Original Article

Preventive practices against COVID-19 among residents of Riyadh, Saudi Arabia

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Abstract

Introduction: This cross-sectional descriptive study aimed to use the knowledge, attitudes, and practices (KAP) model as a framework to assess compliance with preventive measures against COVID-19 among residents of the city of Riyadh.

Methodology: In May 2020, electronic study questionnaires on Microsoft Forms were distributed to a sample of 886 Riyadh residents via social media and WhatsApp groups.

Results: We found that the participants had good knowledge. However, less than half of the participants exhibited positive attitudes and good practices toward COVID-19. There was a statistically significant positive correlation between their practices, attitudes, and knowledge. The most practiced behaviours among the participants were (1) a commitment to home quarantine, (2) the use of a tissue or the inside of an elbow when coughing or sneezing, (3) hand washing for a minimum of 20 seconds, and (4) sterilization of surfaces/equipment and wearing masks in public places. Regression analysis showed that knowledge, attitudes, and age were the three factors that could predict the practices of preventive behaviours against COVID-19.

Conclusions: A higher likelihood of practicing preventive measures during the COVID-19 pandemic was significantly associated with one's total knowledge and attitude scores. Future educational campaigns are recommended to focus on residents' susceptibility to COVID-19, its severity, mask wearing, and the disinfection of surfaces and appliances when targeting public audiences. In addition to raising awareness, public policies that support preventive practices would improve the likelihood of compliance.

Key words: COVID-19; preventive measures; knowledge; attitude; practices.

Introduction

The novel coronavirus disease (COVID-19) was first detected in Wuhan, China at the end of December 2019. The Mayo Foundation for Medical Education and Research has indicated that COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes serious illnesses such as Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS) [1]. The disease has since spread worldwide, resulting in the present pandemic. COVID-19 symptoms occur suddenly, and patients complain of fever, fatigue, dry cough, dyspnea, and diarrhea [2]. Due to the lack of drugs to treat COVID-19 or vaccines to prevent it, countries have relied on community interventions that depend on public engagement and mutual trust, such as event cancellations, social distancing, travel restrictions, home quarantine, and the mass communication of health messages by healthcare authorities [3]. The WHO has announced five standard precautions to help contain the spread of COVID-19: stay home, keep a safe distance, wash hands often, cover the face when coughing, and if sick, call ahead [4].

Like the rest of the world, Saudi Arabia has been affected by this pandemic; its number of confirmed infection cases exceeded 59,000 as of 20 May 2020 [5]. The government imposed measures such as lockdown, social distancing, and a ban on gatherings. The Saudi Ministry of Health (MOH) initiated the first line of defence against COVID-19 by establishing national awareness campaigns addressing important precautions to be protected from COVID-19 and the negative effects of non-compliance. The awareness campaign, which is ongoing, includes a basic explanation of COVID-19, including methods of transmission, signs,

symptoms, and preventive measures such as hand washing, hand sanitizing, and wearing a mask correctly. The MOH has prepared COVID-19 guidelines in many languages to facilitate public engagement and education on a daily basis through videos, infographics, text messages via SMS, TV, radio, the MOH website, and social media platforms. To maximize the benefit of these efforts, resident and citizen adherence to preventive measures, which is affected by their knowledge, attitudes, and practices, is crucial.

This study was conducted using the knowledge, attitudes, and practices (KAP) model as a framework to assess predictive factors of preventive behaviours related to COVID-19 among residents of Riyadh city. The findings of this study are expected to provide insight into preventive practices during a pandemic and the role of awareness campaigns in the development of national public health strategies.

Methodology

Research Design and Sampling

A cross-sectional descriptive study was conducted in Riyadh during May 2020. Residents of the city were recruited using a non-probability (convenience) sampling method. Electronic questionnaires available on Microsoft Forms were distributed via social media and WhatsApp groups. The study population included residents of Riyadh over 18 years of age, regardless of gender, race, and nationality. The study sample was an estimated minimum of 385 participants from the total study population (more than 5 million adult residents according to the Saudi Statistical Yearbook of 2015). This number was estimated to have a confidence level of 95%, and the true value was within ± 5 percent. The survey was completed by 886 participants, 39 of which were excluded because they did not meet the study criteria. Thus, the sample size was 847,673 of which were female and 174 male, with a mean age of 35.7. This achieved a confidence level of 98%, and the true value was within ± 4 percent.

