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COVID-19 Knowledge, Attitudes, and Preventive Measures of University Students in Bahrain

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Key words: COVID-19 pandemic, awareness, attitude, precautionary measures
Parole chiave: COVID-19, consapevolezza, atteggiamenti, misure preventive

Abstract

Background. *The severe, acute respiratory syndrome COVID-19 that was first reported in China in December 2019 quickly became a global pandemic that has resulted in over 100 million infections and more than 2 million deaths.*

Study Design. *This study aimed to assess the awareness level of university students regarding the possibility of becoming infected with COVID-19. In order to achieve this objective, we assessed the students' knowledge, attitudes, and behaviors using an online survey questionnaire offered to a total of 300 students.*

Results. *A positive response regarding awareness of COVID-19 symptoms was registered by more than 70% of the students, whereas 62% felt that wearing a mask did not give full protection against infection, approximately 30% agreed that antibiotics and antivirals did not treat COVID-19, and 62% agreed that vitamin C was helpful in treating common symptoms of COVID-19. Moreover, around 31% of the students believed that COVID-19 is a man-made virus. Students who had gotten infected with SARS-CoV-2 believed that wearing a mask gives full protection (p=0.018). In response to survey questions related to attitude, 80% of students cancelled and postponed meetings with friends, and 90% agreed that mask-wearing is the*

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most precautionary measure used to prevent the infection. In addition, 82% avoided coughing in public, 82% avoided contact if they felt flu-like symptoms and 80% washed their hands far more often due to the pandemic. Interestingly, 76% carried hand sanitizer, 66.5% avoided shaking hands, and 42.7% were taking vitamin C supplements.

Conclusions. *This study showed that the participants had a positive awareness of COVID-19 transmission, symptoms, and treatments misconceptions and mistaken beliefs related to treatments and the origin of the virus were also common and should be addressed. This study thus provides a baseline for a population-based surveillance program that could help local authorities to improve pandemic preparation plans, particularly with regard to governmental education and media campaigns.*

Introduction

COVID-19 first appeared in December 2019 in Wuhan, China, as an epidemic (1). Soon after, on 11th March 2020, the World Health Organization (WHO) declared COVID-19 to be a worldwide pandemic (2). The number of confirmed cases of COVID-19 continued to rise every day. Many studies have been conducted to clarify the epidemiology, virology, and clinical management of SARS-CoV-2. However, thus far, due to a lack of sufficient data understanding researchers have not identified and/or approved any drug against SARS-CoV-2 (3). The studies showed that one infected person can spread the disease to two or more people, leading to a high contagion rate. SARS-CoV-2 has already resulted in ten times more infections than any other coronavirus so far, leading to a global pandemic (4). Symptoms of COVID-19 include shortness of breath, diarrhea, reduced appetite with missed meals,, abdominal pain, chest pain, breathing difficulty and loss of smell and taste (5, 6). Moreover, COVID-19 can lead to dysfunction of the kidneys, lungs, heart and death. Diagnosis is performed by RT-PCR assay on clinical specimens collected from oropharyngeal swabs and nasopharyngeal swabs (7). Since the start of the outbreak of COVID-19, a number of different treatments have been used, including the following: antiviral agents, chloroquine and hydroxychloroquine, corticosteroids, antibodies, convalescent plasma transfusion, and previous vaccines (8). Studies have shown that usage of the convalescent serum from recovered patients appeared to be helpful and effective (9).

Unfortunately, as the global COVID-19 pandemic unfolded, social media platforms played a significant role in the development and sharing of conspiracy theories. In addition, the negative psychological impact of COVID-19 and concomitant uncertainties exacerbated stress and anxiety about the future (10). Thus, under such conditions, development of conspiracy theories began to increase and spread. For example, it has been reported that conspiracy theories are linked to several matters including rejection of global warming and the safety and efficacy of vaccines, rejection, political apathy and prejudice all of which can ultimately have negative outcomes related to people's trust in the recommendations of doctors, scientists and other authorities including government leaders (10). One cross-sectional study explored the relationship between COVID-19 conspiracy beliefs and non-cooperation with public health recommendations in the U.S. (11). According to the findings, individuals who believed conspiracies indicated that their plans to get vaccinated were 3.9 times less and showed poorer support for public health policies in comparison with individuals who disregarded conspiracy theories.

Thus, accurate knowledge, appropriate attitudes, and precautionary measures (KAP) related to COVID-19 have been used in numerous countries to help to control the

spread of this disease (12). KAP surveys are the most useful resources used to assess the public willingness and behavioral changes towards a disease or situation (13, 14). KAP surveys are based on a pre-defined questionnaire that can provide both qualitative and quantitative details regarding a particular issue or disease (15). Moreover, the KAP survey can provide necessary information for the approval or rejection of a hypothesis (16). In addition, KAP can help to determine knowledge gaps, behavioral patterns, and cultural beliefs that make it easier to understand and control efforts (16). It has been suggested that control measures against COVID-19 can be influenced by the KAP of individuals (17). In addition, socio-demographic factors have been found to affect KAP with regard to COVID-19 (18).

Successful disease control efforts thus depend on comprehending both the distribution and frequency of health behaviors and understanding associations with the different socio-demographic backgrounds. For example, studies on the H1N1 pandemic and SARS epidemic in different countries demonstrated the importance of understanding community responses and preparedness (19). The main purpose of the present study is to explore the KAP towards COVID-19 among university students in Bahrain. Furthermore, it aims to determine the association between the different sociodemographic backgrounds and preventive behaviors. Evaluation of KAP of COVID-19 among the university students in Bahrain would thus provide the knowledge base for informing current and new awareness programs for the control of COVID-19.

