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Research Article

Effect of One-day Educational Program on MERS- Corona-Virus and Its Determinants on Knowledge and Practice amongst Secondary School Students at Al-Ahsa City

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Abstract

Aim: To investigate the effects of one-day educational program on knowledge and ways of practices regarding MERS-CoV and its determinants among females' secondary school students.

Methods: Quasi-experimental research design with a single group of participants was utilized. A sample of 192 students were pretested before the administration of the health education program, and then, post-tested after the administration of the health education program.

Results: Total of 192 female secondary school students participated in the current study. The mean age was 16.3 ± .82; with 49.0% enrolled in first year, 42.7% in second year and 8.3% in third year. There were significant differences between the results of pre-test and post-test in items of the questionnaires except for questions that have low response rate of post-test. The results revealed that the majority of students displayed a significant increase in the level of knowledge regarding MERS-CoV; nature, modes of transmission, clinical features of the disease, preventive measures and ways of practice.

Conclusion: The findings suggest that an educational program is crucial for secondary school students as they represent a large segment of the Saudi Arabian population and are thus considered knowledge disseminators for their families and communities.

Keywords: MERS-CoV; Knowledge; Ways of practice; Health education program

Introduction

The Middle Eastern Respiratory Syndrome Corona Virus (MERS-CoV) was first discovered among people living in Saudi Arabia. The countries amongst which the majority of the cases were reported include Saudi Arabia, Jordan, Qatar, the United Arab Emirates, Oman, and Kuwait, all confined to the region of the Arabian Peninsula [1]. Due to its Arabian context, the Corona virus is also referred to as "Middle East Respiratory Syndrome Corona virus". It was discovered that the virus was actually accountable for the epidemic of the severe acute respiratory syndrome in the year 2002-2003, averaging 8,422 cases globally and resulting in 916 deaths [2,3]. Likewise, more than 1626 cases of MERS were reported in 26 countries worldwide, 85% of cases being identified in Saudi Arabia, mostly in Riyadh and Jeddah [4]. According to the Saudi Arabian Ministry of Health, 768 cases have been identified in Saudi Arabia since 2012, 328 of these being fatalities. Additionally, the World Health Organization reported that 586 cases of death were attributed to MERS-CoV since 2012 [4].

Although community spread of MERS-CoV has never been recounted, the risk of contracting an infection is higher when inhabiting the same living domain as an infected individual or entering a health care setting. Transmission of the infection occurs through droplets liberated by infected individuals when coughing or sneezing. Other sources of infection include contaminated surfaces, objects, and hands; the latter being a greater risk when coming into contact with orifices like the mouth, nose, and eyes. The infection can present itself clinically in the form of mild flu-like symptoms on one end of the spectrum to severe acute respiratory illness on the other, even resulting in death; especially in cases associated with co-morbidities [5,6].

Azhar [7] was able to prove in one of his studies that one of the sources of MERS-CoV is camels by isolating identical genomic sequences from both deceased humans and infected camels in Saudi Arabia. Further epidemiological investigations conducted were able to affirm exposure to camels as a risk factor for acquiring MERS-CoV, and thus individuals working in close contact with camels such as farmers, abattoir workers, and veterinarians were given precautionary measures against infection. People were also advised to be careful handling raw camel products such as milk and meat, and given advice on how to prevent cross contamination from infected products to other food items.

Significance of the Study

Till the present time, there is no antiviral treatment or vaccine available for the MERS-CoV, stressing the significance of preventive measures as perhaps the only method available in reducing the spread of the disease. Such measures include care when handling camels or camel products, care when dealing with infected individuals, improving personal hygiene measures like hand hygiene, respiratory etiquette, and cleaning and disinfecting surfaces. Nevertheless, the efficacy of these measures in reducing disease transmission requires giving proper health education to the public to ensure their practice. The significance lies in that the study targets young people, which represent a major sector of the Saudi Arabian population. The aim of the current study is to investigate the effects of one-day education program on knowledge and ways of practices regarding MERS-CoV and its determinants among females' secondary school students.