Research Instrument

The online questionnaire was developed by researchers to collect data from the study population. The questionnaire was comprised of four sections: 1) seven socio-demographic questions, 2) eleven questions related to COVID-19 knowledge, 3) seven questions concerning attitudes towards COVID-19, and 4) seven questions concerning the practice of protective behaviours against COVID-19.

The first section covered socio-demographic characteristics, including age, gender, level of education, workplace, and one's existence of chronic diseases. Participants were also asked about their personal experience and sources of information regarding COVID-19.

The second section assessed the participants' knowledge. This section was based on a previous research questionnaire [6], with some modifications based on Centers for Disease Control and Prevention (CDC) guidelines to match the rapid changes in knowledge regarding COVID-19 [7]. Responses in the knowledge section were scored 1 for correct answers and 0 for incorrect and "I don't know" answers. The total knowledge score was 25. The level of knowledge was assessed based on quartiles, as follows: scores ≤ 12, >12-18, and >18 were denoted as poor, fair, and good knowledge, respectively. The knowledge section consisted of three subcategories: symptoms, risk groups, and precautions. The symptoms subcategory was assessed as poor, fair, and good for scores < 6, 6, and >7, respectively. Knowledge about risk groups was assessed as good, fair, and poor for scores ≥ 5, 4, and <4, respectively. The last knowledge category was awareness of precautions, which was assessed as good, fair, and poor for scores ≥6, 5, and ≤4, respectively.

The third section was the attitudes section, which was adopted from the questionnaire of Zhong *et al.* (2020) [6] to suit the context of Saudi Arabia. This section was evaluated based on a five-point Likert scale ranging from 1 to 5, where 5 was assigned for "strongly agree" and 1 for "strongly disagree" [8]. The total possible score was 35. Scores ≥ 31, 28-30, and ≤ 27 were interpreted as positive, neutral, and negative attitudes, respectively.

The final section of the questionnaire assessed the practice of preventive behaviours against COVID-19, which was developed based on CDC guidelines (2020) [7] and the Saudi MOH [5]. The responses were evaluated based on a five-point Likert scale ranging from 1 to 5, where 5 was assigned for "always" and 1 for "never". One question employed reverse scoring where 5 was assigned for "never" and 1 for "always". The total possible score for this data was 35; scores ≥34, 32-33, and ≤31 were denoted as good, intermediate, and poor practices, respectively.

Validity and Reliability

The questionnaire was developed based on a review of the literature and guidelines. It was translated from English to Arabic using the forward-backward method. The final Arabic questionnaire was tested for face validity by experts in the field of community medicine and public health, which resulted in some minor

modifications. Reliability was assessed using Cronbach's α test and the values obtained for the knowledge, attitudes, and practices sections were 0.6, 0.63, and 0.67, respectively. The tool was piloted with 10% of the sample, and no changes were made.

Data Analysis

Data analysis was conducted using IBM Statistical Package for the Social Sciences software version 22. The data are presented as inferential and descriptive statistics. The latter were used to represent the results related to knowledge, attitudes, and practices. The Pearson correlation coefficient and Chi-square test were used to assess the correlation between the three parameters. Multiple linear regression was used to predict the factors that affect residents' practice of protective behaviours.

Ethical Consideration

Ethical approval was obtained from the Institutional Review Board at Princess Nourah Bint Abdulrahman University (IRB Log Number 20-0176). Informed consent was obtained on the first page of the questionnaire, which contained the objective of the study. The participants were recruited voluntarily, and anonymity was maintained through all stages of the research. Participants were assured that their data would remain confidential and only be used for research purposes.

