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Knowledge of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) and its Management: A Survey among Saudi People in Taif; Kingdom of Saudi Arabia

Abuabker Elbur[1], Abdullah Alharthi[2], Abdulrahman Aljuaid[2], Nawaf Hasan Almalki[2]

[1] *Department of Clinical Pharmacy, College of Pharmacy, Taif University, Kingdom of Saudi Arabia,*
[2]*Pharm D student; College of Pharmacy; Taif University; KSA; Al-Haweiah, Taif, Kingdom of Saudi Arabia*

Abstract: Background: Assessment of the public general knowledge on Middle East Respiratory Syndrome is crucial to the development of health policies for containment of the disease.
Objectives: To measure the level of public knowledge on Middle East Respiratory Syndrome and to identify its predicators.
Methods: A cross –sectional survey was conducted during June –October 2015, whereby adult (≥ 18 years old) Saudi people residing in Taif Area were recruited. Convenience method of sampling was adopted. Data was collected by a structured questionnaire. Face-to-face interview method was used to collect the data. Data was processed and analyzed by the Statistical Package for Social Sciences (SPSS version 21). Logistic regression analysis was performed. P values < 0.05 were considered statistically significant.
Results: A total of 377 participants was recruited (age range 18- 85 years). The majority was males and 65% were university graduates. Of all the interviewees 56 % believed that the disease transmission can occurs through infected camel and bats. The fact that the disease has no specific treatment was known by 53.8% and 42.7% of them denied any role for traditional medicines in the prevention or treatment of the disease. Participants had satisfactory knowledge about the disease and its management were 216 (57.3%). Significant predictors of satisfactory knowledge were age more than 40 years [OR= 0.4; 95% CI (0.2-0.7); P = 0.001], university education [OR= 1.6; 95% CI (1.0-2.6); P = 0.042] and being employed in the medical field [OR= 2.8; 95% CI (1.7-4.5); P < 0.001].
Conclusions: Despite the great effort done by the health authorities in the country to educate the people and to raise their awareness about the disease, there are gaps in public knowledge. Future planned educational interventions should focus on younger people and those with educational background below the university level.

I. INTRODUCTION:

The last two decades witnessed the emergence of several new viral respiratory tract diseases that threaten the global health [1]. Examples of these diseases are severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS). MERSis a viral respiratory disease caused by a novel coronavirus (MERS-CoV) [2].The virus was first isolated in Saudi Arabia at 2012[3].The MERS-CoV is considered an epidemic in Saudi Arabia [4]. Occurrence of the disease and death are higher among men compared to women, and among people of age between 45–59 and >60 years had the highest mortality rate[4]. In Saudi since 2012 a total of 1413 cases was confirmed with the disease and 32 case with the disease without current symptoms; of them 610 died, 833 recovered, 2 patients under treatment [5].

Knowledge of the disease modes of transmission is important for developing effective control measures. The transmission of MERSis defined as sporadic, between family members, often occur in health care settings, and requiring close and prolonged contact [6].The disease is often a lower respiratory tract one, with the following signs and symptoms: Fever; cough; breathing difficulties; pneumonia, which can progress to acute respiratory distress syndrome; multiorgan failure and death among more than a third of the infected patients[7]. Although, without definitive scientific evidence, the use of some antiviral drugs alone or combined with corticosteroids may improve the outcome of therapy among some patients; no specific therapeutic treatment or vaccine available for the disease.

Health authorities in Saudi did substantial efforts in order to control the disease through various measures. Public education is considered as one of the most important measures that can help in the control of infectious diseases. Few studies were conducted in Saudi among the public and health care workers to assess knowledge about the disease and its management [9-11].Assessment of the public general knowledge on MERS is crucial for developing health policy for the containment of the disease. Therefore, this study was conducted

to achieve the following objectives: To measure the level of public knowledge on MERS and to identify sociodemographic variables associated with satisfactory level of knowledge if any.

II. METHODS:

Study design and setting:

A cross –sectional survey was conducted during June –October 2015 in Taif City, Kingdom of Saudi Arabia.

Inclusion and Exclusion criteria:

Adult (≥ 18 years old) Saudi people residing in the city were included. The exclusion criteria were: refusal to participate and people who were mentally incapable to communicate. The objectives of the study were stated clearly for the participants before commencement of the interview process.