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Methodology

Design

This prospective study utilized the quasi-experimental research design with a single group of participants. The students were pretested before the administration of the health education program, and then, post-tested after the administration of the health education program. Additionally, post-test, quasi-experimental design was utilized in the current study to examine changes in knowledge and ways of practice after a one-day educational program among secondary school students. Data collection was conducted during the Fall Semester of 2014/2015 in which an a awareness campaign was held nationally by the health authorities (at the Ministry of National Guard and Ministry of health) to enhance community awareness about MERS-CoV using educational materials that varied from traditional posters, newspapers, and brochures to social media outlets. These campaign gadgets contained information about the signs, symptoms, methods of infection and preventive strategies.

Setting

The school from which participants were selected comprised of a one government school under the auspices of the Ministry of National Guard to which students are enrolled to by individuals employed by the Ministry of National Guard.

Sample size

the following formula is used to calculate the size of the current study, $n = (z)^2 p (1 – p) / d^2$, when p = 1/2 (0.5) then the equation will be $n = (z)^2 / 4d^2$. The (n) is sample size and z = level of confidence according to the standard normal distribution (for a level of confidence of 95%, z = 1.96). P is the estimated proportion of the female secondary school students that presents the characteristic (p = 0.5) and d = tolerated margin of error. For the current study a proportion with a 95% level of confidence and a margin of error of 7% we obtain $N = (1.96)^2 / 4(0.07)^2 = 196$. The actual number of student participated in the pretest was 192 [8].

Sample design

Convenience sampling was chosen for the current research study because it was not feasible to test the entire population (all secondary school students in the region of Al Ahsa City) and therefore it was much more convenient for the researcher to recruit female secondary school students under the Ministry of National Guard because such participants were more accessible and proximate to the researcher as there was no difficulty in negotiating access through the desired contacts. The approval was obtained from the Al Ahsa Ministry of Education that permits staff and students at College of Nursing to contact the secondary female students under the Ministry of National Guard, administer and give health education to them, and obtain any necessary information from them for scientific and research purposes.

Data collection method and instruments

The instruments used in this study are designed to test the knowledge regarding the nature of the disease; methods of transmission, prevention, and treatment of the MERS-CoV and ways of practice of preventive measures such as hand hygiene and influenza vaccination were adopted from validated instruments which were previously used in studies assessing Upper Respiratory Tract Infections (URIs) [9]. Based on a thorough literature review, a questionnaire (in simple Arabic Language) had been developed by the researcher, as well as reviewed by committee expertise in the field of infectious disease. The instrument comprises of questions to obtain demographic data about the participants, closed ended questions with responses of (Yes, No, Not sure) were used to obtain data on source of information on the nature of the disease, signs and symptoms; methods of transmission, methods of prevention and ways of practice regarding MERS-CoV and its determinants. The researcher and trained data collectors started first by administrating the pretest materials and explaining the purpose of the study, stating the participants' rights to be excluded and that their participation is of their own choice. The crucial value of knowing about the disease and how to protect their families and communities was also highlighted in the introduction. The questionnaire was easy to understand and to complete. All students participated at their convenient time at the auditorium. The pre-test questionnaires were administrated and collected at the beginning of the day, followed by the educational program. Finally at the end, the post-test questionnaires were distributed and collected shortly after they were filled out.

Health education program

The materials of the program, handouts and posters were reviewed by expertise committee in the field of infectious disease and the program itself composed of four phases. The first phase comprised of a presentation about the nature of the disease, history of the disease in Saudi Arabia, and statistical results about the prevalence of MERS-CoV. The second phase included scientific information about the signs and symptoms of the disease, methods of transmission and prevention. The third phase utilized a hands-on approach to teach students how to apply preventive hygienic measures against MERS-CoV. The fourth and last phase of the program was an exhibition that included posters, handouts, and videos about MERS-CoV and its determinants.

Ethical approval

The study was approved by the Ethical Committee of the College of Nursing and the College Council at King Saud Bin Abdul-Aziz University of Health Sciences and an approval was obtained from the Ministry of Education that permits baccalaureate students at college of nursing to administer and give health education under the supervision of college staff members.

