



## Original Article

# “Your Health Essential for Your Hajj”: Muslim pilgrims' knowledge, attitudes and practices regarding Middle East respiratory syndrome coronavirus (MERS-CoV) during Hajj season

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## ABSTRACT

**Background:** Up to date, there have been no studies to evaluate pilgrims' knowledge, attitude and practices regarding MERS-CoV during the annual Hajj pilgrimage in order to see whether there is a need for these aspects to be improved.

**Methods:** A cross-sectional survey study was conducted with a convenience sampling. Participants were pilgrims, aged over 18, and able to speak Arabic or English. A self-administered structured questionnaire was distributed during Hajj season in Mecca. Descriptive and multiple linear regression analysis were used in data analysis.

**Results:** Two hundred and fifty-seven participants completed the study, 80% of whom were female, and the median (IQR) age was 35 (24.5–43.5) years. Pilgrims had moderately correct knowledge and accurate attitudes about MERS-CoV with median scores of 5 (IQR: 4–7) and 6 (IQR: 5–7) respectively. Educational level and employment status were significantly associated with knowledge whereas gender and age were significantly associated with attitude and practices respectively ( $P < 0.05$ ). The correlation between knowledge, attitude and practices was significant (correlation coefficient: 0.207;  $P < 0.05$ ). Better knowledge was found to be a predictor for positive practice.

**Conclusions:** These findings will provide insight when designing future interventions to promote specific messages to enhance knowledge, change attitude and improve practice regarding MERS-CoV.

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## 1. Introduction

The Hajj has become the world's largest annually recurring mass-gathering event, attracting more than three million pilgrims from over 184 countries around the world; these pilgrims are often elderly and have underlying medical conditions [1,2]. The factors of old age, presence of comorbidities, extreme weather conditions and overcrowding in mass gatherings such as the annual Hajj pilgrimage in Saudi Arabia, present a high risk of acquisition of airborne infections with the potential for their transmission in the pilgrims' country of origin [3].

The risk of importing serious infections from the Hajj has increased since the emergence of the Middle East respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia and other

neighbouring countries in September 2012 [4]. While most confirmed MERS-CoV cases originate in the Arabian Peninsula, several MERS-CoV infections have been imported to Europe, Asia, Africa and North America, all with direct or indirect connection with the Middle East [4]. These imported cases highlight the fact that MERS-CoV, like other airborne viruses such as influenza, has the capability for worldwide spread. Clinical presentation of MERS-CoV infection ranges from asymptomatic to very severe pneumonia with acute respiratory distress syndrome (ARDS), septic shock and multi-organ failure resulting in death [3–5].

To prevent the spread of infections during the pilgrimage or in the pilgrims' home countries upon their return, the Saudi Ministry of Health (MoH) publishes annual recommendations for Hajjis with advice for elderly adults  $\geq 65$ , pregnant women, children, and those with multiple chronic conditions preferably to postpone Hajj, and those who do attend are requested to maintain optimum preventive measures such as regular hand washing, using disposable

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materials and using masks [6,7]. Knowledge and application of basic hygiene principles and measures in such an environment is therefore vitally important. However, pilgrims may not be aware of MERS-CoV and the protective measures that should be followed to reduce the spread of infectious diseases during the Hajj as had been reported in previous studies [8,9]. As pilgrims' awareness is highly important to control the disease, this study aimed to evaluate pilgrims' knowledge, attitude and practices regarding MERS-CoV during the annual Hajj pilgrimage in Saudi Arabia.

## 2. Methods

### 2.1. Study setting, recruitment, data collection and sample size

A descriptive cross-sectional survey was performed among pilgrims who attended Hajj 2015. The participants were recruited from one of Saudi Arabia's Hajj campaigns. This campaign was selected via convenience sampling. Approval to conduct the study was obtained from the director of the campaign. The survey was conducted in Mina, Mecca, for a period of three days (i.e., 11th of Dhu Al-Hijjah 1436 Hejre to 13th of Dhu Al-Hijjah 1436 Hejre (25–27 September 2015)). The ritual performed on these days is called the Stoning of the Devil and it takes place at Jamarat, Mina. During this ritual, pilgrims throw seven tiny pebbles at each of three white pillars and then they go back to their place of residence in Mina, where they had plenty of time to fill out the questionnaire.