Sample and sampling technique:

A convenience method of sampling was adopted and a total of 377 agreed to participate and included in the study.

Data collection:

Data was collected by mean of a structure questionnaire. Face-to-face interview method was used to collect the data by semi-final year Pharm-D students. The data was collected in public places in the city (Malls, supermarkets, parks, schools, and restaurants). The average time to conduct the interview was estimated to be 10 minutes. The questionnaire items were developed based on the educational material published by Saudi Ministry of Health [5]. The questionnaire was tested with a group of 10 people to ensure applicability and estimate the time frame needed to complete it. Minor suggestions were observed and adopted in the final version. The questionnaire was composed of six parts to collect data on:-

1- Participants demographic characteristics: gender, age in year, residence, educational level, type of current job, and history of contracting the disease or infection of one of the family members or friends and relatives.
2- Knowledge of disease etiology through one question(is the disease caused by bacteria, virus or both of them)
3- Knowledge of disease symptoms, through six questions, whereby common six signs and symptoms were listed.
4- Knowledge of modes of transmission of the disease, through four questions to measure the public knowledge on human-to-human transmission or animal to human transmission.
5- Knowledge of preventive measures, whereby seven preventive measures were selected and ranged from global adherence to hygiene tospecific like washing hands with water and soap.
6- Knowledge about treatment and availability of vaccines for prevention through nine questions.

Evaluation of total knowledge: Responses to the last five parts of the questionnaire were recorded as "Yes", " No" and "Don't know". The participant was given a score =1 if he/she answered the question correctly and zero score if he/she fail to identify the correct answer or he/she did not know the correct answer to end up with a total ranging from 0-27. Finally, the participant was classified as having satisfactory knowledge about the disease and its treatment if he/she scored≥ 22 points and not having satisfactory knowledge if the score was below this cutoff point.

Data analysis:

Data was processed by the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were used to describe all variables. Mean and standard deviation was used to identify mean scores for different studied domains. The Chi-square test was used to test the difference in proportions between medical field employees' knowledge on disease treatment and other respondents . Logistic regression analysis was performedto determine the most significant demographic variables (independent) associated with satisfactory knowledge of the disease and its treatment (dependent).Crude logistic regression analysis was performed as an initial step of qualifying covariates to be included in multivariate logistic regression analysis. *P*value< 0.05 was considered statistically significant.

III. ETHICAL APPROVAL:

Ethical approval for the conduction of the research was obtained from the Pharmacy Practice Research Unit (PPRU), College of Pharmacy, Taif University, Saudi Arabia.

IV. RESULTS:

Respondents' demographic characteristics:

A total of 377 participants was recruited (age range 18- 85 years) . The majority were males and 65% had university education. Employees in the medical field were 115(30.2%). Table (1)showed participants' demographics.

Knowledge of the causative agent:

The majority of the participants 276 (73.2%) knew that the disease is caused by a virus. However, 57(15.1%) incorrectly had the belief that both bacteria and virus cause the disease, 34(9%) did not know the causative agent and 10 (2.7%) believed the disease is a bacterial one.

Knowledge of disease transmission:

Of all the interviewees333 (88.3) knew that the disease is transmitted through droplets produced during coughing or sneezing and 211(56 %) believed that the disease transmission can occur through infected camel and bats.The mean knowledge score of this domain was 3.0± 1.1. Table (2) showed correct responses about disease transmission, symptoms and preventive measures.

Knowledge of symptoms of the disease:

The majority of respondents showed high level of knowledge about the respiratory symptoms of the disease and 231(61.3%) reported that diarrhea can be one of the symptoms, table (2). The mean knowledge score of this domain was 4.8± 1.6.

Knowledge of disease prevention measures:

The majority of interviewees had good knowledge about most of the preventive measures that can help in limiting the disease transmission, table (2). The mean knowledge score of this domain was 6.2± 1.2.

Knowledge on disease treatment:

The fact that the disease has no specific treatment was known by 203 (53.8%) and 161(42.7%) of them denied any role for traditional medicines in the treatment of the disease. The mean knowledge score of this domain was 6.4± 1.9.

