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Original Article

Middle East Respiratory Syndrome (MERS): Awareness among Future Health Care Providers of United Arab Emirates

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ABSTRACT

Introduction: Middle East respiratory syndrome (MERS) has become a significant global public health concern. Recent outbreaks of this syndrome have occurred in several countries, with the major outbreaks in Saudi Arabia, Korea and United Arab Emirates (UAE). The present study assessed the awareness of students of a Medical and Health Sciences University in UAE towards MERS. **Methods:** This cross-sectional study was conducted in 500 university students. The study employed a specially designed, pretested and validated questionnaire based on World Health Organization factsheet for MERS for assessing the knowledge of the respondents regarding MERS. **Results:** Of the 500 participants, majority (303; 60.6%) presented with good knowledge regarding MERS. The mean knowledge score of the respondents was 10.71 ± 4.23 with medical college students having the highest score of 11.87 ± 4.07 followed by dental, nursing and pharmacy students. Gender, college and year of study and participation in educational lecture or conference on MERS were significantly associated with the knowledge level. Males possessed significantly (p<0.001) better knowledge than females. Medical students had significantly (p<0.001) better knowledge of MERS as compared to students from other colleges. As the year of study progressed the awareness regarding MERS also significantly (p<0.001) improved. **Conclusion:** The study participants presented with good knowledge of MERS – a novel viral respiratory potentially serious disease. With recent outbreaks of this syndrome in the region there is a need for medical and health sciences students, who will be the future healthcare providers, to appraise their knowledge of MERS and contribute towards raising awareness about such outbreaks.
Key words: Health Care Providers, Awareness, United Arab Emirates, Middle East Respiratory Syndrome, Public Health.

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INTRODUCTION

Middle East respiratory syndrome (MERS) has become a significant global public health concern.[1] As per the latest World Health Organization (WHO) update on MERS, at the end of September 2019, 2468 laboratory-confirmed MERS cases with 851 associated deaths were reported globally.[2] Majority of these MERS cases were reported from the Middle East countries, predominantly Saudi Arabia.[3] These statistics make MERS a potentially fatal viral disease of the region requiring proper public health responses. Appropriate public health responses are in turn rely on high-quality knowledge and awareness of the disease.[4]

Clinical spectrum of MERS infection varies from asymptomatic or mild respiratory symptoms to severe acute respiratory distress and death.[3] In health care settings, human-to-human infections are responsible for most of the human cases of MERS. The major reservoir host of MERS virus is dromedary camels and is responsible for MERS infection in humans. Though, the role of dromedary camels in viral transmission and the transmission route are not known.[5]

Presently, there are no approved vaccines or antiviral medications for the treatment of MERS and primary management is mainly supportive based on the patient's clinical condition.[6] For prevention and early detection of MERS, WHO recommends public health preparedness including MERS specific national response plan.[4,7] The national response plan should adopt the five pillars of action including: enhancing surveillance and contact management, strengthening laboratory capacity, reinforcing infection control precautions in health care settings and improving risk communications and community engagement.[4]

Many recent studies have been published assessing the knowledge, awareness and attitude towards MERS in different populations around the world[8-16] but not much published data are available pertaining to awareness of MERS in United Arab Emirates (UAE). On the background of this research paucity and recent outbreaks of MERS in the region, the present study was conducted to assess the awareness of students of a Medical and Health Sciences University in UAE.

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METHODS AND MATERIALS

Study design

It was a cross-sectional study carried out for a period of four months to assess the MERS knowledge and awareness of students of RAK Medical and Health Sciences University, Ras Al Khaimah, UAE.

Study population

Students from all the four colleges of the university namely; medical, pharmacy, dental and nursing were considered for the study. Students who were available for data collection and gave written informed consent were included in the study.

Sample size

The sample size was estimated using convenience sampling technique. Five hundred eighty students gave their consent to participate in the study. Out of these 580 students, 500 students completed and returned the questionnaires.