The Hajj pilgrims were sampled using a convenience sampling technique. The inclusion criteria for eligible participants were: (1) people aged 18 or over, (2) able to speak Arabic or English, and (3) willing to take part. Once identified and informed about the study by the researchers, all potential participants were invited to take part. The data were collected by two researchers using a questionnaire-based survey. In order to have a 95% confidence level with a plus or minus 5% margin of error in the results, the study needed to survey at least 384 individuals (i.e., using the formula for the margin of error). The sample size was increased to 500 during the data collection to take into account non-responses.

### 2.2. Questionnaire

A self-administered structured survey questionnaire was designed and used as a tool for data collection. The survey consists of four sections with a total of 35 questions.

- (1) Section one: This section is comprised of eight items; it is mainly focused on participants' characteristics including age, gender, nationality, etc.
- (2) Section two: The main aim of this section is to evaluate the Hajj pilgrims' general knowledge about coronavirus. Dichotomized "yes", "no" and "don't know" options were used for the purpose of evaluation using nine items. To make a clear demarcation of participants' knowledge level, the responses were scored. Every correct answer added one mark to a participant's total score, and zero was given for wrong or uncertain answers. The minimum possible score for each section (knowledge, attitude and practices) is zero, while the maximum is nine. To discern the knowledge differences among the groups, the knowledge score was further divided into three categories: a cut-off value of  $\geq 8$  was taken as good knowledge, while between 5 and 7 was considered moderate and a score of  $\leq 4$  was considered as a poor knowledge score.
- (3) Section three: This section evaluated participant attitudes and beliefs about coronavirus. Nine items were provided for the participants to disclose their beliefs using a three-item

Likert-type scale (agree, disagree, uncertain). Every appropriate attitude added one mark to a participant's total score, and zero was given for inappropriate attitude. A cut-off value of  $\geq 8$  was taken as good attitude, while between 5 and 7 was considered moderate and a score of  $\leq 4$  was considered as a poor attitude score.

- (4) Section four: This section is comprised of nine items that assess practices and behaviours of pilgrims regarding coronavirus using dichotomized "yes" and "no" options. Every appropriate behaviour added one mark to a participant's total score, and zero was given for inappropriate behaviour. A cut-off value of  $\geq 8$  was taken as good practice while between 5 and 7 was considered moderate and a score of  $\leq 4$  was considered as a poor practice score.

The median total scores based on responses to the three parts (knowledge, attitude and practices) were estimated, with a maximum possible score of 27 and a minimum score of 5. For quantitative analysis, a score greater than 80% ( $\geq 22/27$ ) of the possible maximum score was considered good, between 60% and 80% (21–16/27) was considered moderate and less than 60% ( $\leq 15/27$ ) was considered poor [10,11]. The median total score and the median score for the knowledge, attitudes and practices parts were compared based on the participants' characteristics.

### 2.3. Questionnaire validity and reliability

An extensive literature search was conducted initially by the chief investigator and research articles were shortlisted for further discussions among the research team in order to design a structured survey questionnaire. An initial draft of the survey questionnaire was developed after the research team had comprehensively reviewed the Centers for Disease Control and Prevention (CDC), World Health Organization (WHO) and MoH websites [4,6,7,12] and all the selected articles [13,14]. The questionnaire was then subjected to face validity and content validity.

The draft was sent to an expert panel of one clinical pharmacist, one community pharmacist and one academic who are professionally trained and familiar with the concepts being examined in the study for their opinion and comments on the contents of the questionnaire. A second version of the questionnaire was developed after taking the panel's recommendations into account. The questionnaire was then sent to a small sample of five people who performed Hajj last year for their comments and suggestions on making the questionnaire more accommodating. The data were then subjected to analysis by the Statistical Package for the Social Sciences (SPSS) to gain the reliability coefficient. A Cronbach's alpha of 0.82 was computed. Any necessary changes were incorporated after a series of discussions among the research team and expert panel. Since no inherent difficulties in understanding and answering were reported by the respondents, the same questionnaire was used without any major modifications. This final version of the questionnaire was then distributed to pilgrims for data collection. The questionnaire was translated into Arabic, using forward-backward translation [15].

### 2.4. Data analysis

SPSS version 22.0 was used for data analysis. Data were checked for normality before analysis by the Kolmogorov–Smirnov test and by examining normality plots. Specific procedures including descriptive statistics, t-test (for normally distributed data), Mann–Whitney test and Kruskal–Wallis test (for not-normally distributed data), and Chi-square (for non-parametric data) were used as appropriate to identify possible contributory factors

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