

Knowledge, Attitudes and Practices Related To Middle East Respiratory Syndrome-Coronavirus among Residents of Riyadh: A Cross-Sectional Study

Asmaa Alyaemni*

Health and Hospital Administration Department, College of Business Administration, King Saud University, Riyadh, Saudi Arabia

*Corresponding author

Asmaa Alyaemni, Health and Hospital Administration Department, College of Business Administration, King Saud University, College of Applied Medical Sciences; P.O. Box: 10219; Riyadh 11433 KSA; E-mail: aalyaemni@ksu.edu.sa

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Abstract

MERS-CoV (Middle East respiratory syndrome coronavirus) originated in Saudi Arabia in 2012 and the number of cases and deaths is continuing to rise. The epidemiology of MERS-CoV has been thoroughly analyzed, but there are few reports on the knowledge, attitude and practices (KAP) of healthcare workers towards the infection in Riyadh. The objective of this research was to assess the KAP of the general public towards MERS-CoV. This cross-sectional study involved 309 participants in Riyadh. The overall mean scores for knowledge was 3.43 (SD: 0.54), for attitude against prevention was 3.0 (SD: 0.67), and for practices was 3.7 (SD: 0.72), indicating good KP and satisfactory A. Scores only differed by nationality ($P < 0.001$) (age, education, income and gender were non-significant). We recommend various strategies to keep the public updated about the current situation, and about advances in prevention and treatment. Further multi-regions studies with large sample size are needed to build upon the findings of current study.

Introduction

Since 2012, the Middle East has been threatened by MERS-CoV (Middle East respiratory syndrome coronavirus), which has now become a global threat, as there is no vaccine or curative treatment. Both the Ministry of Health (MOH) and the World Health Organization (WHO) have provided preventive guidelines and protective measures against its spread [1]. Nevertheless, the spread in Saudi Arabia is still of great concern; Between 2012 and 02 December 2016, 1841 laboratory confirmed cases were reported to WHO, 80% of whom were reported by the Kingdom of Saudi Arabia. Between 6 and 13 December 2016 the National IHR Focal Point of Saudi Arabia reported ten additional cases of Middle East Respiratory Syndrome.

The MOH reported 1373 confirmed cases and a total of 591 deaths as of 10 May 2016 [2]. From June 2012 to April 2015, MERS-CoV has infected 981 people in Saudi Arabia, accounting for approximately 89% of global cases. The 428 deaths account for 93.8% of global deaths. More than 26 countries in Asia, Africa, and Europe have identified cases of infection. In 2014, the USA reported the presence of MERS-CoV in two individuals who had returned from Saudi Arabia [3]. Moreover, the eight countries in Europe that have diagnosed cases have had a direct or indirect connection with Saudi Arabia [4,5]. MERS-CoV not like other respiratory infections, the early symptoms of MERS-CoV are nonspecific and early identification of patients with MERS-CoV is not always

possible. MERS-CoV might remain asymptomatic or may cause very severe pneumonia with acute respiratory distress syndrome (ARDS), multi-organ failure and septic shock resulting in death. MERS-CoV usually targets immune-compromised individuals or individuals who have other chronic illnesses or comorbidities. The source of this virus is still unknown; however, emerging indications are that the dromedary camel is a host for MERS-CoV for humans [6]. Bats may be the natural reservoir for the virus [7]. From the first zoonotic transmission, followed by transmission through health care facilities by human-to-human transmission, the virus can now spread far and wide by means of air travel [8].

During the season of Umrah and Hajj, 2 million to 2.5 million pilgrims from all over the world including domestic pilgrims, enter the Holy cities, namely Madina and Makkah. The government and health ministry need to monitor carefully all measures taken to control the spread of MERS-CoV from these centers to the rest of the world. No cases have been reported in the limited season of the Hajj, but numerous cases have been reported during Umrah, the term for pilgrimage taken at any other time of the year. Since little is known about transmission and prevention, the probability of outbreak during Hajj should not be taken lightly by health authorities [9]. Thus, it is important to assess the level of knowledge, attitude and practices of locals as they participate in Holy rituals and are affected by the presence of the huge crowd. Moreover, previous studies conducted in Saudi Arabia have evaluated knowledge, attitude and practices of

health care providers, a high-risk group that comes in direct contact with infected individuals [10-14]. These studies suggested that health care workers be provided information about such diseases as part of their training in controlling infectious diseases. This would also help improve public education about infection control as nothing is yet known about the transmission of this virus during mass gatherings [15]. Since there is no specific treatment, it is important to know how the general population understands this disease. Through this study, we aimed to evaluate the knowledge, attitude and perception of the general population of nationals and non-nationals in Riyadh about the spread and primary prevention of MERS-CoV.

