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Knowledge and attitude towards the Middle East respiratory syndrome coronavirus among healthcare personnel in the southern region of Saudi Arabia

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ABSTRACT

Introduction: Middle East respiratory syndrome coronavirus (MERS-CoV) belongs to the family Coronaviridae, and is named for the crown-like spikes on its surface. The clinical presentation of MERS-CoV infection ranges from asymptomatic to very severe disease, and the classical presentation includes fever, cough chills, sore throat, myalgia, and arthralgia.
Methods: A cross-sectional study of 339 healthcare personnel was conducted over an 8-month period in the Aseer region of Saudi Arabia using a structured survey that included demographic information and questions testing participant's knowledge.
Results: Approximately two-thirds of the respondents properly identified the causative agent of MERS-CoV as an RNA virus (66.4%, n = 225) that is enveloped (68.1%, n = 231). On the other hand, few respondents identified the proper number of strains or the genus (16.5% and 17.4%, respectively). More than half of the study sample identified the disease as zoonotic (57.2%, n = 194). Similarly, 89.1% (n = 302) identified that camels and bats are prone to infection with coronaviruses. Only 23.9% (n = 81) properly identified March through May as the season with the highest transmission rate. There was a massive lack of adequate knowledge regarding prevalence of antibodies. Only 18.3% (n = 62) of respondents identified PCR as the proper diagnostic confirmatory test for MERS-CoV infection. Regarding MERS-CoV clinical features, 76.4% (n = 259) recognized the presence of sub-clinical infection, 64.7% (n = 218) indicated that cases should be immediately isolated, and 46.9% (n = 159) identified the main cause of mortality as respiratory failure.
Conclusions: There is limited microbiological and virological knowledge of MERS-CoV infection among healthcare personnel in the southern region of Saudi Arabia, although the clinical aspects are known.

Introduction

The Middle East respiratory syndrome coronavirus (MERS-CoV) belongs to the family Coronaviridae. Most individuals are infected by a coronavirus at some time in their lifespan. Human coronaviruses usually cause mild-to-moderate upper respiratory tract illness.

SARS-CoV and MERS-CoV are zoonotic diseases which can infect both humans and animals, including camels and bats [1].

The first case of MERS-CoV was retrospectively reported at a hospital in Jordan. Subsequently, the first publicly reported case was from Jeddah in the Kingdom of Saudi Arabia. Thereafter, from September 2012 to March 31, 2017, around 1917 cases (684 deaths) of Middle East respiratory syndrome coronavirus (MERS-CoV) were reported to the World Health Organization [2,3]. MERS-CoV is endemic in six countries in the Middle East: Saudi Arabia, United Arab Emirates, Qatar, Jordan, Oman, and Kuwait. A few travel-

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related cases have been identified in Tunisia, the United Kingdom, France, Germany, and Italy [4].

In humans, the exact source and mode of transmission of MERS-CoV is undefined. MERS-CoV has never been isolated from bats and it is uncertain if there has been direct or indirect transmission from bats to humans. Many studies have shown a direct correlation of contact with camels and MERS-CoV infection, including exposure from ingesting unpasteurized camel milk [5–7].

MERS-CoV spreads through contact with respiratory secretions from coughing and sneezing and may also be transmitted through close personal contact, such as touching or shaking hands [8,9].

Clinical presentation of MERS-CoV infection ranges from asymptomatic to very severe disease; The patient may also complain of shortness of breath that may progress to pneumonia, often requiring ventilator support. Around one third of all patients report vomiting, diarrhea, and other gastrointestinal symptoms [8,10,11].

PCR is the best confirmatory test for MERS-CoV; however, a serology test can be used for screening. In a German hospital, contacts of a treated case were screened with two immunofluorescence assays to detect antibodies to MERS-CoV, along with a serum neutralization test; result showed good sensitivity and specificity [12].

Regarding management in uncomplicated case, it is essential to isolate the patient (standard, contact, and droplet precautions) and for critically ill patients, airborne precautions are recommended in addition to the above precautions because of the high likelihood of requiring aerosol-generating procedures [13].

The purpose of this study was to assess the knowledge and attitude towards MERS-CoV among healthcare personnel in the southern region of Saudi Arabia.

Materials and methods

This study was a cross sectional study conducted over an 8-month period (August 2016 through March 2017) that surveyed healthcare personnel working in tertiary and primary care centers in Ahba, Saudi Arabia (majority from the central hospital 296 and 43 from the regional primary health care centers). Using random sampling methods, 339 health personnel were selected to participate in the study. Inclusion criterion was: any healthcare personnel with at least 6 months experience. All healthcare workers, including physicians, pharmacists, nurses, and laboratory technicians, were considered eligible to participate in this study. Respondents were excluded if they were a student or failed to complete the entire questionnaire.

This study was approved by the Ethical Committee of King Khalid University and Aseer Central Hospital (2016-06-05). Informed consent was obtained, and the right to withdraw from the study at any time was also conferred.

Study tools

Respondents completed a multiple-choice questionnaire composed of demographic information (e.g., sex, age, work experience), and questions testing the participant's knowledge about the morphology, transmission, and clinical aspects of MERS-CoV, and sources of information.