Results

The data entered into a computer and Statistical Package for Social Sciences (SPSS), Version 21.0 used for data analysis. Since this study is a descriptive nature, descriptive statistics were used to summarize the data and to describe the study variables. Means and standard deviations computed for the continuous variables, while numbers and percentages used for the categorical variables. Prior to analysis, the data was examined for missing values and outliers. A Chi square test was applied to describe statistical differences among students before and after the educational program and significance level was considered when P values were less than 0.05.

A total of 192 female secondary school students participated in the current study. The mean age was 16.3±.82; with 49.0% enrolled in first year, 42.7% in the second year and 8.3% in the third year. (Table 1 to Table 6).

Sources of Information	Data for Corona (n=192) %
Do you Suffer from Influenza before?	
Yes	43 (23.9)
No	132 (73.3)
I cannot tell	05 (02.8)
I do not have any information about Corona Virus Cell with	
Yes	40 (21.5)
No	83 (44.6)
Not sure	63 (33.9)
I have some information from Television, Magazine or Internet	
Yes	161 (84.7)
No	19 (10.0)

Not sure	10 (05.3)
I have some information from Scientific Journal and Articles	
Yes	101 (54.3)
No	59 (31.7)
Not sure	26 (14.0)
I have large amount of information as a result of participation in Scientific Journal and Article	
Yes	22 (11.7)
No	138 (73.4)
Not sure	28 (14.9)

Table 1: Illustrates that the majority of the sample (85%) reported that most of their current knowledge regarding corona-virus was obtained from social media settings such as internet sources, television programs and magazines.

Knowledge about nature of the Disease	Data for Corona		P-value
	Before (n=192)%	After (n=152)%	
A Precise micro-organism that cannot be seen with naked eye			
Yes	145 (80.1)	136 (93.2)	<0.001
No	08 (04.4)	07 (04.8)	
Not sure	28 (15.5)	03 (02.1)	
The virus live intruder inside a cell to ensure reproductive, most of the viruses cause varying severity of diseases			
Yes	109 (59.9)	125 (85.6)	<0.001
No	19 (10.4)	11 (07.5)	
Not sure	54 (29.7)	10 (06.8)	
Corona viruses multiplies faster than other viruses			
Yes	83 (46.1)	128 (87.1)	<0.001
No	15 (08.3)	10 (06.8)	
Not sure	82 (45.6)	09 (06.1)	
The closer source of the virus is bats			
Yes	70 (38.9)	118 (79.7)	<0.001
No	36 (20.0)	13 (08.8)	
Not sure	74 (41.1)	17 (11.5)	
The SARS disease produced from corona virus			
Yes	20 (11.6)	88 (71.5)	<0.001
No	31 (17.9)	24 (19.5)	
Not sure	122 (70.5)	11 (08.9)	
Corona viruses can cause colds			
Yes	120 (69.4)	112 (91.1)	<0.001
No	18 (10.4)	10 (08.1)	
Not sure	35 (20.2)	01 (0.8)	
Corona virus causes a variety of diseases in livestock and pets			
Yes	78 (45.6)	106 (89.1)	<0.001
No	21 (12.3)	05 (04.2)	
Not sure	72 (42.1)	08 (06.7)	
The causes of upper respiratory tract infections: Bacteria			
Yes	112 (65.5)	89 (76.7)	<0.001
No	18 (10.5)	20 (17.2)	
Not sure	41 (24.0)	07 (06.0)	
The causes of upper respiratory tract infections: Virus			
Yes	131 (78.0)	112 (90.3)	0.001
No	13 (07.7)	10 (08.1)	
Not sure	24 (14.3)	02 (01.6)	

Table 2: Provides detailed values about the change in the level of knowledge regarding the nature of the disease. There was significant differences in the level of knowledge of all detailed items about the MERS-CoV nature with P = 0.001; such as MERS-CoV cannot be seen with the naked eye; multiplies faster than other viruses; SARS disease produced from MERS-CoV and produce colds.

