

Characteristics of First Cases of Coronavirus Disease 2019 and the Effort to Prevent the Early Spread of COVID-19 in Saudi Arabia

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Purpose: To characterize the overall trends in early cases of COVID-19 and to identify the key points of the government effort to minimize the infection.

Patients and Methods: A retrospective review and data were retrieved through online sources and the Saudi Ministry of Health daily announcements that were available online. The data included the number of infections per day, and the gender, nationality, location, source of infection, incidence, rate of recovery, and the rate mortality of COVID-19 patients in Saudi Arabia between March 1 and March 16, 2020.

Results: The incidence of COVID-19 increased in the first two weeks in Saudi Arabia, from zero cases on March 1 to more than 15 cases per day on March 16, with a total of 133 cases. The majority of patients were males (54.9%), of Saudi descent (54.9%), and had travel as their source of infection (57.1%). Most of the cases were in Makkah (37.6%); however, there were increases in cases in all cities. Moreover, the Saudi government enacted several steps to minimize the spreading of infection. There was no statistical significance between source of infection with gender ($p = 0.323$). However, there was statistical significance between source of infection and nationality ($p < 0.001$).

Conclusion: The incidence of COVID-19 cases is expected to continue to increase. However, the efforts of the Saudi government are crucial in minimizing the spread of this infection.

Keywords: Saudi Arabia, COVID-19, prevention, SARS-CoV-2

Introduction

Saudi Arabia has experienced significant improvement in its healthcare service over the last 40 years, largely due to the country's economic status.¹ This improvement has prompted the government to establish a plan to customize healthcare products and to manufacture several of them locally, which will help healthcare services for its citizens, by 2030.² However, the recent global infectious outbreak of coronavirus disease 2019 (COVID-19) is providing challenges for healthcare services everywhere. In Saudi Arabia, the first case of COVID-19 was announced on March 2, 2020.³ The estimated number of cases at that time was 89,075 cases worldwide.³ After several cases were detected linked to clusters within Saudi Arabia, the Saudi government took several steps to minimize the spread of this disease. The aims of this article are to characterize the overall trends in early cases and to identify the key points of the government's effort to minimize the spread of infection.

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Patients and Methods

This is a repeated cross-sectional study in the Kingdom of Saudi Arabia. The ethical approval was released (# 31–04–2020) from The Research Ethics committee, Faculty of Dentistry, King Abdulaziz University, Saudi Arabia, and the Declaration of Helsinki was followed. Data were retrieved through online sources and the Saudi Ministry of Health daily announcements that were available online. Our small pilot database was created based on these limited and reliable sources. The data were gathered retrospectively, and included the number of infections per day, and the gender, nationality, location, and source of infection for each patient. We searched for the incidence, recovery, and mortality rates of COVID-19 patients in Saudi Arabia in the period between March 1 and March 16, 2020. We included all individuals that were announced as contributing to incidence, recovery, or mortality rates of COVID-19 in this period. The percentages of each variable were calculated. The statistical software used to calculate the percentages and create figures was Excel and SPSS. Chi square was used to determine if there was a significant difference between source of infection with gender and nationality. P value < 0.05 was considered statistically significant.

Results

The incidence of COVID-19 increased during those first two weeks in Saudi Arabia, as shown in Figure 1 and Table 1. The trend showed a significant increase in new

cases, from 0 on March 1 to more than 15 cases per day on March 16, with a total of 133 cases (Figure 1). The majority of those infected were males (54.9%), of Saudi descent (54.9%), and had travel as their source of infection (57.1%) (Table 1). Most of the cases were in Makkah (37.6%); however, there were increases in the number of cases in all cities (Figure 1). There was no statistical significance between source of infection with gender ($p = 0.323$). However, there is statistical significance between source of infection and nationality ($p < 0.001$).