Results

Data were obtained from 847 residents of Riyadh city who were over 18 years of age. The mean age of the participants was 36.7 with a standard deviation of ± 11.3; the majority (79%) was female, and 61% were married. The majority held a bachelor's degree (85%); 39% of the study participants did not work, 35% worked in the public sector, and 25% were healthcare practitioners. The majority of the study sample did not suffer from any chronic diseases (78.8%) (Table 1).

Regarding their experiences with COVID-19, only one participant reported having the disease. Four participants reported that someone in their household had the disease, 41 participants had been in contact with confirmed COVID-19 cases (4.1%), 73 knew someone

Table 1. Socio-demographic characteristics of study participants.

Categories	N = 847 (%)
Age	
18 to 25	207 (24.4)
>25 to 35	219 (25.9)
>35 to 45	270 (31.9)
>45 to 60	131 (15.5)
>60	20 (2.3)
Gender	
Female	673 (79.5)
Male	174 (20.5)
Marital Status	
Single	306 (36.1)
Married	524 (61.9)
I don't want to say	17 (2)
Educational Level	
Less than high school	9 (1.06)
High school	69 (8.1)
Diploma	43 (5)
Bachelor	577 (68)
Higher education	149 (17)
Work	
Private sector	131 (15.5)
Public sector (Government)	300 (35.4)
Freelancer	26 (3.1)
Retired	52 (6.1)
I don't work	338 (39.9)
Are you a healthcare practitioner?	
Yes	217 (25)
No	630 (74)

who had been infected with COVID-19 (8.3%), and finally, 25 participants had lost someone to COVID-19 (2.9%). When participants were asked about their information sources regarding COVID-19, 87.4% reported obtaining their information from the official channels of the MOH and 30.7% from reliable scientific resources. Additional resources included news media (42.4% of the participants), social media (51.2%), family and friends (16.6%), or other sources of information (3.8%). The majority of the study participants (77%) had an overall good knowledge of COVID-19. 52% had good knowledge of COVID-19 symptoms, 62% were able to identify high-risk COVID-19 groups, and 85% had good knowledge of preventive and control measures (Table 2).

Knowledge on COVID-19 was significantly associated with the obtention of information from

Table 2. Participant knowledge on COVID-19.

Variable/Factor	Knowledge		
	Good – n (%)	Fair – n (%)	Poor – n (%)
Symptoms of COVID-19	441 (52%)	257 (30%)	149 (17%)
People at risk of COVID-19	529 (62.5%)	167 (19.7%)	151 (17.8%)
Measures for prevention and control	720 (85%)	97 (11%)	30 (3.5%)

official MOH channels ($p = 0.0004$), higher levels of education ($p = 0.0011$), older age ($p = 0.0256$), and previous experience with the disease ($p = 0.0029$). The mean knowledge score was higher among healthcare practitioners; however, no significant statistical difference was found (Table 3).

A positive attitude towards preventive practices was reported by 39% of the study population, whereas 34% showed a neutral attitude, and 27% showed a negative attitude. Moreover, there was a significant association between obtaining information from MOH official channels and positive attitudes toward COVID-19 ($p = 0.0163$).

When the participants were asked about practiced preventive behaviours, 40% reported good practice measures advised by the Saudi MOH, 24% reported fair commitment to preventive measures, and 36% reported poor practices. The most practiced behaviour among the participants was a commitment to home quarantine, as 97% stated that they practiced home quarantine all or most of the time. The second most practiced preventive behaviour was the use of a tissue or the inside of their elbow when coughing or sneezing (94%). In the third place was hand washing for a minimum of 20 seconds, which was reported by 90% of the participants. Finally, the sterilization of surfaces and equipment and mask

wearing in public places were confirmed by 85% and 74.7% of the participants, respectively (Table 4).

The practice of safety measures was significantly associated with the elderly and female participants. Furthermore, there was a statistically significant relationship between being a healthcare practitioner and poor practice of protective behaviours during the COVID-19 pandemic (Table 5).

There was a significant positive correlation between the practice of protective behaviour, knowledge, and attitudes toward COVID-19. Attitudes had a significant positive correlation with knowledge among male participants.