Study instrument

A specially designed and validated questionnaire comprising of two domains; Demographic and Knowledge of MERS was used to assess the awareness of the students regarding MERS. The questionnaire was developed using the WHO fact sheet for MERS.[17] A panel of health sciences experts determined the content validity of the questionnaire. The questionnaire was pre-tested on 50 students and this field testing of the questionnaire yielded a Cronbach's alpha reliability score of 0.90, representing high internal reliability.

Research variables

Response variable

To assess the knowledge regarding MERS, the knowledge domain of the questionnaire was divided into 5 parts consisting of 16 questions. The first part was for assessing the respondents' general knowledge about MERS [4-item], second part was for assessing the knowledge regarding the transmission of MERS [3-item], third part was for assessing the knowledge about signs and symptoms [2-item], fourth part was for assessing the treatment knowledge [2-item] and the fifth part was for prevention of MERS [5-item]. For each question, "I know" response was given a score of one and "I don't know" as zero, for a total possible score of 0 to 16.

Explanatory variables

The demographic part of the questionnaire consisted of 7 questions related to age, gender, marital status, college and year of study, nationality, attendance in any MERS related lecture, conference or training workshop.

Data analysis

Statistical Package for the Social Sciences (SPSS) version 22.0 was used for analyzing the study data. For each respondent the knowledge score was the sum total of all the correct responses with the total score ranging from 0 to 17. The knowledge level was analyzed as a two-category variable: "good" or "poor". The association of demographic characteristics of study respondents with the knowledge level was assessed using the Pearson $\chi 2$. $P \leq 0.05$ were considered statistically significant.

Ethical consideration

The ethical approval for the study was taken from RAK Medical and Health Sciences University Research and Ethics Committee (RAKMHSU-REC-13-2017-UG-P).

RESULTS

Socio-demographic characteristics

Of the 580 study participants, 80 were not included in the analysis as they submitted incomplete questionnaires. Statistical analysis was done on the data from remaining 500 study respondents. Majority of the study participants were in the age group of 20 to 23 years (66.8%), were females (54.0%) and were from medical college (41.2%). The socio-demographic characteristics of the study participants are presented in Table 1.

Knowledge of MERS

Overall, out of the 500 study participants, majority of the respondents (303; 60.6%) presented with good knowledge regarding MERS whereas

Table 1: Distribution of Socio-Demographic Characteristics.

	Frequency *n*=500	Percentage (%)	95% CI
Age			
18-19	92	18.4	15.0 - 21.8
20-21	177	35.4	31.2 - 39.8
22-23	157	31.4	27.6 - 35.6
24-25	44	8.8	6.4 - 11.0
>25	30	6.0	4.2 - 8.0
Gender			
Male	230	46.0	41.6 - 50.6
Female	270	54.0	49.4 - 58.4
College			
Pharmacy	112	22.4	18.6 - 26.0
Medical	206	41.2	36.8 - 45.8
Dental	127	25.4	21.4 - 29.8
Nursing	55	11.0	8.2 - 14.0
Year of Study			
Year 1	60	12.0	9.4 - 15.0
Year 2	148	29.6	25.6 - 33.6
Year 3	154	30.8	27.0 - 34.8
Year 4	93	18.6	15.2 - 22.0
Year 5	45	9.0	6.6 - 11.8
Marital Status			
Single	490	98.0	96.6 - 99.2
Married	10	2.0	0.8 - 3.4
Nationality			
Emirati	42	8.4	6.2 - 10.8
Saudi	43	8.6	6.2 - 11.0
Syrian	88	17.6	14.4 - 21.0
Iraqi	53	10.6	8.0 - 13.0
Egyptian	31	6.2	4.2 - 8.4
Yemeni	21	4.2	2.6 - 6.0
Indian	84	16.8	13.6 - 20.0
African	40	8.0	5.8 - 10.6
Others	98	19.6	16.2 - 23.4

39.4% of them had poor knowledge of the disease. The mean knowledge score of the study respondents (out of the maximum of 16) was 10.71 ± 4.23 with medical college students having the highest score of 11.87 ± 4.07 followed by dental, nursing and pharmacy students (Figure 1).