Epidemiology of First Cases at Saudi Arabia

On March 2, 2020, the first confirmed case of COVID-19 was reported in Saudi Arabia, and was attributed to a Saudi patient returning from Iran via Bahrain (Table 2).³ The second case—attributed to a friend of the first patient who had also traveled via Bahrain—was reported on March 4. However, this patient did not disclose that he had visited Iran (Table 2).³ At the same time, in order to minimize the number of COVID-19 cases, Saudi Arabia announced a temporary ban of entry of its nationals and residents to Mecca for the Umrah pilgrimage, or to visit the Prophet's Mosque in Medina.⁴

One of Saudi Arabia's first confirmed cases spread the disease to his wife on March 5, thus leading to two more cases of COVID-19 attributed to travel. Continued travel

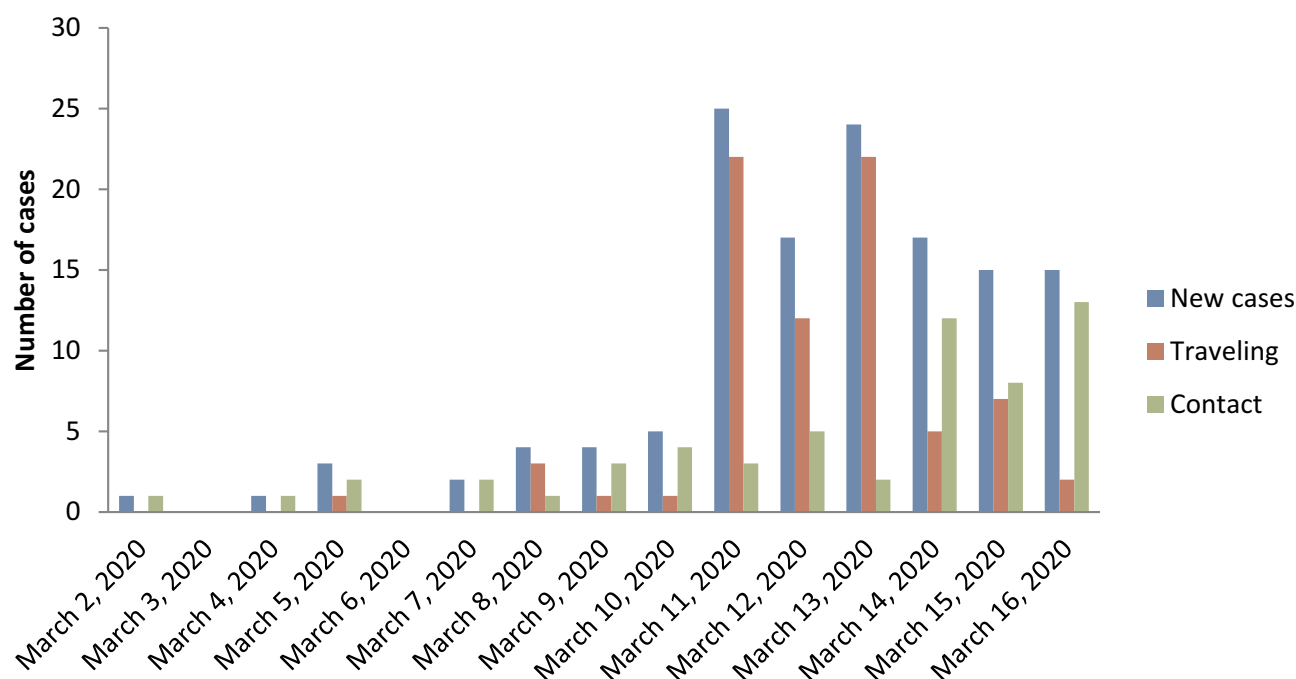


Figure 1 Incidence of COVID-19 cases in Saudi between March 2 and March 16, 2020.

Table I Demographic Characteristics of the Study Sample

| Variables | N(%) N=133 |
|---|---------------|
| Mean age | 50 |
| Gender | |
| Males | 73 (54.9) |
| Females | 60 (45.1) |
| Nationality | |
| Saudi | 73 (54.9) |
| Non Saudi | 60 (45.1) |
| Source of infection | |
| Contact | 57 (42.9) |
| Traveling | 76 (57.1) |
| Locations | |
| Makah | 50 (37.6) |
| Qatif | 34 (25.6) |
| Riyadh | 22 (16.5) |
| Jeddah | 10 (7.5) |
| Eastern | 8 (6.0) |
| Dhahran | 3 (2.3) |
| Jazan | 2 (1.5) |
| Al Ahsa | 2 (1.5) |
| Al Khobar | 1 (0.8) |
| Al Dammam | 1 (0.8) |
| Types of patients | |
| Adults (≥ 18 years) | 131 (98.50) |
| Children (<18 years) | 2 (1.5) |
| Number of recovered patients during the first 15 days | 6 (4.5) |