Subjects and Methods

This cross-sectional study was conducted in different areas of Riyadh city among individuals of age 15-65 years. The study was approved by the Medical Ethics Committee of the Institutional Review Board of King Saud University, College of Medicine (No. E-17-2234). The electronic questionnaire was designed and distributed via social websites and by visiting malls in Riyadh city. Sampling was by convenience. The sample size was deemed adequate based on acceptable margins of error (3% to 6%) for a survey. A total of 309 questionnaires were collected by self-selection through advertisement. The study questionnaire had two parts. The first part collected demographic data on the study sample (age, gender, nationality, education, and income level in Saudi Riyals). The second part had three sections. The first section asked about knowledge of MERS-CoV infection and included 9 items. The second section had 7 items about the individual's attitude toward protection against MERS-CoV infection. The third section, with 7 items, asked about practices for protection against MERS-CoV infection. Responses were marked using a 5-point Likert scale (strongly agree=5, agree=4, neutral=3, disagree=2, strongly disagree=1) and (always=5, most of the time=4, sometimes=3, seldom=2, never=1). The validity and reliability of questionnaire was assessed. Coefficients for each section of questionnaire were 0.723, 0.698, and 0.774, respectively, calculated via Pearson correlation. Reliability was 0.800 for the complete questionnaire. We used the STROBE reporting guidelines for observational studies in the preparation of the manuscript.

Data was entered and analysed in SPSS version 20. Each 5-point likert scale has been given upper and lower boundary for assessing the range of responses: 1 to 1.80 (strongly disagree/ never), 1.81 to 2.60, (disagree/ seldom), 2.61 to 3.40 (neutral/ sometimes), 3.41 to 4.20 (most of the time / agree) and 4.21 to 5.00 (always/ strongly agree). Mean and standard deviations were calculated for each item and graphs showing the percentage of responses within each category were generated using the R statistical computing program (R Foundation for Statistical Computing, Vienna, Austria, package 'likert'). The nonparametric Kruskal-Wallis test was used to test differences between age, education and income in terms of knowledge, attitude and practices. Post-hoc multiple comparison tests after Kruskal-Wallis examined specific pairs of differences. A chi-square test was used to examine differences in knowledge, attitude and practices by gender and nationality.

Results

Of 309 participants, more than half (65.4%) were females, 61.8% were Saudi nationals, and 74.8% had studied at the university level (Table 1). Almost 80% were younger than 35 years of age, and 37.5% earned less than 5000. (Table 2) shows the mean and standard deviation for the Likert scores for knowledge, attitudes and practices. (Figure 1) shows the percentages of respondents with each response in the knowledge (A), attitudes (B), and practices (C) categories centered by the neutral response. The Kruskal-Wallis analysis of the Likert scores for knowledge and attitudes were not statistically significant by age, education or income. Differences in practices were statistically significant for age and education, but post-hoc tests to examine the exact pairs were insignificant (Table 3). (Table 4) shows differences in level of knowledge, attitude and practices by gender and nationality. Females scored higher than males in all three, but differences were statistically significant only for attitudes and practices. By nationality, non-Saudis were significantly higher than Saudis for practices.

