this review, we explain much more details of measures that should be taken with the pharmacists in Saudi Arabia. The following are types of pharmacies which have high risk exposure to the virus and certain precautions to be implemented to protect themselves and prevent health care transmission;

7.4. Community pharmacy

Community pharmacists are the health professionals most dealing with the public. They supply medicines for those with health-related problems, checking the pharmaceutical stocks (medicines, sterilizers and masks. . .etc). They also provide the patients at the time of dispensing their prescriptions with counselling. They inform the public, health professions and patients. Those pharmacists could consider as a link between the general public and health professionals in primary health care. Noticeably, the possibility of exposure of community pharmacist to nCOVID-19 exists, since they could interact with suspected patients; therefore, the first-line pharmacist should follow the precautions listed in (Table 3) to protect them as well.

7.5. Hospital pharmacy

Hospital pharmacists are responsible for managing the stocks of medication supply used in the hospital and are accountable for manufacturing, purchasing and quality testing for these medications. They collaborate as well with other health professionals in improving patients care and support through counselling and informing the optimal use of pharmaceutical medications. In the clinical services, dealing with nCOVID-19 cases, pharmacists working as a part of the multidisciplinary team of doctors, nurses and other health care professions to advise on the selection of appropriate medicine, dose and route of administrations and its possible

Table 5
Recommended preventive measures in the context of nCOVID-19 for pharmacists in different pharmacy workplace*

Type of Pharmacy	Type of activity	Type of PPE
Hospital pharmacy		
Clinical pharmacist	Sharing the care of the nCOVID-19 patient(s)	Medical mask Gown Gloves Eye protection (goggles or face shield)
Outpatient pharmacist	Preliminary screening not involving direct contact	The spatial distance of at least 1 Meter Medical mask No PPE required
Inpatient pharmacist	Any, not involving contact with the nCOVID-19 patient(s)	No PPE required
Patient counselling	Aerosol generating procedures (AGP) on the nCOVID-19 patient(s)	Respirator N95 or FFP2 Gown Gloves Eye protection Apron No PPE required
Drug Information	Any, not involving contact with the nCOVID-19 patient(s)	No PPE required
Community Pharmacy		
	Preliminary screening not involving direct contact	The spatial distance of at least 1 Meter Medical mask No PPE required

* Besides the appropriate PPE use, standard precautions including frequent hand and respiratory hygiene. Before and after PPE use, hand hygiene is mandatory. Discarding the PPE kit is necessary after each use. Rational use of personal protective equipment for coronavirus disease (nCOVID-19), WHO, 2020.

side effects. Due to the direct interaction of those pharmacists with infected patients, clinical pharmacists should follow special measures for their protection and safety purposes (Table 5).

7.6. Preventive role of the pharmacist

Pharmacist and the pharmacy workforce can play an essential role in reducing the transmission of novel nCOVID-19 virus. These precautions could take place by the following:

1-The pharmacist staff should hygiene their area, by cleaning and sterilize their working environment, equipment and instruments according to the guidelines listed in (Chinese Pharmaceutical Association, 12th February 2020).

2-Keep themselves updated about the recent findings in the disease current, how it is transmitted, and how to prevent it from further spreading.

3-Knowing how to access the MOH information sources regarding the nCOVID-19 virus strategies (including the closet healthcare centre for the SARS-CoV-2).

4-Full staff training is mandatory to deal with an emergency plan and workflow, including the accurate way of wearing the Personal protective equipment (PPE).

5-Educating the community, including individuals and families with suspected cases of nCOVID-19 or respiratory illness to seek treatment from healthcare facilities or by contacting the MOH hotline: 937 to get the appropriate advice.

6-Raising awareness regarding this disease by frequent and proper hand sterilizing and other standard precautions listed previously (under standard precautions I).

7-Information materials (leaflets, posters, electronic materials) should be provided for the community, including MOH guidelines

and any other relevant information for the appropriate way to protect people from nCOVID-19 infection. MOH developed a website and social media accounts where these materials and other resources can be accessed.

7.7. KSA government supports towards nCOVID-19

KSA ministries and higher official authorities took immediate and prompt action from the beginning of this pandemic for fighting against the deadly virus through a variety of actions. In the beginning, more than hundred billion riyals SR was provided by the KSA government to mitigate nCOVID-19 and to fight with this virus. Recently, the Saudi health ministry MoH received 7 billion SR funds, and 8 billion SR was provided earlier from the government (Alshammari et al., 2020). On 15th April, King Salman has ordered 47 billion SR for the MOH as additional fund to help against nCOVID-19. He further ordered to fund 50 billion SR for private sector companies to reimburse them (Alshammari et al., 2020). On April 26th, King Salman ordered the King Salman Humanitarian Aid and Relief Center (KSRelief) to sign contract with USA, China, South Korea and Switzerland to combat the nCOVID-19 (Alshammari et al., 2020).