caused more cases by March 7;³ by March 8, contact with previously infected patients became an issue and ultimately caused the Saudi government to temporarily stop all transport in and out of Qatif on its eastern coast to help minimize the spread of infection.⁵ New cases caused by travel were documented on March 9 and 10, which led the Saudi government to impose an entry ban on people traveling from specific countries, and the Ministry of Education announced that all educational places such as schools and universities would be closed to control the spread of coronavirus.⁵

Another key point of infection was a non-Saudi traveling case on March 10, and one on March 11 who arrived in Saudi Arabia and subsequently caused a cluster of cases in the following days.³ They potentially caused infection through contact leading to an additional 21 cases (March 11), 12 cases (March 12), and 14 cases (March 13) from non-Saudi nationality.³ As a consequence, the Ministry of Sports closed all sports halls and centers, and Saudi Arabia expanded its travel

ban to and from the EU and 12 additional countries.^{6,7} Furthermore, the Ministry of Health stressed the importance of avoiding holding official and social events for more than 50 people, and promoted the sterilization and disinfection of Saudi airports and aircraft.⁷

The rate of cases experienced a significant increase by March 14, with a minimum 15 cases per day including travel and contact cases.³ The kingdom's government decided to take stronger steps to control the spread of the virus, such as suspending international flights, and closing of all stores, coffee shops, restaurants, and public places, with the exception of pharmacies and supermarkets.⁶ In addition, all governmental work was temporarily suspended, and workers were requested to stay at home for 16 days.⁶

Discussion

As of March 1, no cases had been detected in Saudi Arabia. However, the situation rapidly changed, with transmission in several cities later on.³ As of March 16, 2020, there were 133 cases reported across Saudi Arabia.^{3,8–13}

In our analysis of these early cases, we detected COVID-19 transmission in two broad perspectives: random cases among travelers from Iran and, to lesser extent, Iraq or from Egypt, and patients who were infected due to subsequent local contact and transmission.^{3,8–13} People coming back from epidemic areas were less likely to look for healthcare or to be tested when symptomatic; however delays in identifying the asymptomatic index cases of some travelers meant that locally acquired cases took longer to be detected and isolated when compared with symptomatic cases, which were more likely to be easier and faster to detect and isolate.¹⁴ Identifying index cases is a very important step in preventing and minimizing the subsequent infection transmission. For example, the index cases from Egypt led to the development of at least 21 more cases.³ Once these cases are determined and their contacts identified, the susceptible cases can be quarantined, which happened in Saudi Arabia directly after these initial cases were identified, and subsequently led to the quarantine of more than 600 cases.¹⁵

It requires considerable effort to track and quarantine locally acquired cases and their subsequent contacts. This effort requires a huge budget and, for this reason, countries have to be ready to prepare substantial public health funds during this phase. Moreover, the quick sharing of any information regarding cases or contacts worldwide, for example through the International Health Regulations