Table 1: Baseline characteristics of study participants (N=309)

Baseline characteristics	Frequency	Percentage
Age		
15 - 25	99	32.0
26 - 35	145	46.9
36 - 45	35	11.3
46 - 60	23	7.4
60 or Above	7	2.3
Gender		
Male	107	34.6
Female	202	65.4
Nationality		
Saudi	191	61.8
Non-Saudi	118	38.2
Education		
Middle school	7	2.3
High School	30	9.7
University	231	74.8
Other	41	13.3
Income level in Saudi Riyal		
less than 5000	116	37.5
5000- 10000	100	32.4
10001- 15000	51	16.5
more than 15000	42	13.6
Total	309	100.0

Table 2: Responses to Likert scale items in ranked order for each section of the questionnaire

Question No.	Mean (standard deviation)
Knowledge	
Q8.	4.24 (1.14)
Q9	4.07 (1.24)
Q12	3.86 (1.15)
Q5	3.60 (1.10)
Q6	3.29 (1.29)
Q11	3.36 (1.08)
Q13	3.30 (1.23)
Q10	2.67 (1.27)
Q7	1.90 (1.18)
Mean (SD)	3.37 (0.54)
Attitudes	
Q14	3.89 (1.23)
Q15	3.86 (1.23)

Q19	3.83 (1.15)
Q20	3.56 (1.31)
Q18	3.05 (1.36)
Q16	2.68 (1.64)
Q17	2.42 (1.31)
Mean (SD)	3.33 (0.63)
Practices	
Q22	4.50 (0.95)
Q21	4.39 (0.91)
Q27	3.93 (1.40)
Q23	3.90 (1.11)
Q25	3.35 (1.11)
Q26	3.13 (1.21)
Q24	2.68 (1.37)
Mean (SD)	3.7 (0.73)
Overall Mean (SD)	3.46 (0.53)

See Figure 1 for the items on the questionnaire .

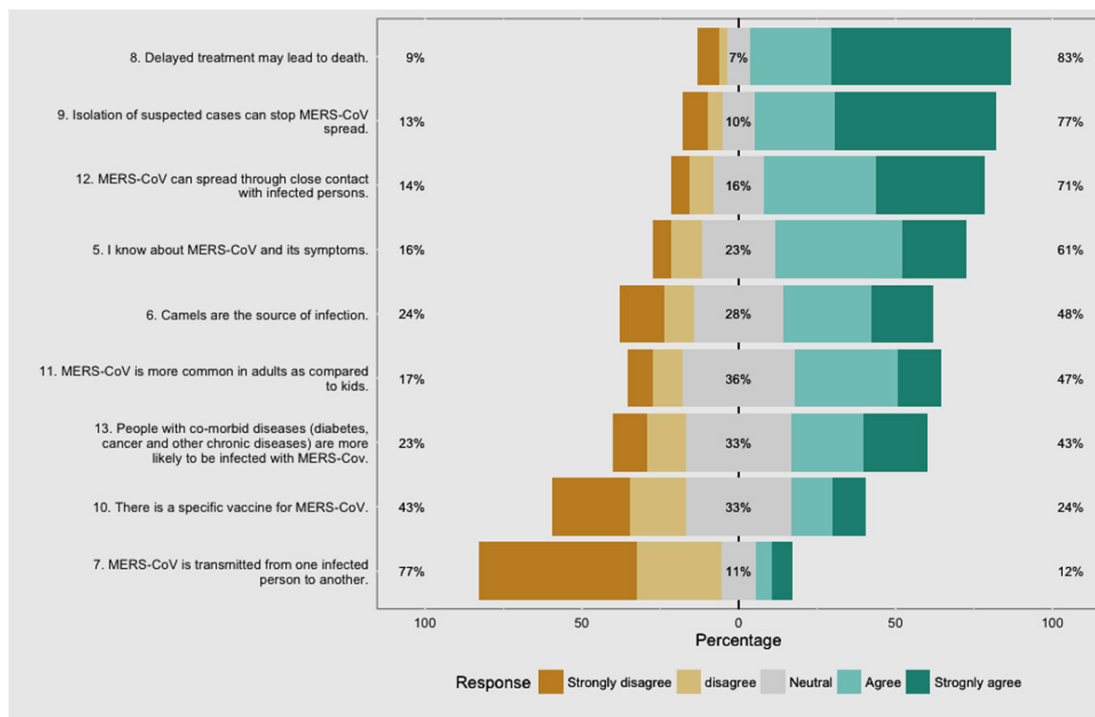


Figure 1A: Percentage of responses within each item on knowledge of MERS-CoV infection in ranked order (n=309).

