MERS-CoV in the COVID-19 era: update from Saudi Arabia, 2019–2020

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Abstract

Background: The prevalence of Middle East respiratory syndrome coronavirus (MERS-CoV) infection during the period of coronavirus disease 2019 (COVID-19) remains uncertain.

Aims: This study aimed to provide an update on the epidemiology of MERS-CoV in Saudi Arabia from January 2019 to October 2020.

Methods: Data on all laboratory-confirmed cases of MERS-CoV infection in Saudi Arabia from January 2019 to 20 October 2020 were retrieved from the Health Electronic Surveillance Network of the Ministry of Health of Saudi Arabia. Data collected were: demographic characteristics of cases, clinical course of the infection, related mortality and association with exposure to confirmed cases or camels.

Results: In total, 299 cases of MERS-CoV infection were reported in the study period. The mean age of cases was 52.4 years. Most of the cases were males (78.9%) and had comorbidities (72.7%), and 11.9% of cases were health care providers. Of the 299 cases, 83 (27.7%) died. Older age and having comorbidities were associated with higher mortality. Exposure to camels was associated with lower mortality. Health care providers also had a lower mortality rate than non-health care providers. Compared with COVID-19, MERS-CoV infection still has a higher mortality rate but with a more predictable pattern and an anticipated deterioration.

Conclusion: MERS-CoV infection remains a public health concern. The percentage of cases that were health care providers (11.9%) is lower than previously reported (19.1–25.0%), possibly due to the various preventive measures put in place to control COVID-19.

Keywords: Middle East respiratory syndrome coronavirus, COVID-19, health personnel, public health, Saudi Arabia

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Introduction

Middle East respiratory syndrome coronavirus (MERS-CoV) was first reported in Saudi Arabia in 2012 *(1)*. The outbreak of this infection progressed to an epidemic with more than 2494 cases reported worldwide by November 2019, of which 2102 cases were from Saudi Arabia *(2)*. Several attempts have been made to understand the behaviour of this coronavirus strain *(3,4)*. It tends to affect elderly people and those with comorbidities, and several outbreaks have occurred in health care settings *(3,5)*. Nonetheless, the emergence of a new coronavirus in 2019 (acute respiratory syndrome coronavirus 2 (SARS-CoV-2)) uncovered the need for repeated in-depth sociodemographic analysis of patients who are infected to uncover any change in the behaviour of the strain. The ongoing COVID-19 pandemic prompts another look at how MERS-CoV survived and whether such outbreaks should be foreseen.

Epidemiological data on MERS-CoV have been reported until 2019. In this study, we aimed to provide an update on the epidemiology of MERS-CoV in Saudi Arabia, from January 2019 to October 2020. We also aimed to investigate the behaviour of MERS-CoV during the COVID-19 pandemic, to understand the difference between MERS-CoV and COVID-19.

Methods

We retrieved data on all laboratory-confirmed cases of MERS-CoV in Saudi Arabia from January 2019 to 20 October 2020 from the Health Electronic Surveillance Network of the Ministry of Health of Saudi Arabia. We collected data on: demographic characteristics of cases, clinical course of the infection, related mortality and association with exposure to confirmed cases or camels. We followed the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for reporting observational studies *(6)*.

This study was reviewed by the King Fahd Medical City research committee and because it did not involve direct patient contact and data were anonymised, the committee decided it did not require institutional review board approval.

Results

Demographic characteristics

In total, 299 cases of MERS-CoV infection were reported from January 2019 to October 20, 2020. The mean age of the cases was 52.4 (standard deviation (SD) 16.56) years. Most cases were males (78.9%) and had comorbidities (72.7%), and 11.9% of cases were health care providers. The demographic details of the cases are given in Table 1.

Risk and exposure

Only about a quarter of the cases (26.8%) had been exposed to a confirmed case; however, data were lacking for 16.3%. As regards history of exposure to camels, 36.1% of cases had been exposed, although data were missing for 24.4% (Table 2). There was no documentation of other possible risk factors or exposures.

Clinical course

The mean time from onset of symptoms to hospital admission was 3.76 (SD 4.66) days. No statistically significant differences were found between time to hospital admission and age (P = 0.348), presence of comorbidities (P = 0.394) or history of exposure to camels (P = 0.661).

