Psychobehavioural responses to the 2014 Middle East respiratory syndrome-novel corona virus (MERS CoV) among adults in two shopping malls in Jeddah, western Saudi Arabia

N.S. AlNajjar,[1] L.M. Attar,[1] F.M. Farahat[2,3] and A. AlThaqafi[2]

الاستجابة النفسية السلوكية لفيروس كورونا الجديد المسبب لمتلازمة الشرق الأوسط التنفسية (2014) لدى البالغين في مجمعين للتسوق في جدة، غرب المملكة العربية السعودية

نسرين سعيد النجار، لجين مدحت عطار، فيصل مصطفى فرحات، عبد الحكيم عقاب الثقفي

الخلاصة: تم اكتشاف متلازمة الشرق الأوسط التنفسية التي يسببها فيروس كورونا أولاً في المملكة العربية السعودية في يونيو/ حزيران 2012. ولقد بلغ عدد الحالات أعلى مستوى له خلال شهر أبريل/ نيسان 2014. ولتقييم محدِّدات الاستجابة النفسية والسلوكية بين عامة السكان في جدة، الواقعة غرب المملكة العربية السعودية، تم تنفيذ مسح مقطعي في نهاية شهر يونيو/ حزيران 2014. وتضمنت المعطيات الخصائص الاجتماعية والسكانية، ومستوى القلق، والتدابير المتخذة للوقاية، والاستجابة بالتجنب الاجتماعي. ولقد استكمل الاستبيان 358 مشاركاً في الدراسة، وكان ٪58.4 منهم من النساء، وكانت الأعمار تتراوح بين 18 و 72 عاماً. ولم يسبق لأحد من المشاركين أن شخص لديه الإصابة بفيروس كورونا الجديد المسبب لمتلازمة الشرق الأوسط التنفسية. ولقد سجل أكثر من نصف المشاركين (٪57.7) درجة معتدلة من القلق باستخدام مقياس القياس البصري المضاهئ. وقد ترافق مستوى القلق مع زيادة ذات أهمية لإدراك قابلية التعرض للعدوى ولسلوكيات اجتماعية للتجنب تتعلق بالسفر وبالحضور في الأماكن العامة.

ABSTRACT Sporadic cases of Middle East respiratory syndrome caused by a novel corona virus (MERS-CoV) were first detected in Saudi Arabia in June 2012. The number of cases was highest during April and May 2014. To assess determinants of psychobehavioural responses among the general population in Jeddah, western Saudi Arabia, a cross-sectional survey was conducted at the end of June 2014. Data included sociodemographic characteristics, level of anxiety, protective measures and social avoidance responses. A total of 358 participants completed the questionnaire; 58.4% were female, and the age range was 18–72 years. None of the participants was diagnosed with MERS-CoV. More than half (57.7%) recorded a moderate anxiety score using a visual analogue scale. Anxiety level was significantly associated with increased perception of susceptibility to infection and social avoidance behaviours related to travel and being in public places.

Réactions psycho-comportementales à l'infection par le coronavirus du syndrome respiratoire du Moyen-Orient (MERS-CoV) de 2014 chez des adultes interrogés dans deux centres commerciaux de Djeddah, dans l'ouest de l'Arabie saoudite

RÉSUMÉ Des cas sporadiques d'infection par le coronavirus du syndrome respiratoire du Moyen-Orient (MERS-CoV) ont été détectés pour la première fois en Arabie saoudite en juin 2012. Le nombre de cas le plus élevé a été observé en avril et mai 2014. Afin de mesurer les déterminants des réactions psycho-comportementales de la population générale de Djeddah, dans la partie occidentale de l'Arabie saoudite, une étude transversale a été conduite fin juin 2014. Les données incluaient les caractéristiques socio-démographiques, le niveau d'anxiété, les mesures de protection et la mise en place de mesures d'éviction sociale. Un total de 358 participants ont rempli le questionnaire, dont 58,4 % de femmes, les âges étant compris entre 18 et 72 ans. Le MERS-CoV n'a été diagnostiqué chez aucun patient. Plus de la moitié (57,7 %) a rapporté un score d'anxiété modéré en se basant sur une échelle visuelle analogue. Le niveau d'anxiété était associé de façon significative à une perception augmentée de sensibilité à l'infection et au phénomène d'éviction sociale lié à la possibilité de voyager ou de se rendre dans les lieux publics.