Table 2 Characteristics of Daily Cases of COVID-19 and Government Action

| Date | Number of Cases in Saudi | Number of Cases Worldwide | Gender | Nationality | Source of Infection | Government Action |
|-------------------|--------------------------|---------------------------|--|--|--|---|
| February 25, 2020 | | | | | | Advised against travel to Italy and Japan ⁸ |
| February 27, 2020 | | | | | | Suspended Umrah or visiting the Prophet's Mosque ⁴ |
| March 1, 2020 | | 86,940 | | | | 25 hospitals and 8,000 beds prepared to handle any cases. ⁴ Stopped all exports of coronavirus detection and prevention products ⁹ |
| March 2, 2020 | 1 ³ | 89,075 | 1 male | 1 Saudi | Travel through Iran/ Bahrain | Advised to postpone non-essential travel to Germany and France ¹⁰ |
| March 3, 2020 | | 90,948 | | | | Red Sea film festival postponed ¹¹ |
| March 4, 2020 | 1 ³ | 93,161 | 1 male | 1 Saudi | Travel through Iran/ Bahrain | Banned to perform Umrah or visit the Prophet's Mosque ⁴ |
| March 5, 2020 | 3 ³ | 95,421 | 2 males 1 female | 3 Saudi | 2 Travel through Iran/ Bahrain 1 contact | Reopened the two holy mosques after sterilization; ¹² temporary closure of the Great Mosque for sterilization purposes; ¹² Riyadh International book fair, postponed; ⁷ Saudi Arabian Int'l Festival for Arab Horse postponed ⁷ |
| March 6, 2020 | | 98,385 | | | | Citizens who had traveled to Iran had to declare by end of day March 7, or else face legal action ¹³ |
| March 7, 2020 | 2 ³ | 102,179 | 2 females | 2 Saudi | 1 Travel through Iran/ Bahrain 1 Travel through Iraq/UAE | The land crossing with the UAE, Kuwait and Bahrain limited to commercial trucks only. ¹³ Any traveler wishing to come is required to present a PCR lab test certificate proving that the individual is coronavirus-free; ¹³ suspended public attendance of sports competitions ⁴ |
| March 8, 2020 | 4 ³ | 109,991 | 3 females 1 male | 4 Saudi | 3 Contact 1 Travel through Iran/UAE | Suspended all transport in and out of Qatif ⁵ |
| March 9, 2020 | 4 ³ | 114,381 | 2 females 2 males | 1 Saudi 3 non (2Bahrain 1 USA) | 1 Contact 2 Travel through Iraq 1 Travel from USA through Philippines and Italy | Suspended travelling to the UAE, Kuwait, Bahrain, Lebanon, Syria, Egypt, Iraq, Italy and South Korea. ⁵ Closed schools and universities. ⁵ Provided \$10 million to WHO in fight against COVID-19 ⁵ |
| March 10, 2020 | 5 ³ | 118,948 | 3 males 2 females | 4 Saudi 1 non (Egypt) | 3 Travel through Iran/Iraq 1 Travel through Egypt 1 Contact | Delivered New Batch of Medical Aid to China ⁷ |
| March 11, 2020 | 25 ³ | 134,576 | 2 female 2 male 21 non specified | 3 Saudi 22 non (Egypt) | 1 kid 12 years 2 Travel through Iraq 22 Contact | Precautionary measures applied on all sports halls and centers ⁷ |
| March 12, 2020 | 17 ³ | 145,483 | 2 males 4 females 11 non specified | 5 Saudi 12 non (11 Egypt 1 non specified 1 Lebanon) | 12 Contact 2 Travel through Iraq 1 Iran/Oman 1 Turkey/Lebanon 1 Turkey/Portugal | Expanded travel ban to and from the EU, and 12 more countries. ⁶ Avoided holding official and social events for more than 50 people ⁷ |
| March 13, 2020 | 24 ³ | | 1 female 9 males 14 non specified | 9 Saudi 15 non (14 Egypt 1 Bangladesh) | 22 Contact 2 Travel through France or Italy | Sterilization and disinfection of Saudi Airports and aircraft ⁷ |

(Continued)

Table 2 (Continued).

| Date | Number of Cases in Saudi | Number of Cases Worldwide | Gender | Nationality | Source of Infection | Government Action |
|----------------|--------------------------|---------------------------|-----------------------|--|--|--|
| March 14, 2020 | 17 ³ | 156,653 | 1 female 16 males | 15 Saudi 2 non (1 USA 1 France) | 5 Contact 12 Travel 3 Iran 1 Italy 3 UK 5 France | Closed all parks, entertainment zones in malls, and sterilizing and ventilating all restaurants. ⁶ Suspend all social events, including funerals and weddings. ⁶ |
| March 15, 2020 | 15 ³ | 169,593 | 3 females 12 males | 12 Saudi 3 non (Spain, Philippine, Indonesia) | 7 Contact 8 Travel (2 Spain, 2 UK, Egypt, Iran, Iraq, Switzerland) | Suspended international flights for two weeks. ⁷ Closed all shopping malls, restaurants, coffee shops, and public parks with the exception of pharmacies and supermarkets ⁶ |
| March 16, 2020 | 15 ³ | 182,490 | 2 females 13 males | 13 Saudi 1 Afghanistan 1 Egypt | 2 Contact 13 Travel 2 Morocco 1 Spain 1 UK 1 France 2 Switzerland 2 Jordan 1 US 1 non-specific 1 Afghanistan 1 Turkey | Suspended government work and ordered public-sector workers to stay at home for 16 days ⁶ |