These contracts have several different purposes, Chinese government planned to send 500 experts in different field to help with the testing and utilize them as consultants. In addition, approximately 14.5 million nCOVID-19 tests will be performed, covering about 40% of the people living in KSA making it the largest test capacity for nCOVID-19 worldwide. Also, establishing six regional laboratory all over the KSA to conduct 50,000 tests per day and mobile laboratory to conduct 10,000 tests per day (Alshammari et al., 2020).

8. Dose summer affects nCOVID-19 spreading's?

Because of the similarity in the symptoms between nCOVID-19, flu and common cold viruses, which includes fevers, coughing and sometimes severe lung infections, and because that common colds and flu are seasonal, which drop down in summer and spring. Many people expressed their hope that the new virus could decrease its spread during spring and summer, and accordingly, the number of infected cases will decrease. However, there is no scientific evidence yet since the virus is still new and early to approve that.

9. Effects on international travelling

If the traveller suffers from symptoms indicating an acute respiratory illness before or after travel, the travellers must seek medical attention and inform the travel history of their health care provider. WHO standards recommended methods to prevent many diseases by cleaning hands with alcohol or rubbing hands with soap and water, as well as healthy nutritional practices. Also, when sneezing or coughing, the nose and mouth should be covered with elbow or tissue and then throw the tissue away immediately, and hands should wash very well. Avoid close contact with anyone who suffers from a fever and cough, and any person who suffers from fever, cough and difficulty breathing should seek medical care early and report his previous travel record of those who provide him with medical care.

Advice to conduct an exit check at international airports and ports in the affected areas, with the aim of early detection of travellers with symptoms for further evaluation and treatment, thus preventing the export of the disease. Exit screening includes an examination of signs and symptoms (fever above 38 degrees, coughing), passengers with symptoms of respira-

tory infection advise to leave the affected areas and directing travellers with symptoms for further medical examination, followed by a test for nCoV-19, keeping confirmed cases under isolation and treatment. Encourage examination at local airports, railway stations and long-distance bus stations as necessary. Travellers with contact with confirmed cases or direct exposure to a possible source of infection should be placed under medical supervision throughout the incubation period up to 14 days

Public health authorities should reinforce collaboration with airlines operators for case management onboard aircraft and report any traveller who suffers from respiratory disease symptoms. Furthermore, The International Air Transport Association (IATA) guidance for cabin crew helping to manage suspected communicable disease on board an aircraft.

More than 12 million Muslims around the world perform Hajj and Umrah each year to the city of Mecca. The Kingdom of Saudi Arabia, as a precaution, has suspended international travel to the country and Mecca. The government called for temporary suspension; however, The ban also appears to include the Prophet's (P.B.U.H) Mosque in Medina.

This decision has disrupted many Muslims traveller who has already in the Kingdom, and many others who decide to perform Hajj end of July this year.

The Ministry of Foreign Affairs said that the Saudi government "temporarily suspends entry to the Kingdom for Umrah and visits to the Prophet's (P.B.U.H) Mosque".

The new precautions are based on the recommendations of the competent health authorities to implement the highest precautionary standards and take the necessary precautions to prevent the emergence and spread of the nCOVID-19 in the Kingdom <https://www.who.int/news-room/articles-detail/updated-who-advice-for-international-traffic-in-relation-to-the-outbreak-of-the-novel-coronavirus-2019-ncov-24-jan> (<https://www.who.int/news-room/articles-detail/updated-who-advice-for-international-traffic-in-relation-to-the-outbreak-of-the-novel-coronavirus-2019-ncov-24-jan>); <http://english.alarabiya.net/en/News/middle-east/2020/02/27/Saudi-Arabia-suspends-entry-for-Umrah-pilgrimage-due-to-coronavirus.html>).

10. Concluding remarks

This manuscript has discussed various elements regarding the nCOVID-19 infection and its correlation with other coronaviruses diseases, control, and the role of the different approaches in containing and preventing the spread of this disease. The Saudi governments imposed aggressive actions to control disease spreading. Additionally, forcing people to stay at home and by developing certain regulations on nCOVID-19 surveillance in healthcare and community settings through the Saudi CDC. Pharmacists as members in the health organizations and following the Saudi CDC preventive measures is mandatory to protect themselves and others. On the contrary, it should turn into a movement, having supporting organizations worldwide, for better control of emerging diseases, including nCOVID-19 as numbers of nearly contact patients increases day by day.

Conflict of interest

The authors declare they have no conflicts of interest.

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