Finally, regression analysis showed that knowledge, attitudes, and age were the three factors that could predict the participants' compliance with preventive practice behaviours against COVID-19, where the regression model p-value was < 0.0001 (Table 6).

Discussion

This study aimed to assess preventive behaviours related to COVID-19 and the factors that could predict compliance with these behaviours among residents of Riyadh.

Table 3. Factors affecting knowledge on COVID-19.

Factors	Knowledge score X±SD	p value
Official MOH channels as a main source of COVID-19 information		0.0004**
Yes	19.94 ± 2.53	
Other sources	18.04 ± 5.27	
Age		
18 to 25	19.41± 0.21	
> 25 to 35	19.36 ± 0.20	
> 35 to 45	19.87 ± 0.18	0.0256*
> 45 to 60	20.25 ± 0.26	
> 60	20.55 ± 0.68	
Gender		
Male	19.79 ± 2.42	.5993
Female	19.68 ± 3.22	
Education		
Less than high school	16.33 ± 1.01	
High school	18.79 ± 0.36	
Diploma	19.74 ± 0.46	0.0011**
Bachelor	19.85 ± 0.12	
Higher education	19.74 ± 0.25	
Work as a health practitioner		
Yes	19.99 ± 2.45	0.0664
No	19.60 ± 3.26	
Experience with COVID-19		
Yes	20.45 ± 2.22	0.0029**
No	19.62 ± 3.14	

*p < 0.05; **p < 0.01.

Table 4. Practice of protective behaviors against COVID-19.

Variable	Always N. (%)	Most of the time N. (%)	Sometimes N. (%)	Rarely N. (%)	Never N. (%)
Go to crowded places	4 (0.47%)	9 (1.06%)	32 (3.77%)	236 (27.8%)	566 (66%)
Wear a mask when going to a public place	523 (61.7%)	115 (13%)	101 (11.9%)	41 (4.8%)	67 (7.9%)
Keep 1.5 m distance from others	550 (64.9%)	188 (22%)	82 (9.6%)	17 (2%)	10 (1.18%)
Wash hands with soap and water for at least 20 seconds	635 (75%)	165 (19%)	38 (4.5%)	7 (0.8%)	2 (0.2%)
Cover mouth and nose with a tissue when coughing or sneezing or use the inside of elbow	682 (80%)	117 (14%)	37 (4.4%)	8 (0.9%)	3 (0.3%)
Sterilize surfaces and used equipment	569 (67%)	158 (18%)	91 (11%)	22 (2.5%)	7 (0.8%)
Committed to home quarantine procedures	689 (81%)	134 (16%)	21 (2.4%)	3 (0.3%)	0 (0.0%)

Table 5. Factors affecting practices of protective behavior.

Variables	Total practice			p-values
	Good (%)	Fair (%)	Poor (%)	
Age				
18 to 25	68 (32.8%)	48 (23.19%)	91 (43.9%)	
>60	9 (45%)	4 (20%)	7 (35%)	
>25 to 35	86 (39%)	53 (24%)	80 (36.5%)	0.0386*
>35 to 45	112 (41.4%)	64 (23.7%)	94 (34.81)	
>45 to 60	68 (51.9%)	31 (23.66%)	32 (24.4%)	
Gender				
Male	44 (25%)	40 (22.99%)	90 (51.7%)	<.0001**
Female	299 (44.43%)	160 (23.77%)	214 (31.8%)	
Education				
Less than high school	5 (55.56%)	3 (33%)	1 (11%)	
High school	31 (44.9%)	18 (26%)	20 (28.99%)	
Diploma	25 (58%)	9 (20.9%)	9 (20.9%)	0.1354
Bachelor	227 (39%)	130 (22.5%)	220 (38%)	
Higher education	55 (36.9%)	40 (26.8%)	54 (36%)	
Are you a health practitioner?				
Yes	75 (34.56%)	48 (22%)	94 (43%)	0.0261*
No	268 (42.5%)	152 (24%)	210 (33%)	

*P < 0.05; **P < 0.01.