[1]College of Medicine, King Abdul Aziz University, Jeddah, Saudi Arabia. [2]King Saud bin AbdulAziz University for Health Sciences, King Abdullah International Medical Research Center, Infection Prevention and Control, King AbdulAziz Medical City, Ministry of National Guard Health Affairs, Jeddah, Saudi Arabia. [3]Department of Public Health and Community Medicine, Faculty of Medicine, Menoufia University, Menoufia, Egypt. (Correspondence to: F.M. Farahat: farahatfa@ngha.med.sa)

Received: 31/10/15; accepted: 03/08/16

Introduction

A Middle East respiratory syndrome caused by a novel corona virus (MERS-CoV) was first detected in Saudi Arabia in June 2012. The number of cases increased to a peak in April and May 2014 (*1,2*). The total number of reported cases up to June 2014 was 714, with a case fatality rate of 40.8% (*1*). Another peak occurred in 2015, however, with fewer cases (440 to end of December 2015) (*1*).

Most patients with MERS-CoV infection were severely ill with pneumonia and acute respiratory distress syndrome, and some had acute kidney injury (*3*). Up to June 2014 the mode of transmission was uncertain but was thought to be through direct (droplet) or indirect (touching contaminated surfaces) contact (*4*).

Unconfirmed beliefs about modes of transmission and doubts regarding the adequacy of national preparedness influence public compliance with precautionary measures and have been associated with avoidance behaviours and increased psychological distress (*5,6*). Avoidance behaviours and anxiety symptoms were experienced during the human avian influenza outbreaks and the SARS epidemic (*7–9*). During the 2009 H1N1 pandemic, anxiety was associated with high perceived susceptibility to infection and disease severity that influenced hygiene measures (*5*) or led to social distancing, rather than substantial changes in hygiene behaviour (*10*).

People are more compliant if they believe they may be affected by the outbreak (*11,12*), the recommended behaviours are effective (*13*), the illness has severe consequences (*14*) or is difficult to treat (*15*) and there is sufficient information on controlling the spread of infection (*16*).

Knowledge of psychobehavioural responses among the general public during epidemics could determine risk communication and public health interventions (*10,17*).

A study conducted on healthcare workers in a tertiary care hospital in Jeddah during the 2014 MERS CoV outbreak reported emotional distress and reluctance to work overtime in despite their feelings of ethical and professional obligation towards their profession (*18*). During the 2014 emergence of MERS-CoV, other generally observed public responses (e.g. avoiding crowded places and hospitals, wearing face masks in mosques and public areas and changing travel plans) have not yet been explored.

Accordingly, our study aims to address psychobehavioural responses in terms of psychological distress/anxiety and avoidance behaviours associated with MERS CoV occurrence among the Saudi population in Jeddah, western Saudi Arabia, where the majority of cases were reported during the 2014 outbreak.

Methods

We carried out a cross-sectional study in June 2014 in 2 shopping centres in Jeddah, western Saudi Arabia. These centres were selected by a simple random sampling technique from a list of 12 large shopping malls which people visit for shopping, recreation and to meet friends.

Study participants were selected using a convenience sampling technique among people who were sitting in the open dining areas from 17.00–22.00 hours during the study period (16–26 June 2014). Study participants included male and female adult (> 18 years) Saudi Arabian and non-Saudi Arabian people residents of Jeddah during the 2014 MERS-CoV outbreak.