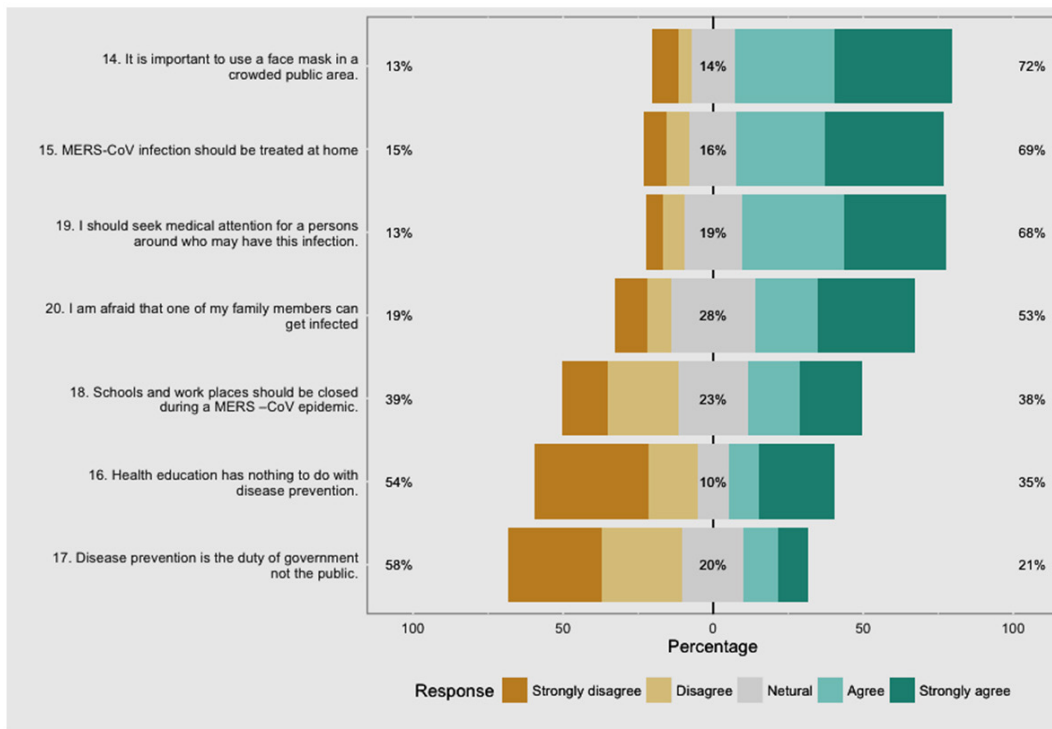


Figure 1B: Percentage of responses within each item on attitudes about MERS-CoV infection in ranked order (n=309).

