RESEARCH MANUSCRIPT

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Public knowledge, attitude, practices, and level of anxiety toward the COVID-19 pandemic among people living in Oman

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Abstract

The purpose was to examine knowledge, attitudes and preventive practices, as well as anxiety and stress of people living in a Gulf country with a diverse population toward the coronavirus disease 2019 (COVID-19) pandemic. A descriptive cross-sectional, exploratory design was used to meet the aims of this study. The target population was all individuals aged 18 years and older and who can read and write Arabic, English, or Hindi. The results showed that most individuals demonstrated a high level of knowledge regarding COVID-19. Most individuals believed that COVID-19 is not fatal and that countries can control the COVID-19 virus. Despite the lower levels of anxiety and stress among this population, many individuals reported high levels of stress and anxiety. Higher levels of anxiety, higher levels of knowledge, and being married were associated with more preventive practices. This study showed that the level of knowledge is positively associated with compliance with preventive measures. Providing the public with accurate and consistent information regarding COVID-19 may enhance their compliance with preventive measures. Using different risk communication strategies will ensure collaboration from the public and encourage them to be active members when facing contagious diseases

KEYWORDS
anxiety, COVID-19, knowledge, preventive practices, stress

1 | INTRODUCTION AND BACKGROUND

Emerging infectious diseases have become increasingly frequent and more widespread during the last 20 years. Contagious diseases can impact all dimensions of life, including social, economic, spiritual, and psychological. Traditional measures including advancements in healthcare have not been completely successful in preventing and controlling contagious diseases in a timely manner.[1]

Collaborative efforts are important when facing contagious diseases. Public awareness is a key factor in any effort to prevent and control these diseases. Compliance with preventive measures is crucial for saving lives, protecting health, and saving the economy and financial resources. Therefore, it is important to evaluate and understand public knowledge, attitudes, and practices, as well as the level of anxiety and stress at the time of pandemics. Understanding these factors can help to determine strategies to enhance compliance of the general public with preventive measures. For example, understanding public practices and attitudes can help to understand how to communicate with the public and send effective messages regarding compliance with governmental instructions and guidelines. These strategies are cost-effective and easy to accomplish.

Oman is characterized as an Arab, Gulf, and Islamic country. There are an estimated 4.65 million people in Oman. Approximately

58.3% of people in Oman are Omanis, with the remaining 41% being expats from many countries all over the world.[2] Oman is considered an ethnically diverse country as expats come from different cultures and ethnicities. Therefore, Oman is considered a good example for understanding public knowledge, attitudes, behaviors, and practices, as well as levels of anxiety and stress, in a country with a diverse population.

The first case of coronavirus infection was reported in December 2019 in China; this was later named coronavirus disease (COVID-19). COVID-19 is an infectious disease caused by a novel type of coronavirus.[3] On March 11th, 2020, the World Health Organization (WHO) declared COVID-19 to be a pandemic disease. By April 2nd, 2020, COVID-19 had spread to more than 203 countries, territories, or areas, infecting over a million individuals and killing more than 56,000.[4] As of March 14th, 2021, COVID-19 has caused more than 119 million cases and more than 2.6 million deaths worldwide.[5] On April 2nd, 2020, the total number of confirmed COVID-19 cases had reached 231.[6] As of March 28th, 2021, the number of cases exceeded 156,000 cases, while 1662 individuals have died due to COVID-19 in Oman. COVID-19 is a highly contagious disease that spreads mainly from person-to-person contact through respiratory droplets produced when an infected person coughs, sneezes, or talks. The virus can also spread from contact with contaminated surfaces and objects. The incubation period of COVID-19 is reported to range from 1 to 14 days, meaning that the disease can easily spread globally.[7] To prevent the spread of COVID-19, the WHO has recommended preventive measures including strict hand hygiene, personal protective equipment, social distancing, quarantine, and seeking medical help when needed.[8] As a result, countries have implemented physical distancing measures, such as lockdown to limit the spread of the disease; this includes closing public places, limiting or banning travel, closing borders, and staying at home orders.[9]

Successful control efforts by countries are based on an individual's and the general public's knowledge and perception, behaviors, and practices.[10] Previous studies on controlling and limiting epidemic infectious diseases have emphasized the importance of understanding community members' responses, readiness, and actions.[11,12] Understanding gaps in general public knowledge, perception, practices, and behaviors can help with identifying strategies and measures to deal with contagious diseases.