Verbal consent was obtained from each participant to voluntarily participate in the study. The purpose of the study, procedures, risks, benefits and alternatives to participation were explained to each potential participant. Each potential participant was afforded sufficient time to ask questions and consider whether or not to participate in the study and complete the questionnaire.

Data were collected through a self-administered questionnaire developed based on similar previous studies conducted in China and Hong Kong during the H7N9 and H1N1 epidemics (*10,19*). The questionnaire included data on sociodemographic characteristics of the participants, avoidance responses, use of protective measures, perceptions and overall knowledge about the 2014 MERS-CoV outbreak. Knowledge was assessed through 7 questions on mode of transmission, clinical features, severity, prevention and availability of a vaccine. One point was given for every correct response and zero for an incorrect response. Those who scored ≥ 4 out of 7 (> 50% correct) were considered as having average/high knowledge.

The questionnaire was pretested for face and content validity, length and comprehensibility. Face validity was established by expert opinion. The pretest was conducted on 10 volunteer participants (5 male and 5 female) randomly selected from the same location. After pretesting, no changes were required. A 5-point Likert response scale was applied and the average time for completion was about 10 minutes.

A 10 cm horizontal line visual analogue scale (VAS) was used to assess level of anxiety among the study population (*20–21*). At the left edge zero = not at all anxious, and at the right edge 10 = extreme anxiety. Each participant marked the point on the line that they felt represented their level of anxiety towards the MERS CoV infection. The distance from the left edge to the mark was measured to the nearest mm and used in analyses as the participant anxiety score (*21,22*). The VAS is a valid, reliable, simple to administer tool that has been used successfully for assessing a variety of health outcomes including

Table 1 Regression analysis of independent variables associated with anxiety among a sample of adults in Jeddah, 2014, *n* = 358

Variable[a]	Anxiety VAS ≥ 5 No. (%)	Anxiety VAS < 5 No. (%)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Sex				
Male	77 (52.4)	70 (47.6)	1	1
Female	129 (61.4)	81 (38.6)	1.45 (0.95–2.22)	1.14 (0.65–2.01)
Age				
≤ 30 years	102 (55.4)	82 (44.6)	1	1
> 30 years	67 (63.2)	39 (36.8)	1.38 (0.85–2.26)	1.21 (0.62–2.35)
Nationality				
Saudi Arabian	146 (56.4)	113 (43.6)	1	1
Non-Saudi Arabian	42 (60.9)	27 (39.1)	1.20 (0.70–2.07)	1.55 (0.71–3.40)
Marital status				
Single	79 (51.6)	74 (48.4)	1	1
Married	127 (62.6)	76 (37.4)	1.57 (1.02–2.40)	1.67 (0.98–2.85)
Education				
Less than university	47 (54.7)	39 (45.3)	1	1
University	155 (58.9)	108 (41.1)	1.19 (0.73–1.95)	1.14 (0.98–1.33)
Income[b]				
Enough	178 (58.0)	129 (42.0)	1	1
Not enough	28 (56.0)	22 (44.0)	0.92 (0.51–1.69)	1.03 (0.40–2.66)
Perception of personal health status				
Satisfied	143 (53.8)	123 (46.2)	1	1
Not satisfied	63 (68.5)	29 (31.5)	1.87 (1.13–3.09)	2.49 (1.31–4.75)
Know of MERS CoV positive case				
No	158 (56.8)	120 (43.2)	1	1
Yes	45 (61.6)	28 (38.4)	1.22 (0.72–2.07)	1.03 (0.52–2.04)
Percieved probability of being infected with MERS CoV				
Unlikely	99 (47.4)	110 (52.6)	1	1
Likely/very likely	105 (73.4)	38 (26.6)	3.07 (1.94–4.86)	3.25 (1.86–5.70)
Overall knowledge on MERS CoV				
Not enough	66 (56.4)	51 (43.6)	1	1
Enough	137 (591)	95 (40.9)	1.11 (0.71–1.75)	1.15 (0.64–2.06)

CI = confidence interval.
OR = odds ratio
VAS = visual analogue scale (5 is the median score of the study sample);
[a]Data missing for some variables.
[b]Self-reported income: enough = being able to cover monthly expenses.

pain (*23*), quality of life (*24*), mood (*25*) and anxiety (*21,22*).

