

ORIGINAL ARTICLE

Knowledge, attitude, and practices associated with COVID-19 among university students: a cross-sectional survey in Qassim Region, Saudi Arabia

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) is a rapidly expanding pandemic caused by a novel human coronavirus. As the outbreak has impacted all stakeholders in the education sector, including university students, it is believed that to facilitate the outbreak management of COVID-19 in Saudi Arabia, this study was aimed to understand the public's awareness of COVID-19. In this study, we aimed to investigate the knowledge, attitude, and practices associated with COVID-19 among Qassim University students during the period of the COVID-19 outbreak.

Methodology: A cross-sectional study was conducted using a validated questionnaire and involving students from various health specialties enrolled at Qassim University in Saudi Arabia. The sample size was 303 students (209 males and 94 females). Age varied from 18 to 28 years old, but most (74.9%) were aged between 21 and 24 years old.

Results: Regarding participants' knowledge about COVID-19, the total mean score was 4.33 ($SD = 0.77$) out of 5 points, indicating that most of the students (85.8%) had good knowledge. Concerning attitude toward COVID-19, the total mean score was 3.35 ($SD = 1.09$), which means that participants were approximately divided in half between the positive and negative attitudes. Concerning practices, the mean score was 3.52 ($SD = 0.96$), with 44.6% and 55.4% compromising inactive and proactive approaches, respectively.

Conclusion: The outcome of this cross-sectional study shows that most of the Qassim University students belonging to different medical fields were well informed of basic information and has positive attitudes, and proactive practices toward COVID-19, indicating the efficacy of the current public health campaign.

Keywords: COVID-19, attitude, practices, Saudi Arabia, university students, Qassim.

Introduction

Coronavirus disease 2019 (COVID-19) is a rapidly expanding pandemic caused by a novel human coronavirus. In late December 2019, a novel coronavirus appeared in Wuhan, China, causing an outbreak [1]. The disease is highly infectious with a clinical symptom including dry cough, fever, fatigue, and dyspnea. It may reach the severe stage, characterized by acute respiratory distress syndrome, metabolic acidosis, bleeding, coagulation dysfunction, and septic shock [2]. The first positive COVID-19 case in Saudi Arabia was reported on March 2, 2020, when the Ministry of Health confirmed the Kingdom's first case [3]. COVID-19 is transmitted from person-to-person via aerosol inhalation from an

infected individual [1]. Therefore, social distancing is a key measure to decrease the spread of COVID-19, aimed at reducing contact between infected persons and others who are not [4]. Saudi Arabia introduced social distancing measures early, including the suspension of religious

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practices as Umrah, temporary closure of educational establishments, entertainment, and sporting events [5]. Public awareness of dealing with infectious respiratory diseases plays an important role in limiting the spread of infections. It is estimated that vaccine development would require months. Therefore, the management of the outbreak would depend on individuals' adherence to the recommended measures. Those measures are hugely affected by knowledge, attitude, and practices (KAPs) of the population [6]. Behaviors such as wrong measures to avoid infection or underestimating the situation, stigmatization, and panic emotions can influence the battle against the outbreak [6]. There is little literature on KAPs toward the COVID-19 outbreak in Saudi Arabia. However, a study conducted in March 2020 in China revealed that Chinese residents with a good socioeconomic status, especially females, had good knowledge, attitudes, and appropriate practices toward COVID-19 [6]. A study by Bhagavathula et al. [7] in April 2020 revealed that health workers and medical students had insufficient knowledge about COVID-19 but had positive attitudes toward the prevention of COVID-19 transmission. A different study conducted simultaneously (April 2020) in Uganda concluded that more than two-thirds of healthcare workers in Makerere University Teaching Hospitals had sufficient knowledge about the transmission and prevention of COVID-19 [8]. An Egyptian study on the general population in April 2020 showed that Egyptians who participated in their survey had good knowledge about COVID-19 and positive attitudes toward using protective measures. However, knowledge was lower among older, less educated rural, and lower income groups [9]. Another study conducted in Pakistan in May 2020 showed that Pakistani university students and employees had sufficient knowledge plus attitudes toward COVID-19, but their preventive practices were inadequate [10]. As the outbreak has impacted all stakeholders in the education sector, including university students, it is believed that to facilitate outbreak management of COVID-19 in Saudi Arabia, we need to understand the public's awareness of COVID-19. In this study, we want to investigate the KAPs associated with COVID-19 among Qassim University students during the period of the COVID-19 outbreak. Therefore, the findings could provide baseline data on the level of awareness of the disease among Qassim University students. The study is likely to assist the authorities in better planning awareness campaigns to eliminate misconceptions about COVID-19. Thus, the objectives of this study are to identify Qassim University students' knowledge of various guidelines related to COVID-19, to assess Qassim University students' attitude toward COVID-19, and to assess Qassim University students' practices regarding COVID-19 recommendations.