Mortality

In total, 83 cases (27.7%) died. Mortality had a linear relationship with age, as shown in Table 3. We used the continuity correction test to compare the frequency of death in cases exposed to camels and those not exposed, and we found a significant association (χ^2_1 = 5.95, P = 0.015). Patients who had been exposed to camels were significantly less likely to die (23.6%) than patients without such exposure (40.3%): odds ratio (OR) = 0.58, 95% confidence interval (CI): 0.38–0.97. Furthermore, we used the test to compare the frequency of death among health care providers compared with non-health care providers, and we also found a significant association (χ^2_1 = 8.38, P = 0.004). Health care providers had a lower mortality rate (6.7%) than non-health care providers (34.7%); OR = 0.19, 95% CI: 0.05–0.74.

We found no statistically significant association between the presence of comorbidities and mortality (χ^2_1 = 2.6, P = 0.107). However, cases with comorbidities (35.1%) had a greater odds of dying than those without comorbidities (23.1%); OR = 1.52, 95% CI: 0.93–2.47), but this was not statistically significant.

Table 1 Demographic characteristics of cases of MERS-CoV infection

Variable	MERS-CoV cases No. (%)
Age, in years (n = 251)	
< 15	0 (0.0)
15–24	6 (2.4)
25–34	34 (13.5)
35–44	50 (19.9)
45–59	63 (25.1)
≥ 60	98 (39.0)
Sex (n = 299)	
Male	236 (78.9)
Female	63 (21.1)
Comorbidities[a] (n = 242)	
Yes	176 (72.7)
No	66 (27.3)
Health care provider (n = 252)	
Yes	30 (11.9)
No	222 (88.1)

MERS-CoV= Middle East respiratory syndrome coronavirus.
[a]Diabetes mellitus, hypertension, renal disease, asthma/chronic obstructive pulmonary diseases, cardiac comorbidities and/or history of cancer.

Table 2 Cases of MERS-CoV infection, by exposure to confirmed MERS cases and camels, Saudi Arabia, 2019–2020

Exposure:	MERS-CoV cases (n = 299) No. (%)
To confirmed MERS-CoV case	
Yes	80 (26.8)
No	170 (56.9)
Undocumented	49 (16.4)
To camels	
Yes	91 (30.4)
No	135 (45.2)
Undocumented	73 (24.4)

MERS-CoV= Middle East respiratory syndrome coronavirus.

Discussion

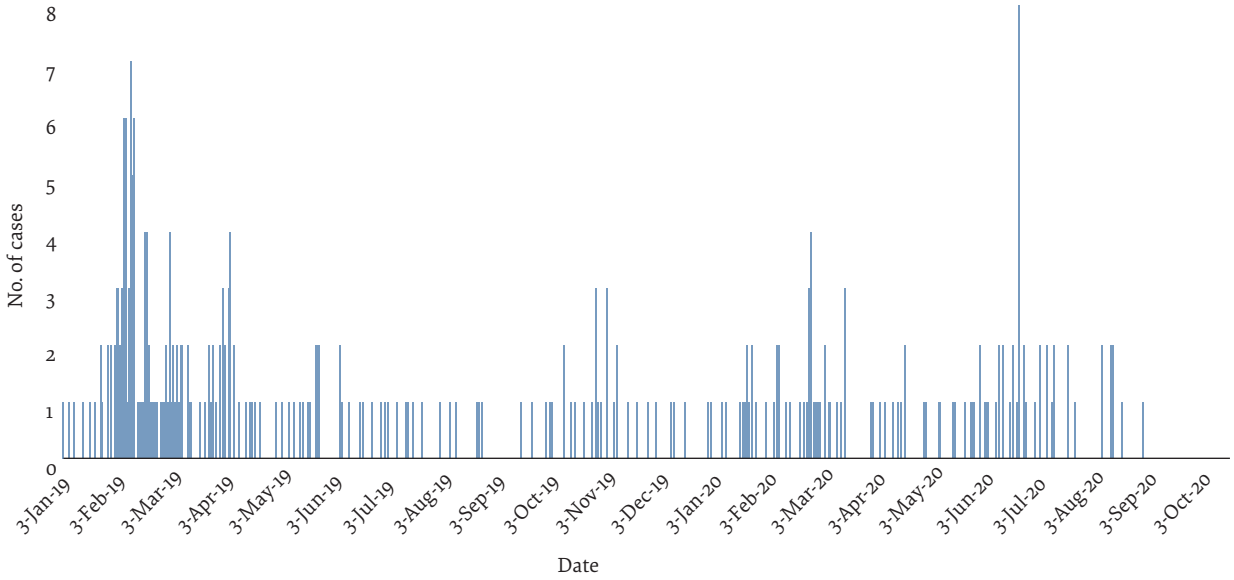
Our analysis revealed an additional 100 confirmed cases of MERS-CoV infection to the documented 199 cases reported by the World Health Organization (WHO) until November 2019. The positive cases in Saudi Arabia from January 2019 to October 20 2020 are shown in Figure 1. In agreement with local and worldwide reports, this infection is still more common in older groups, with a mean age of 52.4 years. In our study, it was more common in males, which is similar to previously reported cases