Symptoms of the Disease	Data for Corona		P-value
	Before (n=192)%	After (n=152)%	
Cough			
Yes	140 (83.3)	109 (91.6)	0.089
No	12 (07.1)	06 (05.0)	
Not sure	16 (09.5)	04 (03.4)	
Fever			
Yes	139 (81.8)	109 (93.2)	0.003
No	17 (10.0)	08 (06.8)	
Not sure	14 (08.2)	0	
Difficulty breathing			
Yes	117 (71.3)	108 (93.1)	<0.001
No	19 (11.6)	05 (04.3)	
Not sure	28 (17.1)	03 (02.6)	
Pneumonia			
Yes	81 (50.0)	94 (82.5)	<0.001
No	28 (17.3)	14 (12.3)	
Not sure	53 (32.7)	06 (05.3)	
Kidney failure			
Yes	24 (14.9)	91 (71.7)	0.004
No	78 (48.4)	29 (22.8)	
Not sure	59 (36.6)	07 (05.5)	
Rhinorrhea			
Yes	95 (57.6)	117 (98.3)	<0.001
No	17 (10.3)	01 (0.8)	
Not sure	53 (32.1)	01 (0.8)	

Table 3: This table presents knowledge about signs and symptoms of the disease. There was a significant difference in the level of knowledge about signs and symptoms of MERS-CoV before and after the program with the students having a better understanding after the teaching program. The percentage of students reporting cough, fever, rhinorrhea, difficulty of breathing followed by pneumonia and kidney failure as symptoms of MERS-CoV in the post test was much higher in comparison to the pretest.

Methods of Transmission	Data for Corona		P-value
	Before(n=192) %	After (n=152)%	
The air through coughing and Sneeze			
Yes	153 (87.9)	116 (97.5)	0.010
No	14 (08.0)	03 (02.5)	
Not sure	07 (04.0)	0	
Shake hands with someone who has a cold			
Yes	84 (50.0)	102 (87.2)	<0.001
No	49 (29.2)	14 (12.0)	
Not sure	35 (20.8)	01 (0.9)	
Touching things used by someone with a cold			
Yes	104 (62.3)	98 (88.3)	<0.001
No	43 (25.7)	10 (09.0)	
Not sure	20 (12.0)	03 (02.7)	
Kissing someone with a cold			
Yes	96 (57.1)	95 (81.9)	<0.001
No	36 (21.4)	18 (15.5)	
Not sure	36 (21.4)	03 (02.6)	
The virus can maintain its ability to pathogenicity for a period that may extend for hours			

Yes	86 (51.2)	101 (87.1)	<0.001
No	25 (14.9)	11 (09.5)	
Not sure	57 (33.9)	04 (03.4)	
Corona viruses are considered weak and the duration of their life outside the body not exceeding 24 hours			
Yes	31 (18.6)	83 (73.5)	<0.001
No	55 (32.9)	22 (19.5)	
Not sure	81 (48.5)	08 (07.1)	
Stay away with a distance of less than half meter when you talk with an infected cold person			
Yes	72 (41.4)	84 (73.0)	<0.001
No	55 (31.6)	23 (20.0)	
Not sure	47 (27.0)	08 (07.0)	
The polluted hands			
Yes	146 (84.9)	110 (94.0)	0.015
No	16 (09.3)	07 (06.0)	
Not sure	10 (05.8)	0	

Table 4: Entails knowledge about the transmission of the disease. There was significant difference in the exchange of knowledge about the transmission of MERS-CoV. Student showed percentage of knowledge increased after the program for modes of transmission such asair through coughing and sneezing, handshaking, touching, kissing, pathogenicity of the virus, and polluted hands.