Total knowledge and its predictors:

Participants had satisfactory knowledge about the disease and its management were 216(57.3%). Significant predictors of satisfactory knowledge were age more than 40 years [OR= 0.4 ; 95% CI (0.2-0.7); P = 0.001], university education [OR= 1.6 ; 95% CI (1.0-2.6); P = 0.042] and being employed in the medical field [OR= 2.8 ; 95% CI (1.7-4.5); P < 0.001]. Table (4) showed the difference in knowledge between medical field employees and other respondents and Table (5) showed the determinants of satisfactory knowledge about the disease and its treatment.

V. DISCUSSION

Few studies were conducted in Saudi among the public and health care workers to assess their knowledgeon The Middle East Respiratory Syndrome and its management. To the best of our knowledge this study is the first of its type in the Western part of the country. The study questionnaire was developed based on the educational messages published on the website of the Ministry of Health. These messages are inclusive as it covers modes of transmission of disease, clinical symptoms, preventive measures and treatment domains. So, the participants' knowledge was assess a cross all the mentioned domains. This information give our study more strength, compared to other studies.

The distribution of the demographic variables of the respondents showed a high percentage of participation of males, highly educated and town dwellers. This may be justified by the facts that females due to cultural norms in the country have a little opportunity to participate in such public survey, specifically if the data collectors are males. The highly educated people, most of them were living in the city, accept to participate in such studies more than low educated ones.

Nearly more than one quarter of the interviewees did not exactly know that the causative agent of the disease is a virus. Knowledge of the etiological agent is considered as the first step of patient education. Once the people know the agent they are most probably understand how the disease is transmitted and what are the preventive measures that limit its distribution.

Nearly 57% of the respondents were classified as knowledgeable about the disease and its management. We applied a stringent cutoff point (≥ 80%) to classify that the participant had satisfactory knowledge about the disease and its treatment. This is because we believed that the educational messages published by the health authorities are direct and simplified. Another previous study in the capital of Saudi found that the knowledge of MERS among public was suboptimal and knowledge was the significant predictor of both the level of concern and precaution [9].

Despite the fact that Medical field employees recruited in this survey were found to be more knowledgeable compared to other participants, they had gaps in knowledge in some items. Comparatively, other researchers in Al Qassim Area found that healthcare workers had good knowledge and attitude towards MERS [10]. However, in another study among healthcare workers in Makkah the authors reported knowledge gap and negative attitudes toward the disease [11].

Although research has revealed that camel could be the main source of MERS [12], 56% of the respondents linked disease transmission to this animal. In the above mentioned study [10], 44% of the participants had lack of knowledge about the source of MERS-CoV. Public and healthcare workers should be clearly educated about this important information.

The most identified gaps in knowledge among interviewees were on disease treatment domain. No difference in the belief that traditional medicines like herb can be used as remedy for the disease between healthcare workers and others. The use of traditional and herbal medicines is very important component of Saudi nation folklore.

The same identified gaps in the treatment domain (no specific treatment for the disease and no vaccine can prevent from the disease) were reported in electronically conducted national survey [13]. Future educational messages to raise the awareness of the public should focus on these items as it may motivate them to adhere to strictly to the preventive measures and help in the containment of the disease.

Significantly higher education and older age (> 40 years) were identified as predicators of good knowledge. Definitely higher level of education helps in understanding the educational messages. In addition, highly educated people have the capability to obtain information about the disease from different sources, which cannot be readily accessible to low educated ones. Likewise the same variables were associated with more knowledge in the above mentioned national survey [13].Future interventions should target the youngers and individuals with low educational background.

Few studies were conducted outside Saudi to assess the knowledge about MERS. In this respect, researchers assessed the knowledge of people who were planning to travel to Saudi to visit the Holy the areas. These studies revealed poor knowledge about the disease [14], [15].So, substantial and continuous effort is needed from the health authorities to raise the level of awareness of Hajj pilgrims and other visitors to the Holy areas with the disease.

The study was conducted in one city in the country this limit the generalizability of the study to all population in the country. Future research should recruit people from different parts of the country in order to better assess the public knowledge about the disease and its management. Stratified sampling is also required in order to measure exactly the knowledge of each subgroup of the society.

VI. CONCLUSIONS:

Despite the great effort done by the health authorities in the country to educate the people and to raise their awareness with the disease, still there are gaps in knowledge. Participants of aged > 40 years, had university education and healthcare workers had better knowledge about the disease and its management.