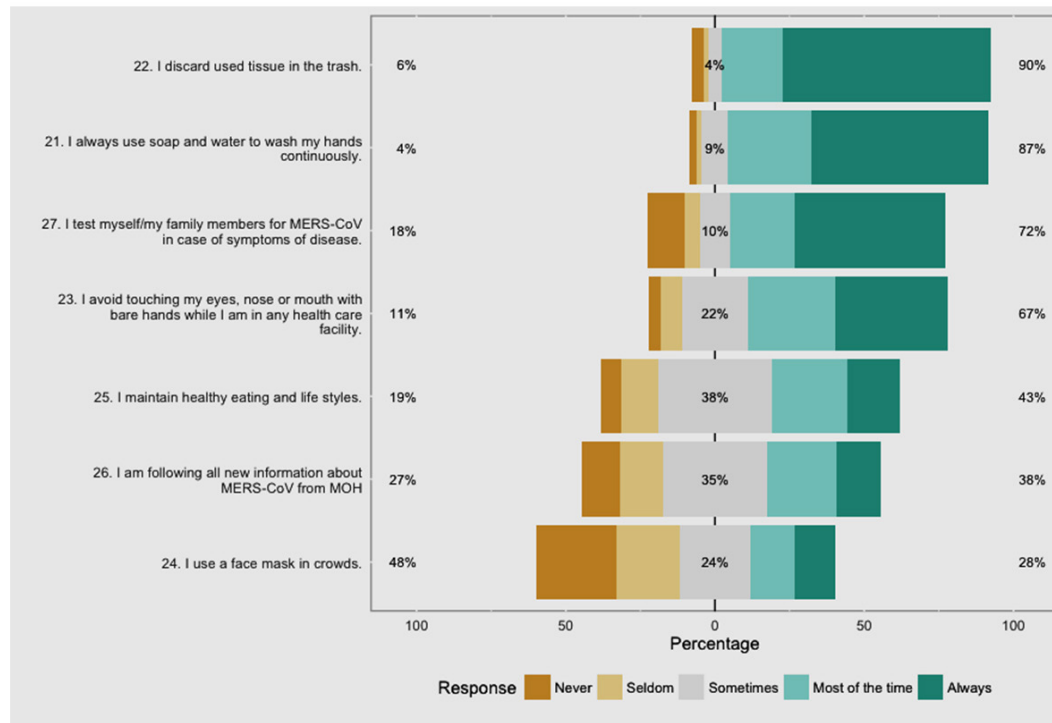


Figure 1C: Percentage of responses within each item on practices related to MERS-CoV infection in ranked order (n=309).

Table 3: Difference in level of knowledge, attitude and practices among study participants (N=309)

Socio-demographics	Knowledge	Attitude	Practice
Age	0.24	0.46	0.05
Education	0.85	0.34	0.04
Income	0.66	0.30	0.08

Values are P values for the Kruskal-Wallis test. Pairwise comparisons after Kruskal-Wallis test found no significant differences between groups.

Table 4: Mean differences in level of knowledge, attitude and practices by nationality and gender

Socio-demographics	Knowledge Mean (SD)	Attitude Mean (SD)	Practices Mean (SD)
Gender			
Female	3.39 (0.52)	3.37 (0.62) ^a	3.74 (0.70) ^b
Male	3.32 (0.58)	3.24 (0.66)	3.62 (0.78)
Nationality			
Saudi	3.33(0.50)	3.31 (0.66)	3.65 (0.71)
Non-Saudi	3.43(0.60)	3.35 (0.60)	3.77 (0.75) ^c

^aChi-squared = 39.771, df = 24, p-value = 0.02263; ^bChi-squared = 47, df = 26, p-value = 0.008 ^cChi-squared = 42, df = 26, p-value = 0.03

Discussion

In this questionnaire survey, the scores indicated neutral knowledge of MERS-CoV and good practices in preventing infection, while attitudes were satisfactory. There were no significant differences in terms of age, education and income for knowledge, attitude and practices. There was a significant difference in nationality for practices. Also, there was a significant difference favoring females over males for attitude and practice. The knowledge possessed by a community reflects their understanding of the MERS-CoV, while their attitude represents feelings and any predetermined ideas that they may have towards this disease. Practice refers to the ways in which they demonstrate their knowledge and attitude through their actions [16]. Understanding the levels of community knowledge, attitude and practice will enable a more efficient process of awareness developing as it will allow any educational program to be designed more appropriately to meet the community's learning needs.

In our study, differences in practices were statistically significant for age and education, but post-hoc tests to examine the exact pairs were insignificant, suggesting that the differences were not actually significant. A study conducted among a larger sample of the Saudi public in the capital city Riyadh and nearby city of Alkharj, found that younger participants have better awareness about MERS-CoV compared with older individuals and the authors referred to the fact that younger participants derived most of the information from a variety of social media unlike older people who derived their information mainly from TV or radio [17]. This association with age has been identified in several local studies and recommended that the best method to deliver adequate relevant awareness information should be through health care providers [18].

A study conducted among Hajj Pilgrims reported that more than three-fourth of the participants was aware of preventive measures against MERS-CoV [19]. While other local study among public

in Riyadh reported that the majority of the participants (1147) used precautionary measure in their daily life. They reported use of a face mask and disposable tissues, and practiced hand washing and avoiding contact with ill patients and touching eyes, nose and mouth. In our study, mean scores for hand washing, tissue disposals, avoidance of touching the eyes, nose and mouth were similar to the earlier study. However, our study showed a low level of concern about using a face mask in a crowd (the lowest score with mean 2.68 among Saudis more than non-Saudis).