Results

The study sample included 339 healthcare personnel. A majority of the study sample was female (n = 235, 69.3%). Most respondents had less than 10 years of work experience (n = 193, 56.9%), and were working at Aseer Central Hospital (n = 296, 87.3%). More than half of respondents were between 26- to 36-years-old (n = 179, 52.8%). All demographic data are presented in Table 1.

Table 1
Demographic characteristics of survey respondents.

Descriptive data Characteristic	Healthcare workers	
	N	%
Gender		
Male	104	30.7%
Female	235	69.3%
Age		
18–25	77	22.7%
26–35	179	52.8%
36–45	46	13.7%
46–55	23	6.8%
+56	14	4.0%
Profession		
Physician	94	27.7%
Nurse	197	58.1%
Other	48	14.2%
Work experience		
Interns	60	17.7%
Less than 10 years	193	56.9%
10–20 years	67	19.8%
20–30 years	19	5.6%

Respondent knowledge of coronaviruses

Regarding the general virology of MERS-CoV, two-thirds of the survey respondents properly identified the causative agent as an RNA virus (66.4%, n = 225) and enveloped (68.1%, n = 231). Few respondents identified the proper number of strains or the genus (16.5% and 17.4%, respectively).

More than half of the study sample correctly identified the disease as zoonotic (57.2%, n = 194). Similarly, 89.1% (n = 302) identified that camels and bats are prone to infection with coronaviruses. On the other hand, only 23.9% (n = 81) properly identified the March–May period as the season of greatest disease transmission.

Results showed a massive lack of adequate knowledge regarding prevalence of MERS-CoV among abattoir workers (5.0%, n = 17), the general population (19.5%, n = 66), and camel owners and shepherds (31.6%, n = 107). Only 18.3% (n = 62) identified PCR as the proper diagnostic confirmatory test for MERS-CoV infection. An estimated 76.4% (n = 259) recognized the presence of sub-clinical infection, 64.7% (n = 218) indicated that cases of MERS-CoV should be immediately isolated, and 46.9% (n = 159) identified the main cause of mortality as respiratory failure (Table 2).

Discussion

Middle-East respiratory syndrome (MERS) was first reported in the Kingdom of Saudi Arabia (KSA) in September 2012 and found to be caused by the novel beta coronavirus MERS-CoV [14]. Since then, more than 1400 cases have been reported from KSA, with a mortality rate of about 40%. We conducted this study to assess knowledge and attitude towards MERS-CoV among healthcare workers in Saudi Arabia. It is the first study conducted in the southern region of KSA, and the second in KSA overall; the first study, by Khan et al., was conducted over a 2-month period in two multispecialty hospitals of the Al-Qassim region in 2014. They found that the respondents had good knowledge of and positive attitude towards MERS-CoV. Specifically, healthcare workers were less educated about the management and consequences of MERS-CoV, while a majority were well aware of hallmark symptoms, precautionary measures, and hygiene issues [15].

In our study, respondents had good knowledge about virus type and structure, the zoonotic nature of the disease, and the main

Table 2
Respondent knowledge of coronavirus virology and epidemiology (n = 339).

Knowledge item	Number	Percent
It is an RNA virus	225	66.4
It is an enveloped virus	231	68.1
There are 6 strains of the coronaviruses	56	16.5
MERS-CoV belongs to gamma genus of corona viruses	59	17.4
MERS-CoV is a zoonotic disease	194	57.2
MERS-CoV is transmitted by close contact	80	23.6
Camels and bats can be infected with MERS-CoV	302	89.1
March–May is season of maximum transmission	81	23.9
Main symptoms are respiratory and gastrointestinal	327	96.7
Occurrence of subclinical infection	259	76.4
The highest prevalence of anti MERS-CoVIgG is found among abattoir workers	17	5.0
The prevalence of anti MERS-CoV IgG among general population is 0.2%	66	19.5
The prevalence of anti MERS-CoV IgG among camel owners and shepherds is 2.3%	107	31.6
The main cause of mortality is respiratory failure	159	46.9
Cases should be immediately isolated	218	64.7
The confirmatory diagnostic test is PCR	62	18.3
There is no available vaccine	261	77.0
Management is supportive	201	59.3

symptoms. Only one-quarter of the respondents recognized that the virus can be transmitted by close contact with infected persons, which carry a little concern in infection transmission and prevention. Two-thirds knew about the lack of vaccination and that case management is mostly supportive care.

From this study, we found that healthcare workers in the southern region of Saudi Arabia had moderate knowledge of MERS-CoV. This adequate knowledge may be attributable to the educational campaign conducted by the ministry of health through the command and control center, which is dedicated to MERS-CoV infection queries from healthcare workers and all other practitioners.

Limitations of the present study include the use of a questionnaire to evaluate healthcare personnel knowledge. In addition, respondents may have experienced limited exposure to patients with MERS-CoV since the number of confirmed cases of MERS-CoV in the region is low.

Conclusions

Knowledge and attitude towards MERS-CoV infection among healthcare personnel in the southern region of Saudi Arabia were limited for microbiological and virological information, but adequate for clinical aspects. These results show that additional education on MERS-CoV may be needed for healthcare personnel in the southern region of Saudi Arabia.

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Competing interests

None declared.

Ethical approval

This study was approved by the Ethical Committee of King Khalid University and Aseer Central Hospital (2016-06-05).

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