(IHR) mechanism, is crucial to minimize any possible global spread of infection.¹⁴

Most of the early introduced cases in Saudi Arabia had a history of travel to Iran. This was consistent with the epidemiological pattern in the world, which has seen hot-spot areas of infection in South Korea, Iran, and Italy, in addition to mainland China, and supported the recommendation for testing suspected cases with travel history to Iran and other areas with a high risk of ongoing community transmission. Testing of potential and suspected cases based on geographic risk was required to ensure early detection of COVID-19 cases, which Saudi Arabia has conducted since February 27, 2020. Moreover, additional supplemental methods are still needed, such as comprehensive testing of any patients with severe acute respiratory infections in hospitals regardless of travel history, based on the WHO case definition recommendation which was updated on February 27, 2020.¹⁶

With increasing numbers of COVID-19 cases in Saudi Arabia, we need more data, surveillance, evidence, and investigations from countries in Asia or Europe suffering more widespread transmission, particularly in relation to disease transmission, spectrum, prevention, and management, which can help us to improve and prepare our healthcare services better to face this disease and build upon our surveillance and investigation systems.¹⁷ Understanding the disease's infection pattern and severity

in the community is very important in order to help plan for the impact of the disease on the healthcare service, as well as how healthcare professionals should prepare their facilities to manage the cases. It also helps to understand how to manage the spread of the disease among the wider population, and to apply more restrictions in order to minimize the spread of infection as much as possible. Hospital-based surveillance, which is a passive surveillance, could help estimate the case incidence rate and identify the risk factors of severe cases and deaths.^{18–25}

These are preliminary results of COVID-19 as based on the first reported cases of the disease in Saudi Arabia. To our knowledge, this is the first report and all the results contained in this article should be interpreted with caution. However, there are multiple limitations due to small sample size and limited information for some variables. Moreover, data were collected in a retrospective pattern, thus contributing to an inability to correlate it with disease signs and symptoms, prescribed medicine, or additional factors. In addition, we did not assess the long-term trend, recovery, or mortality rates due to COVID-19 in Saudi Arabia. Additional research is needed to build knowledge on the disease pattern, infectious and incubation periods, modes of transmission, attack rate, reproductive numbers, evaluation of effectiveness of prevention, and case management methods. Moreover, the data for this kind of epidemiologic investigation need to be

acquired from primary resources, which are not easily accessible. Therefore, the various data resources we used could be potentially unreliable. However, we believe that it can help to recognize the prevention effort which was done nationally with the new outbreak, which helped to a certain degree to prevent the widespread of infection and the secondary outbreak so far.

Detection Methods, Isolation and Quarantine in Saudi Arabia

Saudi Arabia required all laboratories to use a nucleic acid-based detection system, and testing using at least one confirmatory target in addition to the screening targets.²⁶ In addition, Saudi Arabia is preventing all non-Saudi arriving who are above 8 years old from entering until they provide a negative PCR test certificate issued from a verified source within 72 hours from the time the test is undertaken until departing to Saudi. Moreover, all travelers must be registered in TATAMAN and TAWAKKALNA applications that are designed for following up and monitoring people during periods of quarantine and isolation. All travelers must undergo self-quarantine if they have no symptoms upon arrival, or isolate at home or in a facility depending on the case condition if a traveler develops symptoms of COVID-19 upon arrival.²⁶

Conclusion

The study showed an increase in the trend of COVID-19 in early March, and it is expected to continue increasing. However, the Saudi government enacted several efforts to minimize the spread of this infection. Therefore, these data can be used to create a national strategy for any infectious disease in the future regarding prevention, screening, and therapy.

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Disclosure

The authors report no conflicts of interest in this work.

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