Understanding the influence of psychological status during an epidemic disease can help with identifying strategies to change behaviors and help individuals comply with preventive measures.[13,14] In the Netherlands, Bults, et al.,[14] found that a higher level of anxiety during the H1N1 pandemic was associated with complying with protective measures. They also found that the level of anxiety was high during the early stages of the pandemic. Consistent with this finding, Leung, et al.,[15] found that anxiety was high during the outbreak peak and was associated with complying with preventive measures. Inconsistent with this finding, Liao, et al.,[16] found that levels of anxiety among individuals in Hong Kong were not associated with adhering to preventive measures toward the H1N1 pandemic. Therefore, it is important to describe the level of anxiety of the public during the COVID-19 pandemic and its relationship to complying with protective measures.

Some sociodemographic and health factors may be negatively associated with an individual's compliance with treatment and instructions.[17] Identification, mitigation, and eliminating factors that increase the noncompliance to infection control measures could help to save resources and improve outcomes. The adoption of stringent mitigation efforts will not be effective unless people adhere to them. No studies have been conducted to evaluate or understand how people act and behave during times of pandemics in Oman. With the current COVID-19 pandemic, it is a golden opportunity to study factors, such as knowledge, attitudes, and practices, as well as anxiety and stress, in people living in a Gulf country with a diverse population toward the COVID-19 pandemic and to understand people's compliance with preventive measures announced by the government and healthcare agencies. The specific aims were:

1. To describe the knowledge, attitudes, and practices regarding COVID-19 among adult individuals in Oman.
2. To describe anxiety and stress among adult individuals in Oman during the COVID-19 epidemic.
3. To identify sociodemographic and health variables as well as stress and anxiety associated with practices toward COVID-19.

2 | METHODS

A descriptive cross-sectional, exploratory design was used to describe COVID-19 related knowledge, attitudes, and practices, as well as levels of anxiety and stress, in adult individuals in Oman. The outcomes of this study will form the foundation for a later interventional study to identify strategies and programs to deal with current and future contagious outbreaks.

2.1 | Sampling

The target population is all individuals aged 18 years and older and who can read and write Arabic, English, or Hindi. The researchers used non-probability convenience sampling to recruit participants. Snowballing was via Facebook and WhatsApp groups in Oman. The estimated total number of adult individuals in Oman is 3.7 million. With an alpha error of 0.05, 95% confidence, and 50% response distribution, the estimated sample size was 470.[18] Proportional quota sampling will be used to ensure representation of the Omani population, stratified by age, geographical area, and gender.

2.2 | Instrument

COVID-19 survey. The survey was developed based on previously published studies conducted with similar contagious diseases.[10,14,19,20] The COVID-19 survey consists of 39 items divided into four sections:

(1). Sociodemographic and health variables including age, gender, level of education, income, marital status, employment, place of residence, smoking, number of children, number of chronic diseases, type of health insurance, and family members with chronic diseases (12 items).

(2). Knowledge regarding COVID-19 (10 items). Respondents were asked to answer questions regarding clinical manifestations, transmission, and prevention. A score of one point was given for a correct answer. The overall score for knowledge combines the scores of the 10 items. A higher score indicates a higher level of knowledge.

(3). Attitudes towards COVID-19 (6 items). Respondents were asked to indicate how much they agree or disagree, or were not sure, with six statements related to COVID-19.

(4). Practices to prevent the spread of COVID-19 (11 items). Respondents were asked to indicate how often they adhere to COVID-19 instructions regarding handwashing, wearing a mask, social distancing, and visitation on a five-point Likert-type scale ranging from 1 (never) to 5 (always). The overall compliance practice score combines the scores of the 11 items. A higher score indicates a higher level of compliance.

The survey was checked for face validity by two researchers and piloted using a random sample of 20 participants. The survey was made available in Arabic, English, and Hindi.

2.3 | The depression anxiety stress scale (DASS-21)

The depression anxiety stress scale (DASS-21) is a set of self-reporting scales that is used to measure the intensity of depression, anxiety, and stress over the previous week of administration. The DASS-21 is the short version of the basic 42-item questionnaire (DASS-42) developed by Lovibond and Lovibond in 1995.[21] It consists of three 7-item scales (total of 21 items): Depression scale, anxiety scale (AS), and stress scale (SS).[21] Items are measured through a four-point Likert scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). Items on each scale are summed and doubled to be equivalent to the basic DASS-42 scale. For this study, only the anxiety and stress subscales were used. Anxiety refers to physiological hyperarousal, while stress refers to persistent levels of tension, frustration, and irritability. The degree of anxiety and stress (normal, mild, moderate, severe, extremely severe) was classified according to the scores, where the higher the score, the more severe the stress and anxiety. The survey's reliability was measured by using Cronbach's alpha and found to be good; it was