Methodology

A cross-sectional study was conducted using a validated questionnaire and involving students from various health specialties enrolled in Qassim University in Saudi

Arabia. The sample size was 303 students (209 males and 94 females). Ages varied from 18 to 28 years old, but most (74.9%) were aged between 21 and 24 years old. Table 1 shows the sociodemographic characteristics of the participants in detail.

The assessment of students' KAPs toward COVID-19 was achieved through a questionnaire which consisted of five questions on each construct (15 questions total). The correct answers had been identified and coded with 1, whereas the wrong answers had been coded with 0. The total score of KAPs had been calculated by adding all questions in each indicator separately. KAP score range was from 1 to 5 points, which indicates that the higher the score, the higher the KAPs toward COVID-19, and by using 3-point (midpoint of 5) as the cutoff point to determine the level of KAPs, students were classified as having poor/negative/inactive KAPs if the scores were equal to or below 3 points, whereas good/positive/proactive KAPs if the scores were above the three points. The data are presented with counts and proportions for all categorical variables, whereas means ± standard deviations were used to present continuous variables. Mann-Whitney *U*-test or Kruskal-Wallis test was used for between-group comparisons. Normality, statistical interactions, and collinearity (i.e., variance inflation factor) were also assessed using Kolmogorov-Smirnov and Shapiro-Wilk test. A correlation matrix was also

Table 1. Sociodemographic characteristics of participants (*n* = 303).

Study variables	N (%)
Age group	
• 18-20 years	48 (15.8)
• 21-24 years	227 (74.9)
• 25-28 years	28 (09.3)
Gender	
• Male	209 (69.0)
• Female	94 (31.0)
College	
• Medicine	128 (42.2)
• Dentistry	35 (11.6)
• Nursing	17 (05.6)
• Applied medical sciences	08 (02.6)
• Pharmacy	43 (14.2)
• Medical rehabilitation	72 (23.8)
Academic year	
• First year	20 (06.6)
• Second year	21 (06.9)
• Third year	77 (25.4)
• Fourth year	72 (23.8)
• Fifth year	54 (17.8)
• Intern	59 (19.5)

conducted to determine the associations among all the pairs of KAPs. The p -value < 0.05 has been considered as a significant level for all statistical tests.

Results

In Table 2, we present the assessment of students' knowledge toward COVID-19. It shows that most of the students (78.9%) correctly identified that viral infectious disease was related to COVID-19, and nearly all of them believe that COVID-19 is mainly transmitted through respiratory droplets and close contact. Furthermore, a great proportion of them (90.8%) believe that the 14-day duration was the COVID-19 incubation period. In comparison, a little more than two-third (67%) know that all people are generally susceptible to viral disease. Finally, almost all participants (97.4%) were correct that fever and dry cough were the major symptoms of COVID-19.

Concerning the assessment of students' attitudes toward COVID-19 shown in Table 3, it was found that almost all students were scared of human-to-human transmission of COVID-19, with more than two-third (67.3%) were hopeful that the outbreak would stop soon to be able to

return to school. Moreover, approximately 41% of them would never eat wild animals. When asked if they would be more capable of endurance concerning the current public health emergency, nearly three-quarters of them (74.3%) responded "yes." When asked if the outbreak has impacted their study, almost two-thirds of them (62.4%) also answered "yes."

In Table 4, we assessed the students' practices toward COVID-19. Based on the results, nearly all students (93.4%) would rationally analyze the situation before going to the hospital for the treatment. When asked if they would be willing to help frontliners, more than two-thirds of them (67.3%) were ready to help. When asked what they would do if they had close contact with confirmed cases, 93.1% of them would proactively report to the community and stay in quarantine as per protocol. When asked what they would do if someone cured of COVID-19 and asked for a meeting, only a little more than one-third of them (36.3%) would find an excuse to avoid contacting them. Finally, when asked what would be their top priority when the epidemic stops, many students (62.4%) would like to go back to school and restart a normal study.

The descriptive statistics of KAPs toward COVID-19 were calculated (Table 5). The total mean knowledge score was 4.33 ($SD = 0.77$), indicating that most students (85.8%) have good knowledge. Concerning attitude toward COVID-19, the total mean score was 3.35 ($SD = 1.09$), which means that participants were divided approximately in half between positive attitudes and negative attitudes. With respect to practices, the mean score was 3.52 ($SD = 0.96$), with 44.6% and 55.4% compromising inactive and proactive approaches, respectively.