VII. RECOMMENDATIONS:

Future educational interventions to raise the public awareness with the disease should focus on younger people, with educational background below the university level. The educational messages should be designed in a more simplified format and delivered through the primary health care facilities, which are well-distributed in the country.

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Table (1) Basic and demographic characteristics

Background characteristic	Frequency	Percentage
Gender		
Male	291	77.2
Female	86	22.3
Age in year		
≤40	276	73.2
>40	101	26.8
Residence		
Town	350	92.8
Outside town	027	07.2
Educational Level		
University & above	245	65.0
Below university	132	35.0
Occupation		
Medical field	115	30.5
Outside the medical field	262	69.5
Marital status		
Married	189	50.1
Single	188	49.9
Did you or one of your family or relatives or friends had MERS		
Yes	026	06.9
No	351	93.1
Total	377	100

Table (2): Correct responses of the public on the disease transmission, symptoms and prevention measures

Item	Frequency (%) (N=377)
Mode of transmission	333 (88.3)
Direct transmission through droplets produced during coughing or sneezing	
Touching surfaces and devices contaminated by the virus	284(75.3)
Direct contact with infected patients	331 (87.8)
Transmission through infected camel and bats	211(56.0)

Symptoms of the disease	
Congestion in the nose and throat	308 (81.7)
Cough	319 (84.6)
Fever	339 (89.9)
Shortness of breath	318 (84.4)
Diarrhea	231(61.3)
severe pneumonia "in advanced case"	296 (78.5)
Prevention measures	
Wash hands with water and soap	361(95.8)
Avoid touching the eyes, nose and mouth with hands	328 (87.0)
Avoid contacting with infected people	342 (90.7)
Use handkerchief when coughing or sneezing	346(91.8)
Put on face-masks only if you are sick or visiting sick patients	258(68.4)
Adhere to hygiene	358(95.0)
Pay attention to other health habits	338(89.7)

Table (3) correct responses about the disease treatment

Item	% Correct response
Take antipyretic and painkillers medications	298 (79.0)
Drink a lot of fluids	308 (81.7)
A review of the health facility if necessary	349 (92.6)
Elderly patients, health practitioners, people in contact with camels and people of chronic diseases or diseases affecting the immune system, have to review the health facility when feeling symptoms of the disease.	319 (84.6)
There is no specific treatment for MERS	203(53.8)
MERS disease can be cured	293 (77.7)
MERS can leads to death	333 (88.3)
MERS can be treated by traditional medicines	161 (42.7)
No vaccine for the prevention of MERS	151 (40.1)

Table (4): Comparison of respondents' knowledge on disease treatment domain by occupation type

Item	**% Correct response**		**P value**
	Medical field (n= 115)	**Outside the medical field (n= 262)**	
Take antipyretic and painkillers medications	87.0	75.6	0.008
Drink a lot of fluids	92.2	77.1	<0.001
A review of the health facility if necessary	94.8	91.6	0.051
There is no specific treatment for MERS	62.6	50.0	0.016
MERS disease can be cured	84.3	74.8	0.026
MERS can leads to death	89.6	87.8	0.278
MERS can be treated by traditional medicines	40.0	43.9	0.278
No vaccine for the prevention of MERS	50.4	35.5	0.005

Table (5):Determinants of satisfactory Knowledge

Covariates	**% with satisfactory knowledge**	**(n= 377)**	**Univariable analysis crude OR(95% CL)**	P value	**Multivariable analysis crude OR(95% CL)**	P value
Gender						
Male	58.1	291	1.1(0.7-1.9)	0.573		
Female	54.7	086				

Age group in year ≤40 >40	 51.8 72.3	 276 101	 0.4(0.3-0.7)	 <0.001	 0.4 (0.2-0.7)	 <0.001
Residence Urban Rural	 58.0 48.1	 350 027	 1.5(0.7-3.3)	 0.321		
Educational level University& above Below university	60.4 51.5	245 132	1.4(0.9-2.2)	0.037	1.6 (1.0-2.6)	0.042
Marital status Married Single	 61.9 52.7	 189 188	 1.5(1.0-2.2)	 0.070		
Occupation Medical Field Outside the medical field	 74.8 49.6	 115 262	 3.0(1.8-4.9)	 <0.001	 2.8 (1.7-4.5)	 < 0.001