0.80 for the AS and 0.84 for the SS.[22] The reliability of the Arabic version was measured by alpha coefficients and found to be 0.75 for anxiety and 0.77 for stress.[23]

2.4 | Data collection

To adhere to the mitigation efforts and social distancing recommendations, an anonymous online survey was used to assess sociodemographic and health variables, knowledge, attitudes, and practices regarding COVID-19 disease, as well as levels of stress and anxiety, using Google Forms. This survey link was sent to potential participants in Oman using secure social media platforms (Facebook, WhatsApp) and email. Using an anonymous online survey will help to minimize social desirability bias and increase response rates.[14] Potential participants received an online survey with an explanation of the purpose of the study, along with the study consent form. Potential participants were asked about their age. Participants older than 18 years were able to access the study survey. The survey was administered in Arabic, English, and Hindi. Ethical approval was obtained from the first author's institution. To ensure the validity and reliability of this survey, a pilot study was conducted with 20 participants to assess feasibility and question validity. The average time to complete the study survey was about 20 min.

2.5 | Data analysis

The Statistical Package for the Social Sciences (SPSS) software program version 24 was used for data entry and analysis. The data cleaning procedure includes the management of missing data and running the frequency table in SPSS. Also, Cronbach's alpha was used to measure the internal consistency of the Arabic, English, and Hindi versions of the DASS. Descriptive statistics were used to describe the demographic and health characteristics of the sample, the knowledge, attitudes, and practices regarding COVID-19, and anxiety and stress levels. Stepwise regression analysis was used to evaluate the strength of association of demographic and health characteristics (age, gender, level of education, employment and insurance type, smoking, number of children, number of chronic diseases, a family member with chronic diseases), levels of knowledge, anxiety, and stress with practice score.

3 | RESULTS

Sample characteristics are presented in Table 1. The majority of the participants were married ($n = 351$, 73.7%), fully employed ($n = 377$, 79.7%), highly educated (Baccalaureate and post-graduate) ($n = 348$, 73%), without chronic diseases ($n = 426$, 89.9%), and non-smokers ($n = 407$, 85.9%). The mean age for the participants was 36.0 ($SD = 9.6$, range 18.0–72.0) years and mean number of participants' children is 2.2 ($SD = 1.9$, range 0–10.0).

TABLE 1 Demographic of the individuals in Oman (N = 477)

Characteristics	n (%)
Female	
Marital status	262 (55.3)
Married	351 (73.7)
Single	113 (23.7)
Divorced	10 (2.1)
Widowed	2 (0.2)
Insurance	
Private	100 (21.0)
Public	162 (34.2)
Did not have	212 (44.7)
Education	
High school or less	49 (10.3)
Diploma	79 (16.6)
Baccalaureate	213 (44.7)
Higher degree	135 (28.3)
Income (monthly)	
Less than $1000	70 (15.5)
$1000–$2499	107 (23.7)
$2500 –$5000	217 (48.1)
More than $5000	57 (12.6)
Employment	
Full	377 (79.7%)
Part-time	17 (3.6%)
Students	34 (7.1%)
Unemployed	38 (8.0%)
Retired	7 (1.5%)

3.1 | Knowledge, attitude, and practices regarding COVID-19

The mean score for knowledge was 7.96 (SD = 1.38, range 1.0–10.0). Table 2 shows that most participants answered the questions correctly. Most know the clinical manifestations, differences from the common cold, mode of transmission, available treatment, and prevention methods. Table 3 shows individuals' attitudes toward COVID-19. Most participants will seek additional information, believe in the importance of handwashing, and will seek testing when needed. Most participants believed that COVID-19 is not fatal and they have confidence in countries' efforts in dealing with COVID-19. The mean score for practice was 50.66 (SD = 4.53, range 25.0–55.0). Finally, the Pearson correlation test was used to examine the relationships between knowledge level and preventive practices. There was a significant relationship between the level of knowledge and preventive practices: $r(474) = 0.19$, $p < 0.001$.

3.2 | Stress and anxiety

Levels of anxiety and stress are presented in Table 4. Most participants expressed normal levels of anxiety (73.8%) and stress (74.4%). Many participants reported severe to extremely severe levels of anxiety (8.2%) and stress (8.6%). There were no significant changes in the levels of anxiety and stress scores among participants by the month in which the survey was completed.