All questionnaires were anonymous. Approval of the Institutional Research Board of King Abdullah International Medical Research Center was obtained to conduct the study.

Sample size was estimated assuming 25% prevalence of anxiety related to the emergence of MERS CoV in Jeddah based on a similar study by Rubin et al. during the swine influenza outbreak (*26*). At 95% confidence interval, 5% margin of error, 285 was estimated as the sample size. This was increased to 400 to compensate for incomplete questionnaires or non-response.

Statistical analysis

Data were analysed using *SPSS*, version 21. The Mann–Whitney and Kruskal–Wallis tests were applied to compare anxiety scores in different groups. Associations between independent variables and anxiety were assessed using univariate and multivariate logistic regression analysis, with calculation of odds ratios

Table 2 Mean anxiety score regarding MERS-CoV infection a sample of adults in Jeddah, 2014, *n* = 358

Avoiding behaviour	Anxiety score[a] mean (SD)	*P*-value[b]
Change plan for Umrah		
Yes (*n* = 54, 30.68%)	5.78 (2.35)	0.001
No (*n* = 122, 69.32%)	4.52 (2.17)	
Postpone planned domestic travel		
Yes, due to MERS CoV (*n* = 50, 17.36%)	5.66 (2.31)	0.01
Yes, not due to MERS CoV (*n* = 238, 82.64%)	4.74 (2.21)	
Postpone planned international travel		
Yes, due to MERS CoV (*n* = 35, 12.23%)	6.09 (2.21)	0.002
Yes, not due to MERS CoV (*n* = 251, 87.76%)	4.79 (2.25)	
Avoid eating outside the home		
Yes, due to MERS CoV (*n* = 67, 21.54%)	5.91 (2.41)	0.001
Yes, not due to MERS CoV (*n* = 244, 78.46%)	4.71 (2.17)	
Avoid visiting hospitals		
Yes, due to MERS CoV (*n* = 155, 48.29%)	5.34 (2.28)	0.03
Yes, not due to MERS CoV (n = 166, 51.71%)	4.78 (2.25)	
Avoid public places		
Yes, due to MERS CoV (*n* = 84, 26.33%)	5.89 (2.27)	0.001
Yes, not due to MERS CoV (*n* = 235, 73.67%)	4.67 (2.19)	

SD = standard deviation.
[a]Scored on a 10 cm visual analogue scale.
[b]Mann–Whitney test.

and 95% confidence intervals. Anxiety score was used as a binary variable (≥ 5 vs < 5) in the regression analysis. Only those variables which were statistically significant in the crude analysis were introduced in the final model. Statistical significance was set at $P < 0.05$.

Results

A total of 400 participants of about 420 approached agreed to complete the questionnaire. Questionnaires that were returned blank or with the majority of the questions unanswered, including those which were not marked on the anxiety VAS, were excluded: a total of 358 questionnaires were analysed. Demographic characteristics can be seen on Table 1. More than half of the participants were female (210, 58.7%). Age ranged between 18 and 72 years. The majority of the participants were Saudi Arabian (259, 72.3%). About three-quarters reported feeling satisfied about their general health condition.

None of the participants had been diagnosed with MERS-CoV. Around one-fifth of them (73, 20.4%) knew of a confirmed case of MERS-CoV (Table 1), of whom 87.7% (*n* = 64) had been admitted at hospital and 74.0% (*n* = 54) had died. When asked about the probability of being infected with MERS CoV, 58.6% perceived the probability of infecton as unlikely compared with 27.2% who percieved it as likely and 13.8% as very likely (Table 1).