Regarding the relationships among KAPs parameters, no correlation was detected between knowledge and attitude ($r = 0.063$; $p = 0.275$) nor between knowledge and practices ($r = 0.016$; $p = 0.783$). However, there was a significant positive correlation between attitude and practices ($r = 0.226$; $p < 0.001$), suggesting that a positive attitude toward COVID-19 leads to proactive practices and vice versa. When the sociodemographic characteristics were compared against the KAPs (Table 6), we have learned that the attitudes of oldest age groups (25-28 years) were significantly more positive compared to the other age groups ($F = 5.808$; $p = 0.005$). We also observed that female students had significantly better knowledge ($T = -2.105$; $p = 0.045$), whereas male students had significantly proactive practices than females ($T = 3.211$; $p = 0.003$). Furthermore, nursing students showed significantly better knowledge than the other college specialties ($F = 2.419$; $p = 0.043$). Furthermore, we have found that 5th-year level students were significantly more associated with having better knowledge than the other year levels ($F = 8.255$; $p < 0.001$), whereas, in attitudes, it was 3rd-year level students who showed more positive attitudes ($F = 4.495$; $p = 0.001$).

Table 2. Assessment of students' knowledge toward COVID-19 ($n = 303$).

Knowledge statement	N (%)
1. What type of infectious disease is COVID-19?	
• Bacterial	61 (20.1)
• Viral*	239 (78.9)
• I do not know	3 (01.0)
2. What is the main transmission route of COVID-19?	
• Respiratory droplets and close contact*	300 (99.0)
• Food	2 (0.70)
• I do not know	1 (0.30)
3. How long is the COVID-19 incubation period?	
• 1-14 days*	275 (90.8)
• 3-7 days	3 (01.0)
• More than 14 days	17 (05.6)
• I do not know	8 (02.6)
4. Who are susceptible to COVID-19?	
• The old and children	51 (16.8)
• People are generally susceptible*	203 (67.0)
• Young adults	3 (01.0)
• People with pre-existing diseases	45 (14.9)
• I do not know	1 (0.30)
5. What are the main clinical manifestations of COVID-19?	
• Fever and dry cough*	295 (97.4)
• Sore throat and myalgia	7 (02.3)
• I do not know	01 (0.30)

* Indicates the correct answer.

Knowledge, attitude, and practices associated with COVID-19 among university students

Table 3. Assessment of students' attitude toward COVID-19 (n = 303).

Attitude statement	N (%)
1. Are you scared by the human-to-person transmission of COVID-19?	
• Yes, but I am rational, and I can protect myself*	273 (90.1)
• I do not care, I feel the same	25 (08.3)
• I am panic and do not know what to do	05 (01.7)
2. Do you hope the outbreak stops fast so you can return to school soon?	
• Yes*	204 (67.3)
• I do not care	17 (05.6)
• No, I want to stay at home as long as possible	82 (27.1)
3. What is the attitude toward wild animals' consumption?	
• I do not eat wild animals, and I will accuse consumers*	124 (40.9)
• I do not know personally, but I would not stop others	110 (36.3)
• I do not mind to have a try	69 (22.8)
4. Do you think you will be more capable of endurance such as public health emergency?	
• Yes, I am more educated and thus more capable*	225 (74.3)
• I will be the same	57 (18.8)
• No, I am too scared to withstand it anymore	21 (06.9)
5. Do you think this outbreak has impacted the study?	
• Yes, it did have *	189 (62.4)
• No, I am self-disciplined and my study was not affected at home	114 (37.6)

*Indicates the correct answer.

Table 4. Assessment of students' practices toward COVID-19 (n = 303).

Practices statement	N (%)
What would you do if you had fever and dry cough?	
• I will analyze the situation rationally. Stay home for observation and quarantine or go to the hospital for treatment *	283 (93.4)
• I want to go to the hospital, but I am afraid to be infected	14 (04.6)
• I feel panic. I do not know what to do	06 (02.0)
If the country needs you, are you willing to help the frontline rescue?	
• Yes, a country's trouble is everyone's responsibility*	204 (67.3)
• I am not sure and need suggestions from the family	77 (25.4)
• No, it is too dangerous	22 (07.3)
What would you do if you had close contact with confirmed cases?	
• Proactively report to the community and stay in quarantine as required*	282 (93.1)
• Same as before	14 (04.6)
• I feel panic and do not know what to do	07 (02.3)
What would you do if someone cured of COVID-19 wanted to meet you?	
• I will meet them and show more kindness	107 (35.3)
• I will meet them just like before	86 (28.4)
• I will find an excuse to keep away from them*	110 (36.3)
What will be your top priority when the epidemic stops?	
• I will go back to school and restart normal study*	189 (62.4)
• Same as before	68 (22.4)
• The outbreak is too scary. I need to enjoy my life as much as possible	46 (15.2)

*Indicates the correct answer.