Moreover, a study conducted among healthcare workers reported an acceptable amount of knowledge related to symptoms, vaccination, spread and the fatality [12]. MOH reported a 90% decline in nosocomial infections in Saudi Arabia, which was linked to application of updated guidelines and precautions recommended by WHO [1]. These WHO recommendations were strictly maintained and standard precautions were used consistently with all patients, regardless of their diagnosis. Droplet precautions were added to the standard precautions when providing care to patients with symptoms of acute respiratory infection; contact precautions and eye protection were added when caring for probable or confirmed cases of MERS-CoV infection; airborne precautions were applied when performing aerosol generating procedures.

In our study, participants demonstrated an acceptable amount of knowledge on coronavirus spread, symptoms, prevention and its fatal nature, which is in agreement with a previous similar local study [18]. Knowledge, attitude and practices in Saudi Arabia may be greater because the outbreak is recent and has affected a great many people. Awareness campaigns arranged by the Ministry of Health are constantly update both health care workers and the public about signs and symptoms along with methods of primary prevention, as well as secondary and tertiary prevention measures [1,12]. The Information is provided through different communication channels, including educational campaigns, hotline telephone numbers and government websites. Several studies related the satisfactory level of awareness to the successful distribution of the information about MERS-CoV by media and governmental agencies in the country. Another local study conducted in the Eastern province showed that the common sources of information for local people were the television, newspapers, magazines and social circles such as friends and family.

Moreover, in our study we found that females had better mean scores for knowledge, attitude and practices, but the association was only statistically significant for attitude and practice. A study conducted in different regions of Saudi Arabia also reported that women demonstrated a higher level of knowledge, but in this study the relationship was significant [20]. Another local study showed that there was significant differences by gender in term of males have a higher score for knowledge and concerns [18].

Moreover, participants had reasonable mean scores for knowledge that the primary source of infection is the camel, unlike a previous study of of healthcare workers who thought the mode of disease transmission was primarily from human to human or unlike a previous study among public in Riyadh who mistakenly thought that the disease is immunodeficiency diseases [12]. Our results were similar to those of Almutairi et al [18]. In which most participants believed that the government should isolate patients in health facilities. They also believed that disease prevention is the duty of both the government and public, yet they were not sure about closing workplaces and schools during an epidemic.

Other studies conducted among the public in Saudi Arabia also reported that participants had high levels of concern and had used precautionary measures reasonably [18]. The results of these studies are also in agreement with the findings of our study. Other studies have not looked into differences in knowledge, attitudes and practices among nationalities. We found that non-Saudis scored higher in practices than Saudis, possibly because of the level of education and a higher sense of individual responsibility for health. Assessing the level of non-nationals awareness and practice about MERS-CoV in such a high-risk area is important. Almutairi's study included Saudis and non-Saudis and showed that one-fourth of the participants preferred that the government restrict travel to and from the high-risk areas in the country. The participant's preferred to stay at home. Another local study showed that majority of the public do not trust the information disseminated by MOH about outbreak of a disease [17]. In one international report, an asymptomatic traveller returning home from Saudi Arabia was not considered or tested for MERS-CoV during initial presentation, was then discharged and readmitted with transfer between different health facilities before diagnosis, over an 8-day period; this single lapse and delay in diagnosis was responsible for South Korea's tragic outbreak [21]. Thus, a single lapse in awareness during the key initial presentation can cause a serious threat to a population. In addition, internationally gaps in preparation are not identified and rational public health communications during outbreaks are not always followed by healthcare providers or patients [18]. Therefore, a regular national assessment for updated awareness and caution among nationals and non-nationals should be employed in regard to human-to-human transmission of MERS-CoV since its mechanisms are not yet fully understood globally. Without transparency and clear communication from local public health authorities, public trust cannot be won and voluntary public collaboration cannot be expected [22]. The limitations of this study are that a subjective tool was used to assess KAP among study participants and the study was conducted strictly in the region of Riyadh among 309 participants only. Thus, we cannot generalize our findings.

Conclusion

From this cross-sectional study we conclude that participants had good knowledge and practices and a satisfactory attitude toward MERS-CoV infection. No significant difference was seen in terms of age, education, income and gender for knowledge, attitude and practices; however a significant difference in nationality was found for practices only. We recommend strategies to raise awareness about the role and importance of health education. Strategies should be formulated to promote protective measures among the public like wearing masks in crowded situations. Awareness and preventive programs should be conducted for the public and for all nationalities. Further multiregional studies with larger sample sizes are needed to build upon the findings of current study.

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