Majority of the study respondents had good knowledge regarding prevention of MERS (80.0%) followed by knowledge regarding MERS signs and symptoms (66.9%) and transmission (64.5%). Though, only 57.3% of the study respondents had MERS treatment related knowledge.

Three hundred and seven (61.4%) of the study respondents acknowledged the fact that MERS is a viral respiratory disease caused by a novel coronavirus. Majority of the participants (60.6%) were also aware of the fact that largest outbreaks of MERS have occurred in Saudi Arabia and United Arab Emirates. More than half (57.2%) of the respondents knew that MERS can be transmitted to humans from dromedary camels and 67% of them were also aware of the possible human-to-human transmission.

Furthermore, 334 (66.8%) of the participants were cognizant of the clinical spectrum of MERS which ranges from mild respiratory symptoms to severe acute respiratory disease and death. Only 49.4 % of the respondents knew that currently there is no vaccine or specific treatment available for MERS.

Majority of the study respondents were well aware of the prevention strategies like practicing regular hand washing before and after touching animals (83.6%), avoiding contact with sick animals (79.2%) and not to consume raw or undercooked animal products, including milk and meat (83.6%). Table 2 and Figure 2 represent the knowledge of study respondents on different aspects of MERS.

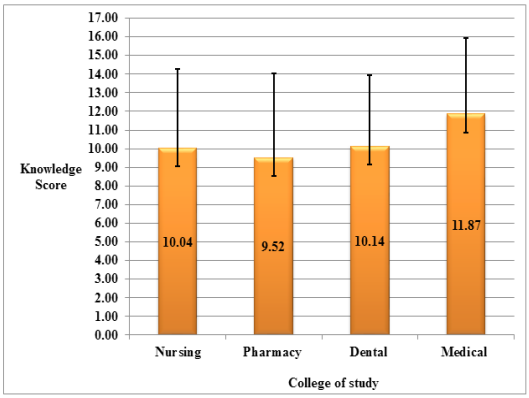

Figure 1: Mean (+/-SD) Knowledge Score of the Study Respondents.

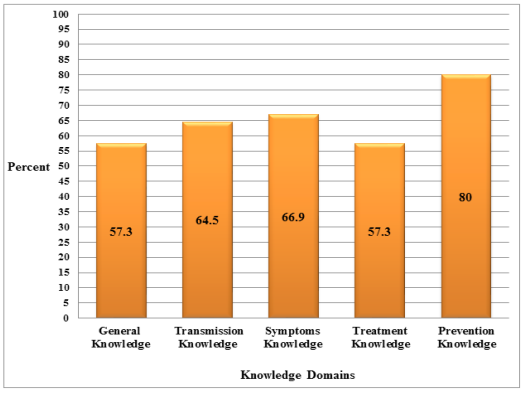

Figure 2: Knowledge of study respondents regarding MERS by different domains.

Table 2: Knowledge of respondents regarding Middle East respiratory syndrome (MERS).

Questions	Frequency	[%]	95% CI
General Knowledge of MERS			
MERS is a viral respiratory disease caused by a novel coronavirus			
I know	307	[61.4]	57.2 - 66.0
I don't know	193	[38.6]	34.0 - 42.8
MERS-CoV outbreaks have occurred in several countries, with the largest outbreaks seen in Saudi Arabia and United Arab Emirates			
I know	303	[60.6]	56.0 - 65.2
I don't know	197	[39.4]	34.8 - 44.0
Approximately 35% of reported patients with MERS have died			
I know	248	[49.6]	45.4 - 53.8
I don't know	252	[50.4]	46.2 - 54.6
80% of human cases have been reported in the middle east			
I know	287	[57.4]	52.6 - 61.6
I don't know	213	[42.6]	38.4 - 47.4
Knowledge of transmission of MERS			
MERS can be transmitted to humans from dromedary camels			
I know	286	[57.2]	53.0 - 61.6
I don't know	214	[42.8]	38.4 - 47.0
Human-to-human transmission is also possible in MERS			
I know	335	[67.0]	62.8 - 71.2
I don't know	165	[33.0]	28.8 - 37.2
People with diabetes, renal failure, chronic lung disease and immunocompromised persons are considered to be at high risk of severe disease from MERS-CoV infection			
I know	346	[69.2]	65.2 - 73.4
I don't know	154	[30.8]	26.6 - 34.8
Knowledge of symptoms of MERS			
Clinical spectrum ranges from no symptoms (asymptomatic) or mild respiratory symptoms to severe acute respiratory disease and death.			
I know	334	[66.8]	62.4 - 71.2
I don't know	166	[33.2]	28.8 - 37.6
A typical presentation of MERS-CoV disease is fever, cough and shortness of breath			
I know	335	[67.0]	62.8 - 71.0
I don't know	165	[33.0]	29.0 - 37.2
Knowledge of treatment of MERS			
No vaccine or specific treatment is currently available			
I know	247	[49.4]	45.2 - 53.8
I don't know	253	[50.6]	46.2 - 54.8