Table 3 Deaths from MERS-CoV infection, by age group, Saudi Arabia, 2019–2020

Age group (years)	Deaths (n = 78) No. (%)
< 15	0 (0.0)
15–24	1 (1.3)
25–34	3 (3.8)
35–44	10 (12.8)
45–59	21 (26.9)
≥ 60	43 (55.1)

MERS-CoV= Middle East respiratory syndrome coronavirus.
P = 0.015 by linear-by-linear association.
Note= Five of the people who died did not have their age documented.

Figure 1 Total number of reported cases of Middle East respiratory syndrome coronavirus infection, Saudi Arabia, January 2019 to October 2020



(2,7–9). Comorbidities were also a risk factor for infection in our analysis as in previous studies *(2,7–9)*.

The mortality rate associated with MERS-CoV has not declined significantly. In our study, 27.7% of cases died, which is less than the previously reported rate of 31.8 % in the same setting *(2)*. Similarly, the mortality rate was also comparable to the mortality rate in an aggregated analysis of cases from Lebanon, Malaysia, Oman, Qatar, Saudi Arabia and United Arab Emirates between 2017 and 2018, which was 30.5% *(9)*.

The risk of death was associated with older age and the presence of comorbidities. The mortality rate in patients with comorbidities, in particular, was 1.52 times higher than those without comorbidities, although the level of significance barely exceeded 0.05. Higher mortality was observed in cases older than 50 years, particularly in cases aged 50–59 years for primary cases (acquired from animals) and 70–79 years for secondary cases (acquired from another infected human) *(2)*. Therefore, older age groups and people with comorbidities should be targeted with early identification and continuous monitoring for possible deterioration.

Identifying the source of infection and the associated mode of transmission is important to develop infection control measures and eradication strategies, if possible. With MERS-CoV infection, dromedaries are still the main source of infection, although human to human transmission might also occur. In our study, 36.1% of cases of MERS-CoV infection had been exposed to camels. A study in 2014 reported a similar rate of exposure to dromedaries *(8)*. The fact that exposure of MERS-CoV cases to camels is similar in 2014 and 2020 suggests a persistence of the virus in this reservoir.

Nevertheless, exposure to camels was associated with lower odds of death. This finding suggests the development of a more virulent strain in human-to-human transmission than in animal-to-human transmission. Virus behavioural change may explain such findings, whether due to genetic plasticity and/or to alteration in host tropism *(10)*. In support of this explanation, a large number of camels have been found to have pre-existing antibodies to MERS-CoV in Saudi Arabia, which contributes to a declining virulence of the primary zoonotic strain *(11)*. Further studies are warranted to investigate this assumption.

Human-to-human transmissibility is still considerable, as evidenced by the number of infections acquired by health care providers. We found that 11.9 % of cases were health care providers. This figure is less than the previously reported figure of 19.1% to 25.0% before November 2019 *(2,7)*. The decline in infection rate among health care providers could indicate better adherence to infection control measures recently because of the COVID-19 pandemic.

MERS-CoV infection has a higher mortality rate than COVID-19, which has a reported mortality rate of 0.85% *(12)*. Furthermore, the clinical course associated with MERS-CoV infection has a predictable pattern with a predicted deterioration. For instance, we found no significant difference in the time from the onset of symptoms to hospital admission among cases that survived and those that died. It highlights a significant difference from the new coronavirus causing COVID-19, where sudden deterioration is one of its characteristics.

Our analysis has some limitations. First, data on exposure to camels were missing in 24.4% of the cases. Second, a further analysis is needed to study the mortality associated with different the comorbidities separately.

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Competing interests: None declared.

Le coronavirus du syndrome respiratoire du Moyen-Orient à l'ère de la COVID-19 : le point sur la situation en Arabie saoudite en 2019-2020

Résumé

Contexte : La prévalence de l'infection par le coronavirus du syndrome respiratoire du Moyen-Orient (MERS-CoV) pendant la pandémie de maladie à coronavirus 2019 (COVID-19) reste incertaine.