3.3 | Factors associated with the level of practice and knowledge toward COVID-19

Multicollinearity was not a problem as VIF values were close to 1.[24] For the knowledge score, the best fit model that emerged accounted for 16% of the variance in knowledge level (F(3, 400) = 25.55, $p < 0.0001$). Examination of the standardized

TABLE 2 Level of knowledge regarding COVID-19 among adult individuals in Oman (N = 477)

Knowledge statement	Correct answer, n (%)
Main clinical symptoms of COVID-19	444 (93.1)
Differences from the common cold	309 (64.8)
Supportive treatment is the most common treatment	439 (92.0)
Not all cases with COVID-19 develop into severe cases	332 (69.6)
Contacting wild animals can result in getting the infection	79 (16.6)
COVID-19 cannot be spread when a fever is not present	389 (81.6)
Spreads via respiratory droplets from infected individuals	445 (93.3)
Young adults and children to take preventive measures	447 (93.7)
Isolation and treatment of infected people	460 (96.4)
The observation period is 14 days	454 (95.2)

Abbreviation: COVID-19, coronavirus disease 2019.

Attitude	Yes n (%)	No n (%)	Not sure n (%)
I believe COVID-19 is fatal	54 (11)	322 (68)	101 (21)
I believe vaccine can prevent the spread of COVID-19	347 (72.7)	8 (1.7)	122 (25.6)
Seek testing if signs and symptoms of the disease appear	461 (96.6)	7 (1.5)	9 (1.9)
I seek additional information	417 (87.4)	42 (8.8)	18 (3.8)
I believe handwashing can prevent the disease	460 (96.4)	13 (2.7)	4 (0.8)
I have confidence countries can control COVID-19 virus	322 (67.5)	21 (4.4)	134 (28.1)

TABLE 3 Attitude regarding COVID-19 among adult individuals in Oman (N = 477)

Abbreviation: COVID-19, coronavirus disease 2019.

TABLE 4 Anxiety and stress levels during COVID-19 pandemic in Oman (N = 477)

Variable	Level	n (%)
Anxiety	Normal (0–7)	352 (73.8)
	Mild (8–9)	25 (5.2)
	Moderate (10–14)	61 (12.8)
	Severe (15–19)	17 (3.6)
	Extremely severe (20+)	22 (4.6)
Stress	Normal (0–14)	355 (74.4)
	Mild (15–18)	42 (8.8)
	Moderate (19–25)	39 (8.2)
	Severe (26–33)	25 (5.2)
	Extremely severe (34+)	16 (3.4)

Abbreviation: COVID-19, coronavirus disease 2019.

regression coefficients for the individual variables indicated that significant predictors of knowledge were level of anxiety ($\beta = -0.24$, $t(400) = -5.31$, $p < 0.0001$), being male ($\beta = -0.24$, $t(400) = -4.92$, $p < 0.001$), and family members with chronic diseases ($\beta = 0.16$, $t(400) = 3.44$, $p < 0.001$). For the practice score, the best fit model that emerged accounted for 10% of the variance in practice level ($F(4, 397) = 11.55$, $p < 0.0001$). Examination of the standardized regression coefficients for the individual variables indicated that the significant predictors of the practice were level of anxiety ($\beta = 0.19$, $t(397) = 3.90$, $p < 0.0001$), level of knowledge ($\beta = 0.11$, $t(397) = 2.25$, $p < 0.001$), being married ($\beta = 17$, $t(397) = 3.45$, $p < 0.05$) and the presence of chronic diseases ($\beta = -0.10$, $t(397) = -2.14$, $p < 0.05$).

4 | DISCUSSION

Contagious diseases have become increasingly frequent and can impact the social, economic, spiritual, and psychological aspects of life. Despite traditional efforts being employed by countries to control COVID-19, the number of new cases and death rates have increased. Public involvement is critical for the prevention and control of these diseases. Therefore, understanding knowledge, attitudes, and practices, as well as levels of anxiety and stress, toward COVID-19 is important for policy-makers when dealing with current and future contagious diseases.

To the best of our knowledge, this is the first study aimed at understanding knowledge and attitudes, as well as levels of anxiety and stress, and the association with healthy practices related to COVID-19 among adult individuals living in a Gulf country. Approximately 41% of people living in this country are expats from numerous countries all over the world.[2] This representation of people from different cultures and ethnicities can help with understanding and controlling COVID-19 globally.