Table 6. Results of multiple regressions on factors associated with good preventive practices.

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	24.28	1.06	22.91	< 0001*
Age	0.026	0.01	2.67	0.0077*
Knowledge	0.08	0.038	1.52	0.1281
Attitude	0.19	0.03	5.63	< 0001*

*p < 0.05.

The results show that 77% of the participants had an overall good knowledge, and 40% reported good preventive practices, which was particularly true among highly educated and older age groups. This difference can be attributed to two main factors: firstly, participants' perception of a COVID-19 as threat (imposed by a feeling of susceptibility to the disease/an acknowledgment of its severity), as confirmed by a significant correlation, and secondly, relying on official channels of the MOH as an essential source of information, which was reported by 87.4% of participants and significantly correlated with good knowledge. A number of studies have reported similar findings, suggesting the importance of health education and public health campaigns in the fight against COVID-19. A study conducted in Malaysia revealed that 95% of the respondents linked the protective measures to with the information they received [9]. In India, although people were only moderately knowledgeable about the disease itself, they had an adequate level of knowledge about preventive measures and showed a willingness to comply with the measures taken by the government [10]. In China, one study found a good level of knowledge, optimistic attitudes, and good practices among Chinese people, which has been attributed to the efforts of health education campaigns [6]. Another study conducted with residents in Anhui province in China pointed to good knowledge, attitudes, and practices while highlighting the importance of community health education and mental health support [11]. Similarly, the Nigerian public exhibited relatively high knowledge about COVID-19 because they obtained their information from TV and radio [12]. A Bangladeshi study found that poor practices were considerably high, and the authors attributed the poor knowledge to non-scientific and rigid religious beliefs [13].

A study in the United States pointed out that poor knowledge regarding COVID-19 was associated with poor practices; namely, not wearing masks in public, attending crowded gatherings, and buying more goods than necessary [14]. This is in line with the findings of the present study wherein a significant positive correlation was found between practices and both attitudes and knowledge. Moreover, both knowledge and attitude were identified as predictors of the elderly population's adherence to preventive practices.

To use the findings of this study in educational campaigns, it is important to identify the gaps in both knowledge and practice. The study participants showed a good understanding of preventive behaviours and a lower understanding of the symptoms and risk groups.

These areas should be covered more by educational campaigns to increase people's perceptions of the severity of the disease and their susceptibility to it, thus prompting good practice. A notably high level of commitment was reported toward home quarantine. However, it is important to keep in mind that the study was conducted when lockdown and curfew policies to address COVID-19 were enforced in Riyadh, which highlights the importance of raising awareness on public policies [15].

The least followed practices among the study participants were sterilizing surfaces and equipment and wearing masks in public places. As knowledge developed regarding COVID-19, wearing masks became compulsory for the general public whereas the practice was previously limited to health practitioners and patients.

Conclusions

Based on our study, we conclude that most of the study participants had good knowledge, but less than half of the participants exhibited positive attitudes and good practices toward COVID-19. A higher likelihood of practicing preventive measures during the COVID-19 pandemic was significantly associated with participants' total knowledge and attitude scores. These results show the significance of improving knowledge regarding COVID-19 via MOH online awareness campaigns, which, in turn, would enhance attitudes and practices. Therefore, we recommend maintaining an awareness program that particularly targets young groups. Future educational campaigns are recommended to focus on people's susceptibility to COVID-19, the severity of the disease, mask wearing, and the disinfection of surfaces and appliances when targeting public audiences. There should also be a greater focus on targeting young men and healthcare practitioners to comply with protective practices. Finally, public policies designed to stop the spread of COVID-19 (e.g., banning gatherings, reinforcing the use of masks and physical distancing in public places) would improve the likelihood of compliance with preventive measures.

Authors' Contributions
FA, AnA, and LB contributed to the conceptualization of the research idea, designed the methods and participated in the

data collection process. Both SM and AlA analysed and interpreted the data. FA, AnA, and LB drafted the paper. All authors approved the final manuscript.

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