Table 2: **Continued**

Treatment is supportive and based on the patient's clinical condition			
I know	326	[65.2]	61.0 - 69.6
I don't know	174	[34.8]	30.4 - 39.0
Knowledge of prevention of MERS			
Should practice general hygiene measures when visiting farms, markets, barns, or other places where dromedary camels and other animals are present			
I know	398	[79.6]	76.2 - 83.2
I don't know	102	[20.4]	16.8 - 23.8
Should practice regular hand washing before and after touching animals			
I know	418	[83.6]	80.4 - 86.8
I don't know	82	[16.4]	13.2 - 19.6
Should avoid contact with sick animals			
I know	396	[79.2]	75.6 - 82.8
I don't know	104	[20.8]	17.2 - 24.4
Should not consume raw or undercooked animal products, including milk and meat			
I know	418	[83.6]	80.2 - 87.0
I don't know	82	[16.4]	13.0 - 19.8
WHO recommends that affected countries should develop public health prevention strategies to combat the virus			
I know	370	[74.0]	70.0 - 78.0
I don't know	130	[26.0]	22.0 - 30.0

Gender, college and year of study and attending educational lecture or conference on MERS were significantly associated with the knowledge level. As far as gender is concerned, males possessed significantly (p<0.001) better knowledge than females regarding MERS. Medical students had significantly (p<0.001) better knowledge of MERS as compared to students from other colleges. As the year of study progressed the awareness regarding MERS also significantly (p<0.001) improved. Students who had exposure to educational conferences or lectures related to MERS possessed better knowledge (p<0.001) of the disease. The association of socio-demographic characteristics and MERS knowledge is shown in Table 3.

DISCUSSION

Middle East respiratory syndrome (MERS), first identified in Saudi Arabia, is an emerging viral respiratory disease caused by the MERS coronavirus. Middle East countries like Saudi Arabia, Bahrain, Oman, Egypt, Jordan, Kuwait, Lebanon, Iran, Qatar, Tunisia, United Arab Emirates and Yemen have reported laboratory confirmed cases of MERS. We conducted this study to assess the knowledge regarding MERS among the students of a medical and health Sciences University in UAE who will be the future healthcare providers in the region. Their awareness and

Table 3: **Level of knowledge as per Socio-Demographic characteristics.**

Variable	N	Good Knowledge	Poor Knowledge	*P*-value
Age (%)	500			0.209
18-19		15.5	22.8	
20-21		37.6	32.0	
22-23		33.0	28.9	
24-25		7.9	10.2	
>25		5.9	6.1	
Gender (%)	500			**<0.001**
Male		54.5	33.0	
Female		45.5	67.0	
College (%)	500			**<0.001**
Pharmacy		17.5	29.9	
Medical		50.2	27.4	
Dental		21.8	31.0	
Nursing		10.6	11.7	
Year of Study (%)	500			**<0.001**
Year 1		9.6	15.7	
Year 2		34.0	22.8	
Year 3		33.3	26.9	
Year 4		13.2	26.9	
Year 5		9.9	7.6	
Nationality (%)	500			0.984
Emirati		9.2	7.1	
Saudi		9.1	8.3	
Syrian		17.2	18.3	
Iraqi		10.9	10.2	
Egyptian		5.6	7.1	
Yemeni		4.0	4.6	
Indian		16.3	17.0	
African		8.6	7.1	
Others		19.1	20.3	
Participation in lecture/ conference/ workshop on MERS (%)	500			**<0.001**
Yes		75.8	24.2	
No		42.4	55.6	

Statistically Significant values are in bold

understanding of this emerging potentially fatal disease is very crucial as they are the ones who will be donning the roles of competent healthcare providers and will be contributing towards the prevention and management of these public health concerns.