Prevention of the Disease	Data for Corona		P-value
	Before (n=192)%	After (n=152)%	
Enough Sleeping			
Yes	90 (52.9)	87 (73.7)	<0.001
No	35 (20.6)	20 (16.9)	
Not sure	45 (26.5)	11 (09.3)	
Avoid close contact to people with cold infection			
Yes	151 (83.9)	109 (92.4)	0.075
No	18 (10.0)	07 (05.9)	
Not sure	11 (06.1)	02 (01.7)	
Avoid contact with things used by someone with cold infection			
Yes	143 (81.7)	111 (93.3)	0.014
No	19 (10.9)	06 (05.0)	
Not sure	13 (07.4)	02 (01.7)	
Avoid sharing tool with a cold infected person			
Yes	141 (80.1)	106 (90.6)	0.020
No	19 (10.8)	09 (07.7)	
Not sure	16 (09.1)	02 (01.7)	
Take antibiotics before infection			
Yes	41 (24.0)	65 (57.0)	<0.001
No	80 (46.8)	43 (37.7)	
Not sure	50 (29.2)	06 (05.3)	
Taking medicines for cold and flu symptoms before the start of the disease			
Yes	49 (28.7)	54 (47.0)	0.002
No	90 (52.6)	51 (44.3)	
Not sure	32 (18.7)	10 (08.7)	
Taking vaccines or vaccines for influenza disease			
Yes	137 (78.3)	105 (92.1)	0.008
No	16 (09.1)	04 (03.5)	
Not sure	22 (12.6)	05 (04.4)	
Using herbs or traditional medicines			
Yes	59 (34.7)	56 (48.3)	0.004
No	48 (28.2)	38 (32.8)	
Not sure	63 (37.1)	22 (19.0)	
So far, there is no vaccine or specific treatment for the disease			
Yes	65 (38.7)	90 (67.2)	<0.001
No	35 (20.8)	26 (19.4)	
Not sure	68 (40.5)	18 (13.4)	

Table 5: Illustrated the difference in the level of knowledge among female secondary school regarding methods of prevention. The results showed that students gained knowledge in avoiding exposure to people with cold infection, coughing and sneezing, avoiding contact with things used by someone with cold infection, taking vaccine for influenza and better understanding that there is no vaccine or specific treatment protective against MERS-CoV with significant differences in the pre-test and post-test.

Ways of Practices	Data for Corona		P-value
	Before (n=192)%	After (n=152)%	
Personal cleanliness			
Yes	94 (87.0)	48 (88.9)	0.107
No	07 (06.5)	06 (11.1)	
Not sure	07 (06.5)	0	
The use of masks on the face			
Yes	107 (75.9)	105 (90.5)	0.004
No	20 (14.2)	09 (07.8)	
Not sure	14 (09.9)	02 (01.7)	
The use of tissue that can be discarded or single-use			
Yes	122 (81.3)	105 (86.8)	0.468
No	20 (13.3)	12 (09.9)	
Not sure	08 (05.3)	04 (03.3)	
Vaccination against flue (influenza)			
Yes	95 (73.6)	63 (85.1)	0.154
No	16 (12.4)	06 (08.1)	
Not sure	18 (14.0)	05 (06.8)	
Vaccination of one or more person in the family at home			
Yes	108 (70.1)	98 (81.7)	0.017
No	22 (14.3)	16 (13.3)	
Not sure	24 (15.6)	06 (05.0)	
Avoid contact with infected persons			
Yes	116 (77.9)	107 (87.0)	0.028
No	15 (10.1)	12 (09.8)	
Not sure	18 (12.1)	04 (03.3)	
Avoid touching your nose, mouth or eyes in case of infections			
Yes	111 (76.0)	110 (92.4)	0.001
No	19 (13.0)	07 (05.9)	
Not sure	16 (11.0)	02 (01.7)	
Avoid the exposure to patient sneezing spray			
Yes	118 (80.8)	107 (92.2)	0.014
No	14 (09.6)	07 (06.0)	
Not sure	14 (09.6)	02 (01.7)	
Washing food and fruit well			
Yes	119 (75.8)	112 (91.8)	0.002
No	20 (12.7)	05 (04.1)	
Not sure	18 (11.5)	05 (04.1)	
Wash your hands with soap or Antibacterial cleanser powder continuously all the time			

Yes	127 (81.9)	108 (87.1)	0.486
No	20 (12.9)	12 (09.7)	
Not sure	08 (05.2)	04 (03.2)	

*Results are expressed as number (%)

Table 6: The results about ways of practices against MERS-CoV are explained in Table 6. Students showed better understanding for utilizing masks on the face;the use of tissue that can be discarded or single-use,avoid touching your nose, mouth or eyes in case of infection;with significant differences in the pre-test and post-test. Although, student need more education about personal hygienic care, P=0.107.