Table 5. Descriptive statistics of the KAPs toward COVID-19 (n = 303).

KAP parameters	N (%)
Knowledge total score (mean ± SD)	4.33 ± 0.77
Level of knowledge	
• Poor	43 (14.2)
• Good	260 (85.8)
Attitude total score (mean ± SD)	3.35 ± 1.09
Level of attitude	
• Negative	159 (52.5)
• Positive	144 (47.5)
Practices total score (mean ± SD)	3.52 ± 0.96
Level of practices	
• Inactive	135 (44.6)
• Proactive	168 (55.4)

KAPs (knowledge, attitude, and practices).

Discussion

To the best of authors' knowledge, this is the first study that investigated COVID-19-associated KAPs among Qassim University students. Since December 2019, COVID-19 has become the center of global concern. COVID-19 has spread rapidly in China and several other countries, including Saudi Arabia, causing acute infectious pneumonia [11]. The virus spreads from infected individuals to others through respiratory droplets such as coughing or sneezing and contaminated hands [1]. The disease is highly infectious with clinical symptoms, including dry cough, fever, myalgia, fatigue, and dyspnea. It may reach the severe stage, characterized by acute respiratory distress syndrome, metabolic acidosis,

Table 6. Comparisons of KAPs in regard to the sociodemographic characteristics of students (n = 303).

Factor	Knowledge Total score (5) Mean ± SD	Attitude Total score (5) Mean ± SD	Practices Total score (5) Mean ± SD
Age group			
• 18-20 years	4.10 ± 0.93	3.02 ± 1.08	3.50 ± 1.11
• 21-24 years	4.37 ± 0.74	3.35 ± 1.08	3.48 ± 0.93
• 25-28 years	4.39 ± 0.63	3.89 ± 0.99	3.89 ± 0.83
F-test	2.490	5.808	2.316
p-value^a	0.178	0.005 **	0.080
Gender			
• Male	4.27 ± 0.79	3.36 ± 1.08	3.64 ± 0.91
• Female	4.47 ± 0.68	3.33 ± 1.13	3.27 ± 1.01
t-test	-2.105	0.214	3.211
p-value^b	0.045**	0.837	0.003**
College			
• Medicine	4.31 ± 0.80	3.28 ± 1.14	3.37 ± 0.96
• Dentistry	4.29 ± 0.75	3.51 ± 1.01	3.54 ± 1.12
• Nursing	4.76 ± 0.44	3.82 ± 0.81	3.41 ± 1.00
• Applied medical sciences	4.50 ± 0.53	2.50 ± 1.41	3.75 ± 0.71
• Pharmacy	4.07 ± 0.86	3.23 ± 1.07	3.72 ± 0.96
• Medical rehabilitation	4.42 ± 0.71	3.26 ± 1.03	3.68 ± 0.84
F-test	2.419	2.008	1.597
p-value^a	0.043**	0.196	0.167
Academic year			
• First year	3.60 ± 0.99	3.25 ± 1.25	3.65 ± 1.35
• Second year	3.76 ± 0.94	3.00 ± 1.14	3.57 ± 0.93
• Third year	4.35 ± 0.76	3.74 ± 0.80	3.64 ± 0.93
• Fourth year	4.44 ± 0.60	3.19 ± 1.16	3.46 ± 0.87
• Fifth year	4.57 ± 0.74	2.98 ± 1.05	3.37 ± 0.94
• Intern	4.39 ± 0.74	3.53 ± 1.15	3.54 ± 0.97
F-test	8.255	4.495	0.641
p-value^a	<0.001**	0.001**	0.577

^ap-value has been calculated using the Kruskal-Wallis test.

^bp-value has been calculated using the Mann-Whitney U-test.