We report that majority of the study respondents (60.6%) presented with good overall knowledge of MERS. These results are agreement with different studies conducted in Saudi Arabia[11,13,14,18,19] and China[15] among the student population. These findings can be attributed to the facts that the study population was students from a medical and health sciences university and also MERS related awareness spread by the Ministry of Health and Prevention, UAE and WHO.

Our results revealed that the future healthcare providers possessed overall good knowledge related to prevention, clinical spectrum and transmission of MERS. These findings are encouraging as well aware and informed healthcare providers are critical to the prevention, diagnosis and management of such outbreaks.

In the present study majority of the study respondents acknowledged the fact that MERS is caused by a novel coronavirus. Similar findings were reported by a study conducted in medical and health sciences university students in Makkah, Saudi Arabia[13] where more than two thirds of the study participants knew about the causative organism. Contrasting results were reported by study conducted in Riyadh, Saudi Arabia[11] where only 14% of the students knew about the corona virus.

Regarding transmission of disease from camels, our findings are similar to the findings of a study conducted in medical, dental, nursing and pharmacy students[13] where more than half (59%) of the respondents believed that MERS can be transmitted to humans from infected camels.

Prevention strategies are very important as they reduce the risk of MERS transmission. The study reports positive findings related to the prevention knowledge of the study respondents. Majority of the participants were cognizant of the facts that regular handing, avoiding contact with sick animals and avoiding consumption of raw or undercooked animals products can help in preventing the transmission of the disease. These results were consistent with the findings of other studies conducted in the Middle East region.[11,13,14,19]

Treatment knowledge of our study respondents needs improvement as only 49.4% knew of the fact that no vaccine or specific treatment is currently available for MERS. Contrasting results were obtained by a study conducted in College of Medicine, King Saud Bin Abdulaziz University, Riyadh, Saudi Arabia where majority of the students successfully answered questions related to MERS treatment.[11]

The mean knowledge score of medical college students was the highest (11.87 ± 4.07) followed by dental, nursing and pharmacy students. Overall mean knowledge score of the study respondents was 10.71 ± 4.23. This result is similar with a study conducted among medical students in King Abdulaziz University, Jeddah, Saudi Arabia[19] where the mean knowledge score of the students was 10.32 ± 4.21.

In our study males possessed significantly better knowledge of MERS as compared to females. This finding is in line with the finding of a study conducted among Saudi health care workers[10] but in contrast with findings of a study conducted in Saudi medical students.[11] Our study showed that as year of study advanced the knowledge of students regarding MERS significantly improved which can be ascribed to the fact that as the students become senior they get more exposed to emerging public health concerns like MERS.

The present study has some strengths and limitations. MERS is a potentially serious viral disease in the region. The study focusses on the awareness of future health care providers on this public health concern. The high response rate of the survey (86.2%) is another strength of our study. The study respondents were from multiethnic background which also adds to the strength of the study. The study has some limitations also. Selection bias owing to cross-sectional study design and random sampling is an important limitation. The results of the study cannot be generalized as the study sample is only a representation of the students studying in medical and health sciences universities in UAE.

CONCLUSION

Overall, the study respondents presented with good knowledge of MERS – a novel viral respiratory potentially serious disease. With recent outbreaks of this syndrome in Middle East region there is a need for the medical and health sciences students to appraise their knowledge and awareness of MERS as they are the future health-care providers who will be responsible for creating awareness about such outbreaks with a special emphasis on their preventive measures.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATIONS

MERS: Middle East respiratory syndrome; **UAE:** United Arab Emirates; **WHO:** World Health Organization.

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