Discussion

The current study showed that secondary school students have the significantly higher score in the post-test compared to pre-test. The educational program allowed the majority of students to realize that there is no specific treatment or vaccine to protect against MERS-CoV which reflected in their increased concern of acquiring MERS-CoV infection as well as the clinical features of the Severe Acute Respiratory Syndrome (SARS) and kidney failure. Thus it shows that this program helped to raise student's awareness about the fatality and seriousness of the disease. This study corresponds with as study conducted by [4] to investigate the knowledge, practice, and attitudes of secondary school and university students toward MERS-CoV infection. The results of the mentioned study indicated an adequate level of understanding and knowledge about disease risk amongst both university and high school students with no significant difference between them. Nevertheless, there is a perceptible difference as regards to the knowledge of precautionary measures against the disease, with university students having a higher level of understanding. This could be attributed to stronger educational efforts about prevention being made in university settings in comparison to high schools. Moreover, the results also indicated that most students acquired their information from traditional and social media settings rather than from organized institutional programs. This finding strongly highlights the need for conducting more educational programs especially on ways of practice of preventive measures such as proper use of tissues to prevent the spread of infection and correct tissue disposal.

Another study conducted by [10] interviewed the public to measure their level of knowledge and attitude regarding protective measures for H1N1 influenza pandemic. He found that the greater precaution measures against the H1N1 influenza pandemic were taken by participants who were male ($p < 0.001$), older ($p = 0.047$), male better educated ($p = 0.04$) and more knowledgeable ($p < 0.001$). The education level was the only predictors of increasing knowledge of H1N1 ($p < 0.001$). Moreover, [11] investigated the knowledge of male secondary school students regarding prevention of acute respiratory infections in Abha city. His results indicated that half of the students out of 1030 students answered the questions correctly about the main causative agents for ARTIs and (59.3%) recognized correctly the mode of transmission of ARTIs. He recommended that improving health education is crucial for secondary school students.

Additionally [12], investigated the effects of an educational program among nursing college staff and students during a MERS- corona-virus outbreak in Saudi Arabia. The participants included 133 students and 18 Faculty members. The findings showed that knowledge about MERS-CoV increased and participants were more able to identify the role of a nurse during an epidemic after the program as shown by the results of the post test but still the gap of knowledge existed. He recommends that nursing colleges should be well-equipped to protect students and staff to prevent disease spread especially during an epidemic, unquestionably this will include using comprehensive educational programs to arm them with knowledge about preventive measures.

"Assessment of the Awareness of Middle East Respiratory Syndrome-Corona Virus Infection in Saudi Arabia: Cross Sectional Survey" was done by [13], 73.6% of his participants were females and about 71.2% of the respondents had a university-level education. 72.2% of the participants claimed that they did not receive enough information from their healthcare centres regarding MERS-CoV and the authors concluded that more efforts is needed to raise awareness among Saudi communities. They also stated that health care centres should be better equipped with media necessary for controlling MERS-CoV during an outbreak. Although the results of the current study showed that female secondary school students attained a better understanding of the MERS-CoV and its determinants after the program, it is still limited to only one day of teaching, which is not enough for secondary school students. In other words, some of the questions had a low response rate, which could affect the significance of the outcome answer.

Conclusion

This study was able to investigate the change in the level of knowledge regarding MERS-CoV, nature, modes of transmission, clinical features, preventive measures and ways of practices. There were significant differences between the results of pre-test and post-test in items of the questionnaires except for questions that have low response rate of post-test. The findings suggest that an educational program is crucial for secondary school students as they are the source of knowledge dissemination for their families and communities.

Recommendations

Although student had acquired a better understanding of the nature of the disease, its clinical manifestations, modes of transmission and prevention, it is believed that a more comprehensive educational program would have produced greater and broader outcomes. A more comprehensive program could allow students to gain enhanced practice on the proper use of discarded tissue and correct tissue disposable, how to prevent infection while sneezing and coughing, hand hygienic care, vaccination against influenza, personal hygienic care and protective hygienic care. Advanced health information should be broad casted to all secondary school in all Al Ahsa City through social media as a technique for health prevention and promotion. More strict data collection technique needs to be utilized to acquire wide scale sample.

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