**Significant at p < 0.05 level.

bleeding, coagulation dysfunction, and septic shock [2]. The Centers for Disease Control and Prevention suggests that the virus incubation period can range from 2 to 14 days [12]. This cross-sectional survey on 303 university undergraduates found that 99% of participants knew the mode of transmission of COVID-19, 97.4% knew the common symptoms, 90.8% were aware of its incubation period, and only 69% were aware of who is susceptible to COVID-19. Overall, to see that most of the university students had a good COVID-19 knowledge, which might be attributable to the fact that the sample comprised students belonging to the medical, dentistry, pharmacy, and applied health science fields. Similar studies were conducted in Uganda, Egypt, and Pakistan on a wide different population reported good knowledge [8–10]. More than two-thirds of the participants (74.3%) think that they can endure this public health outbreak, which is slightly higher than Chinese university students (73.81%) [13]. Public awareness of dealing with infectious respiratory diseases plays an important role in limiting the infection's spread. It is estimated that vaccine development would require months. Therefore, the management of the outbreak would depend on individuals' adherence to the recommended measures. Those measures are hugely affected by KAPs of the population [6]. This cross-sectional study found that most of the students had proactive practice against COVID-19, which indicates that the administration has delivered effective health education of health. Similar study was done in China, which showed good practice against this outbreak as well [9].

Conclusion

The outcome of this cross-sectional study shows that most of Qassim University students in different medical fields were well-informed of basic information and has positive attitudes and proactive practices toward COVID-19, indicating the efficacy of the current public health campaign.

List of Abbreviations

COVID-19 Coronavirus disease 2019
KAPs Knowledge, attitude, and practices

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consent was obtained from all the participants.

Ethical approval

Ethical approval was granted by Subcommittee of Health Research Ethics, Deanship of Scientific Research, Qassim University, dated: June 17, 2020 ref# 19-14-02.

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References

- Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med*. 2020;382(13):1199–207. <https://doi.org/10.1056/NEJMoa2001316>
- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020;395(10223):507–13. [https://doi.org/10.1016/S0140-6736\(20\)30211-7](https://doi.org/10.1016/S0140-6736(20)30211-7)
- Saudi Arabia announces first case of coronavirus [Internet]. Arabnews; 2020 [updated 2020 March 03; cited 2020 July 14]. Available from: <mailto:https://www.arabnews.com/node/1635781/saudi-arabia>
- Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med*. 2020;27(2):taaa020. <https://doi.org/10.1093/jtm/taaa020>
- Yezli S, Khan A. COVID-19 social distancing in the Kingdom of Saudi Arabia: bold measures in the face of political, economic, social and religious challenges. *Travel Med Infect Dis*. 2020;101692. <https://doi.org/10.1016/j.tmaid.2020.101692>
- Zhong BL, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices toward COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci*. 2020;16(10):1745. <https://doi.org/10.7150/ijbs.45221>
- Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, Bandari DK. Knowledge and perceptions of COVID-19 among health care workers: cross-sectional study. *JMIR Public Health Surveill*. 2020;6(2):e19160. <https://doi.org/10.2196/19160>
- Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus Disease-2019: knowledge, attitude, and practices of health care workers at Makerere University Teaching Hospitals, Uganda. *Front Public Health*. 2020;8:181. <https://doi.org/10.3389/fpubh.2020.00181>
- Abdelhafiz AS, Mohammed Z, Ibrahim ME, Ziady HH, Alorabi M, Ayyad M, et al. Knowledge, perceptions, and attitude of Egyptians toward the novel coronavirus disease (COVID-19). *J Community Health*. 2020;45(5):1–10. <https://doi.org/10.1007/s10900-020-00827-7>
- Salman M, Mustafa ZU, Asif N, Zaidi HA, Hussain K, Shehzadi N, et al. Knowledge, attitude and preventive practices related to COVID-19: a cross-sectional study in two Pakistani university populations. *Drugs Ther Perspect*. 2020:1–7. <https://doi.org/10.1007/s40267-020-00737-7>

11. Bao Y, Sun Y, Meng S, Shi J, Lu L. 2019-nCoV epidemic: address mental health care to empower society. *Lancet*. 2020;395(10224):e37–8. [https://doi.org/10.1016/S0140-6736\(20\)30309-3](https://doi.org/10.1016/S0140-6736(20)30309-3)
12. Symptoms of coronavirus [Internet]. Center for Disease Control and Prevention [updated 2020 May 13; cited 2020 July 14]. Available from: <mailto:https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>
13. Peng Y, Pei C, Zheng Y, Wang J, Zhang K, Zheng Z, et al. Knowledge, attitude and practice associated with COVID-19 among university students: a cross-sectional survey in China. *Research Square*. 2020;1–24 <https://doi.org/10.21203/rs.3.rs-21185/v1>