MERS-CoV infection: Mind the public knowledge gap

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ABSTRACT

In August 2015, the Corona outbreak caused by Middle East respiratory syndrome coronavirus (MERS-CoV) was the 9th episode since June 2012 in Saudi Arabia. Little is known about the public awareness toward the nature or prevention of the disease. The aim of this work was to assess the knowledge of the adult population in Riyadh toward the MERS-CoV.

In this cross-sectional survey, a self-administrated questionnaire was distributed to randomly selected participants visiting malls in Riyadh. The questionnaire contained measurable epidemiological and clinical MERS-CoV knowledge level variables and relevant source of information.

The study included 676 participants. Mean age was 32.5 ($\pm$SD 8.6) years and 353 (47.8%) were males. Almost all participants heard about the corona disease and causative agent. The study showed a fair overall knowledge (66.0%), less knowledge on epidemiological features of the disease (58.3%), and good knowledge (90.7%) on the clinical manifestation of the MERS-CoV. Internet was the major (89.0%) source of disease information, and other sources including health care providers, SMS, television, magazines and books were low rated (all <25%). In a multivariate logistic regression analysis age $\leq$30 years (Odds Ratio (OR) = 1.647, 95%CI 1.048–2.584, P = 0.030), male gender (OR = 1.536, 95%CI 1.105–2.134, P = 0.01), and no tertiary education (OR = 1.957, 95%CI 1.264–3.030, P = 0.003) were independent significant predictors of poor epidemiological knowledge.

This study concludes that there was inadequate epidemiological knowledge received by the public and the reliance mostly on the clinical manifestations to recognizing the MERS-CoV disease. Comprehensive public health education programs is important to increase awareness of simple epidemiological determinants of the disease is warranted.

Introduction

Middle East respiratory syndrome coronavirus (MERS-CoV) is a novel coronavirus that causes a viral respiratory disease (Middle East respiratory syndrome, MERS) [1]. Globally, the World Health Organization (WHO) has reported 1864 laboratory-confirmed MERS-CoV cases with 659 associated deaths in 27 countries since September 2012 [2]. According to the last WHO report, the Kingdom of Saudi Arabia (KSA) remains the most afflicted country,

with remarkable morbidity and mortality rates [3]. The first case of coronavirus infection was identified in the KSA in June 2012 [4]. Subsequently, continuous detection of the virus has been reported in different healthcare facilities in the KSA and other Asian countries, including Korea, the United Arab Emirates and Iran [5–8]. Most of the reported cases have emerged from the Middle East; other cases reported elsewhere had direct connections with primary cases of infection in the Middle East [9]. Therefore, many countries worldwide have implemented prevention measures, particularly amongst potential travelers to Middle Eastern countries. The KSA is a particular concern since it is the epicenter of the disease and a destination for millions seeking the Haj pilgrimage or Umrah annually.

Strict guidelines have been developed for disease control and prevention, with a particular emphasis on protective measures [10]. These guidelines include frequent and thorough hand washing and avoiding people who are sick and coughing, undercooked meat, unsafe water, close contact with animals and camel-based

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products, such unpasteurized milk or raw meat [4]. Because no MERS-CoV vaccine is available currently, these protective measures can potentially reduce the risk of viral infection.

Major gaps exist in the knowledge of the epidemiology, prevalence and clinical spectrum of the infection [1]. As highlighted by the WHO, provision of information to the general public about the virus, its transmission modes and adequate protective measures is the cornerstone for prevention and control of the disease [10,11].

Although there is a great need to clarify the nature, genomic features, and epidemiological characteristics of the disease, the number of investigations conducted in this field is far from the expected. This information is urgently needed for the planning and effective implementation of preventive and control measures to combat dissemination of the virus within and outside of the Middle Eastern region. Despite the strong link between the transmission patterns of the disease and both zoonotic transfers and human-to-human transmission [12], data on the risk and contributing factors to the rapid spread and health effects of the virus are lacking, particularly in hospitalized patients from the KSA [8]. Significant questions remain unanswered on the extent of the Saudi people's awareness of the characteristics and nature of this virus. Finding answers to these questions is instrumental for the implementation of effective preventive measures to reduce and control the frequent occurrence of MERS-CoV outbreaks. Increased public awareness of the disease may decrease the risk of the virus and help combat the disease in the annual mass-gathering events that occur in the KSA, such as the Hajj and Umrah. This study aimed to identify the gap in knowledge of the adult population residing in Riyadh, KSA, toward the nature and transmission modes of MERS-CoV infection.