Objectifs : La présente étude visait à faire le point sur l'épidémiologie du MERS-CoV en Arabie saoudite entre janvier 2019 et octobre 2020.

Méthodes : Les données sur tous les cas d'infection par le MERS-CoV en Arabie saoudite, confirmés en laboratoire, entre janvier 2019 et le 20 octobre 2020 ont été extraites du réseau de surveillance électronique sanitaire du ministère saoudien de la Santé. Les données recueillies étaient les suivantes : caractéristiques démographiques des cas, évolution clinique de l'infection, mortalité associée et lien avec une exposition à des cas confirmés ou à des chameaux.

Résultats : Au total, 299 cas d'infection par le MERS-CoV ont été rapportés pendant la période de l'étude. L'âge moyen des personnes concernées était de 52,4 ans. La plupart des cas étaient de sexe masculin (78,9 %) et présentaient des comorbidités (72,7 %) ; 11,9 % des cas étaient des prestataires de soins de santé. Sur les 299 cas, 83 (27,7 %) sont décédés. Un âge avancé et la présence de comorbidités étaient des facteurs associés à une mortalité plus élevée. En revanche, l'exposition à des chameaux était corrélée à une moindre mortalité. Le taux de mortalité des prestataires de soins de santé était également inférieur à celui du reste des sujets. Par rapport à la COVID-19, l'infection par le MERS-CoV présente toujours un taux de mortalité plus élevé, mais affiche un schéma plus prévisible et un processus de détérioration de l'état anticipé.

Conclusion : L'infection par le MERS-CoV demeure un problème de santé publique. Le pourcentage des cas correspondant à des prestataires de soins de santé (11,9 %) est inférieur aux valeurs rapportées précédemment (19,1-25,0 %), peut-être grâce aux différentes mesures de prévention mises en place pour lutter contre la COVID-19.

فيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية في حقبة كوفيد-19 : تحديث من المملكة العربية السعودية، 2019–2020

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الخلاصة

الخلفية: ما زال معدل انتشار العدوى بفيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية خلال حقبة مرض فيروس كورونا 2019 (كوفيد-19) غير مؤكد.

الأهداف: هدفت هذه الدراسة إلى تقديم أحدث المعلومات عن الخصائص الوبائية لفيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية في المملكة العربية السعودية في الفترة من يناير / كانون الثاني 2019 وحتى أكتوبر/ تشرين الأول 2020.

طُرق البحث: جُمعت بيانات جميع الحالات المؤكدة مختبريًا لعدوى فيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية في المملكة العربية السعودية من يناير / كانون الثاني 2019 وحتى أكتوبر/ تشرين الأول 2020 من نظام "حصن" الإلكتروني التابع لوزارة الصحة في المملكة العربية السعودية. وتمثلت البيانات التي جُمعت في: الخصائص السكانية للحالات، والمسار السريري للعدوى، والوفيات ذات الصلة وارتباطها بالتعرض للحالات المؤكدة أو الإبل.

النتائج: إجمالًا، أُبلغ بوجود 299 حالة عدوى بفيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية أثناء فترة الدراسة. وكان متوسط عمر الحالات 52.4 عامًا. وكانت معظم الحالات من الذكور (78.9٪)، وكانت لديهم اعتلالات مصاحبة (72.7٪)، فيما كان 11.9٪ من الحالات من مقدمي الرعاية الصحية. ومن بين 299 حالة تُوفِّيت 83 (27.7٪). وارتبط التقدم في العمر ووجود اعتلالات مصاحبة بارتفاع معدل الوفيات. وارتبط التعرض للإبل بانخفاض معدل الوفيات. كما كان معدل الوفيات في صفوف مقدمي الرعاية الصحية أقل منه في صفوف غير مقدمي الرعاية الصحية. وبالمقارنة مع كوفيد-19، لا يزال معدل الوفيات الناجمة عن عدوى فيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية أكثر ارتفاعًا، ولكنه يسير بنمط أكثر قابلية للتنبؤ به وبتدهور أكثر توقعًا.

الاستنتاجات: لا تزال عدوى فيروس كورونا المسبب لمتلازمة الشرق الأوسط التنفسية تسبب قلقًا صحيًا عامًا. وتقل نسبة الحالات التي كانت في صفوف مقدمي خدمات الرعاية الصحية (11.9٪) عما سبق التبليغ به (19.1–25.0٪)، وربما يعود ذلك إلى مختلف التدابير الوقائية التي اتُّخذت لمكافحة كوفيد-19.

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