More than half the participants (57.7%) reported anxiety level score of ≥ 5 (study sample median) on a 10 cm VAS [mean anxiety score 4.94, standard deviation (SD) 2.29].

Univariate logistic regression showed that married people, those who were not satisfied with their health status and those who perceived they had a greater probability of being infected were at greater risk of anxiety compared with their counterparts [odds ratio (OR) = 1.57, 95% confidence interval (CI): 1.02–2.40; OR = 1.87, 95% CI: 1.13–3.09; OR = 3.07, 95% CI: 1.94–4.86 respectively] (Table 1). In the multivariate regression analysis, only perception of personal health status and perception of greater probability of being infected were significant predictors of anxiety during the 2014 outbreak (OR = 2.49, 95% CI: 1.31, 4.75; OR = 3.25, 95% CI: 1.86, 5.70 respectively) (Table 1).

Level of anxiety was significantly associated with several avoiding behaviours, including changing plans for performing Umrah, postponing domestic or international travel, avoiding eating outside the home and avoiding visiting hospitals and public places ($P < 0.05$) (Table 2). Analysis was done among those who responded they had plans for Umrah or travel.

Mean anxiety level was significantly associated with hand washing after

Table 3 Mean anxiety score and personal hygiene behaviour among a sample of adults in Jeddah, 2014, *n* = 358

Variable	Anxiety level[a] mean (SD)	*P*-value*
Cover mouth		
Always	4.96 (2.91)	0.506
Usually	4.72 (2.92)	
Sometimes	4.74 (2.99)	
Rarely	4.62 (4.03)	
never	5.41 (3.26)	
Wash hands after cough or sneeze		
Always	5.48 (3.08)	0.013
Usually	5.13 (2.84)	
Sometimes	4.67 (2.77)	
Rarely	3.79 (2.65)	
Never	3.53 (2.93)	
Wash hands after coming back home		
Always	5.14 (3.00)	0.44
Usually	5.06 (2.70)	
Sometimes	4.63 (2.85)	
Rarely	3.7 (2.90)	
Never	6.25 (3.50)	
Wear face mask		
Always	5.47 (3.09)	0.002
Usually	6.1 (2.83)	
Sometimes	5.64 (2.88)	
Rarely	4.92 (2.81)	
Never	4.28 (2.91)	

SD = standard deviation.
[a]Determined using a 10 cm visual analog scale.
**Kruskal–Wallis test.*

coughing or sneezing ($P = 0.013$) and wearing a face mask ($P = 0.002$) (Table 3).

The main information source for MERS-CoV was television (TV) the mode of transmission of MERS-CoV, clinical manifestations and prevention was modest.

Prevalence of anxiety about MERS-CoV in our study was higher (57.7%

Anxiety was associated with perception of increased susceptibility to infection, in concordance with Cowling et al. (*10*), as well as satisfaction with general health status.

Only 13.8% of our participants perceived themselves as very likely to acquire MERS-CoV, similar to the findings of Lau et al., who reported that 10% of participants considered themselves to have a high or very high chance of contracting influenza A/H1N1 during the prepandemic period (*27*).

The most common source for information on the disease in this study was TV, which is consistent with previous studies during other influenza epidemics. Akan et al. found the majority of the university students in their study (89%) had received information from the mass media (TV) (*28*). Also, TV was the major source of information (38.6%) in a study carried out in India during the 2009 H1N1 pandemic (*5*). This finding is important as it demonstrates that mass media (specifically TV) continues as a major source of health information, contrary to the expected shift towards internet sources and other smart mobile applications. An interesting observation in our study was related to the use of new applications (e.g. WhatsApp) and short message services (SMS) as important sources for public awareness. Considering how widespread the use of these applications is among the study population, they might lead to increased public panic because of rumors and incorrect