Methods

A cross-sectional study was conducted from June to September of 2015. Five main commercial malls in Riyadh were randomly selected. People in the main cities in the KSA visit malls for different purposes, including shopping and entertainment, all year long. Therefore, malls can be considered representative of the Saudi population for purposes such as scientific research. Approval for the project was obtained from the Research Committee, College of Public Health and Health Informatics, King Saud Bin Abdul-Aziz University for Health Sciences, and from the Institutional Research Board Committee (IRBC) at King Abdullah International Medical Research Center (KAIMRC) (#IRBC/383/15), Riyadh, National Guard Health Affairs at the Ministry of the National Guard.

The study included Saudi adults living in Riyadh aged 18 years and older. The study excluded non-Saudi adults or visitors from outside of Riyadh. Proportional quota sampling was used to ensure that the respondents were demographically representative of the general population, with quotas based on age, gender, region and social class. A sample size of 768 was calculated based on an expected 50% proportion of poor knowledge in this population toward MERS-CoV transmission and prevention measures at 80% power with a 95% confidence level and a design effect of two [10]. A two-stage sampling method was employed. The first stage consisted of selecting 5 top malls located in different zones of Riyadh city (north, south, middle, east, and west). Then, a simple random sample of adults shopping in these malls who were willing to participate in the study was interviewed using a self-administered questionnaire. To measure the level of knowledge in both males and females, a 1:1 ratio was purposefully chosen. The enrollment strategy was undertaken to cover all three different work shifts of the malls (morning, afternoon, and night). Of 768 possible participants, 676 individuals of both genders were successfully interviewed (response rate = 88.02%).

Data collection tool

All respondents were informed of the purpose of the study. Consenting participants were selected randomly from each study site, and a self-administered questionnaire was distributed and filled out by the participants. The questionnaire was initially designed in English after a thorough search for relevant recent literature on public knowledge, attitudes and practices. Further information was retrieved from the WHO and the KSA Ministry of Health websites on both the H1N1 virus [10] and MERS-CoV [13–15] and was adapted with some modifications to the local context of both the nature of coronaviruses and the cultural context of the KSA. Furthermore, the questionnaire was reviewed by experts in infectious diseases for relevance, simplicity and internal consistency. Arabic translation of the questionnaire was conducted by a professional translator.

The questionnaire was designed to contain 5 parts, of which three parts were reported in this study. These parts included socio-demographic information [age (<30 or ≥30 years), gender, marital status (married or unmarried), education level (tertiary or no tertiary) and occupation (employed or unemployed)], seven questions on the participants' sources of information about the disease and 18 questions measuring the level of knowledge (nature of the disease, transmission, signs and symptoms, and methods of prevention). A Likert scale (yes, no, and do not know) was used in 18 questions to measure knowledge. The 18 knowledge questions were categorized into two knowledge domains (epidemiological and clinical). The former domain included 10 questions, and the latter domain included 8 questions. The epidemiological domain questions were related to knowledge of the nature of the causative agent, modes of transmission (droplets, contact, and animal to man or other transmission), incubation period and availability of vaccines. The clinical domain measured knowledge of the clinical signs and symptoms (cough, fever, shortness of breath, pharyngitis, diarrhea, no symptoms, death and other consequences) and questions inquiring about the availability of a cure for the disease. To evaluate the responses to these questions, a correct answer was allocated a value of one, and a wrong answer was allocated a value of zero. The total possible knowledge score of 18 (range from 0 to 18) was dichotomized to poor knowledge if the total score was <14 (25th percentile of the total score) or good knowledge if the score was ≥14.

A pilot study on 20 subjects was conducted, and the data were analyzed to ensure face validity, comprehension and feasibility. Cronbach's alpha reliability coefficient was 0.71, which was considered satisfactory for the purpose of this study.

Data analysis

Data were summarized as frequencies and proportions and were compared using the Chi-square test. Logistic regression models were fitted to identify factors associated with a poor score (a score <14). Variables found significant in the univariate analyses were included in the final multivariate logistic regression analysis. All tests were two-sided, and statistical significance was considered at a P-value of <0.05. The data entry and statistical analysis were performed using the Statistical Program for Social Sciences (IBM SPSS Corp, SPSS Statistics ver. 20, USA).

Results

Sociodemographic characteristics of the participants

The study included 676 participants. Of these, 289 (42.8%) were aged <30 years, 353 (52.2%) were males, 389 (57.5%) were married, 557 (82.4%) had received a tertiary education and 622 (92%)