Most people demonstrated a high level of knowledge regarding COVID-19. Similarly, previous studies conducted in Chinese Nigeria, and Ecuador showed a high level of knowledge about COVID-19.[25–27] A possible explanation for the high level of knowledge is due to the extensive media used by governments and other local and international health organizations to educate the public about COVID-19. The Internet, radio, and television were the main sources of COVID-19 information in previous studies.[25,28,29] Another possible explanation for the increased level of knowledge in this current study is the high percentage of individuals with a higher degree. Despite the high level of knowledge, one-third of adult individuals were unable to identify differences from the common cold symptoms. Not knowing the differences may increase individuals' visits to clinics and emergency departments, which will increase health expenses and workloads for the healthcare systems.

Furthermore, this study showed that being male, having a high level of anxiety, and the absence of chronic diseases in the family were associated with lower levels of knowledge. Previous studies showed that older age, a lower level of education, low income, and unemployment were associated with a lower level of knowledge.[28-30] Therefore, using different educational methods by policy-makers and health workers that target specific groups of people may improve knowledge and consequently improve compliance with preventive

measures announced by the government and healthcare agencies toward COVID-19.

Most participants believe that COVID-19 is not fatal and countries can control the COVID-19 virus. This belief may encourage individuals to be less strict when following preventive COVID-19 guidelines. Previous studies conducted in Hong Kong, Australia, and Italy during earlier influenza outbreaks showed that individuals with a decreased risk perception were less likely to comply with preventive measures.[31–33] Therefore, policy-makers are encouraged to use risk communication strategies when addressing the general public, including those individuals who are less likely to comply with preventive measures.

This study examined the level of anxiety and stress among people living in a Gulf country during this pandemic and found that despite the lower baseline levels of anxiety and stress among this population, many individuals reported high levels of stress and anxiety. These results were consistent with those of Traunmuller, et al.,[34] who found that 11% of the Australian respondents reported severe to extremely severe levels of anxiety and stress. In contrast, Wang, et al.,[35] found higher levels of anxiety and stress among the Chinese participants during the initial stages of COVID-19. Higher levels of anxiety or stress among the Chinese participants may be due to the ambiguity of information during the early stages of the disease. Higher levels of anxiety and stress may be associated with the perception of risk.[34,36] Most participants included in the current study felt that this disease is not fatal and countries can successfully control it.

This study also examined the sociodemographic and health variables as well as stress and anxiety levels associated with practices toward COVID-19. Higher levels of anxiety, higher levels of knowledge, and being married were associated with more preventive practices. Individuals who are aware of the consequences of the disease and have knowledge of preventive measures are more likely to comply with preventive practices. A positive relationship between the level of knowledge and preventive practices toward contagious diseases is consistent with those of previous studies.[26,28,37,38] Providing accurate and consistent information regarding COVID-19 using reliable sources of information is important, especially in an era of false information due to the use of social media as an information source.

Being anxious was also associated with greater compliance with preventive measures, thus supporting previous studies.[34,36] Being anxious regarding the consequences of a pandemic may enhance preventive compliance. Anxiety is experienced by individuals on a daily basis. A higher or lower level of anxiety during a pandemic can result in negative consequences.[39] People with low levels of anxiety may be less likely to comply with preventive measures, while people with high levels of anxiety may impact healthcare systems due to their frequent visits to emergency departments and clinics.[39] On the other hand, some people with high levels of anxiety are reluctant to seek medical help out of fear that they will become more susceptible to infectious diseases in healthcare settings.[39,40] Therefore, policy-makers and healthcare providers are required to deliver a reasonable message to the public to ensure appropriate compliance during pandemic events.

Study limitations should be noted. Most of our study population were highly educated people. Therefore, study findings may not reflect the entire population of the Gulf region. Another potential limitation is the use of a generic tool to assess anxiety and stress. Using a specific tool to measure stress and anxiety during the pandemic may be more beneficial for capturing the psychosocial burden.

5 | CONCLUSION

This study showed that the level of knowledge is positively associated with compliance with preventive measures. Providing the public with accurate and consistent information regarding COVID-19 may enhance their compliance with preventive measures. Using different risk communication strategies will ensure collaboration from the public and encourage them to be active members when facing contagious diseases. Using these simple strategies may save lives and save the economy.

CONFLICT OF INTERESTS
The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT
Data available on request from the authors.

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