Methods

1. Study design

The type of study is a cross-sectional investigation by a validated questionnaire (20) that was designed to measure the level of knowledge, attitude, and practices against COVID-19 in university students in Bahrain. The questionnaire featured multiple-choice questions and checkboxes questions that contained general information about COVID-19. It consisted mainly of four sections with more than 30 questions/outcomes: [1] demographical questions, [2] knowledge about symptoms, transmission, and prevention; [3] attitude against the COVID-19 and [4] practices for prevention against COVID-19. The survey was distributed among students from different universities and graduate students via social media platforms. It was anonymous and voluntary for the participants of the study to click on the link to complete the online questionnaire. The period of data collection was from 17/11/2020 to 21/11/2020. The questionnaire was created with Google Form and its consistency validated with the Cronbach Test (α =level 0.8).

2. Participants

Participants' inclusion criteria were being university college students who lived in Bahrain and could read and understand English. Due to the emergency and particular period, we adopted a convenience sampling. We distributed our online survey form through online lectures and lecture homepages, university club mailing lists, and social networks (Microsoft Teams and Blackboard). The participants have been divided into groups depending on their university majors. The study size was obtained depending on the previous study with 368 students who were analyzed from the same perspective (20).

3. Study variables

Variables in this study focused on measuring awareness, attitude, and practice towards COVID-19.

4. Data analysis

Data entry and analysis were performed using SPSS analysis and Jamovi for graphs

Table 1 - Demographical characteristics of university students

	Percentage of participants (absolute number)
Age	
18-21	67.3 (165)
22-25	29.3 (72)
26-30	2.0 (5)
30≤	1.2 (3)
Gender	
Male	29.8 (73)
Female	70.2 (172)
Level of Education	
Bachelor's degree	93.3 (230)
Master degree	4.5 (11)
Doctorate degree	1.6 (4)
University Major	
Science	35.5 (87)
Arts	2.8 (7)
Business	16.7 (41)
Engineering	20.8 (51)
Health and sport science	9.0 (22)
Information technology	4.5 (11)
Law	5.7 (14)
Medicine	2.8 (7)
Education	2.0 (5)
COVID-19 infection history	
Yes, infected	13.9 (34)
No, not infected	86.1 (211)

Counts and percentages were analyzed for all variables. Categorical variables were analyzed using a chi-square test to investigate the relation between COVID-19 infection and the demographical characteristics, awareness, attitude, and precautionary measures among the students. P-value ≤ 0.05 was considered statistically significant.

Results

1. Demographical Characteristics

A total of 300 responses was collected for this survey, among which only 245 were valid (81.6%, 172 females and 73 males). Participants have been distributed into four groups according to their age (Table 1). Similarly, the students' degree has been shown in table 1, that includes bachelor, master, and Ph.D. In addition, table 1 also shows the SARS-CoV-2 history of the participants: 34 out of 245 participants caught SARS-CoV-2 infection (Table 1).

To access the knowledge of students about transmission, symptoms, and treatments of SARS-CoV-2 infection, different questions were asked, as mentioned in table 2. The data presented show that most of the students have good knowledge about the collection of a sample, transmission route, and incubation

Table 2 - Knowledge about transmission, symptoms, and treatment of COVID 19

	Percentages of participants (absolute number)
Where is the diagnostic swab collected from? (n'245)	
Nasopharyngeal	59.6 (146)
Oropharyngeal	4.1 (10)
Both (nasopharyngeal and oropharyngeal)	36.3 (89)
Is SARS-CoV-2 transmitted through the respiratory droplets only? (n'245)	
Yes	62.4 (153)
No	37.6 (92)
How many days does the incubation period of COVID-19 last? (n'245)	
1-7	21.2 (52)
8-14	74.8 (182)
15-21	4.5 (11)

Does the face mask prevent the spread of respiratory droplets? (n'245)	
Yes	89.0 (218)
No	11 (27)
Do all society members need to wear a mask? (n'245)	
Yes	81.2 (199)
No	18.8 (46)
Does the face mask give full protection against COVID-19? (n'175)	
Yes	9.4 (23)
No	62.0 (152)
Which are the most common symptoms in a person infected with SARS-CoV-2? (every person suffered from a variable number of symptoms)	
Shortness of breath	70.6 (173)
Fever	72.6 (178)
Cold	48.5 (119)
Sore throat	41.6 102)
Headache	63.7 (156)
Diarrhea	26.9 (66)
Loss of taste and smell	71.0 (174)
Fatigue	25.3 (62)
Chest pain	39.6 (97)
Nausea	25.7 (63)
Is a vaccine against COVID-19 available? (n'246)	
Yes	58.4 (143)
No	41.6 (103)
Can COVID-19 be treated with the usual antibiotic and antiviral drugs? (n'104)	
Yes	24.1 (59)
No	30.6 (75)
What is the medical treatment for the most common symptoms? (Every person could give more than one answer)	
Paracetamol	58.7 (144)
Self-isolation	28.9 (71)
Vitamin C	62.0 (152)
Vitamin B	23.2 (57)
Vitamin D	35.1 (86)
Blood plasma injection	27.3 (67)
Hydroxychloroquine	22.0 (54)
Increase fluids	20.9 (51)
Minisec Capsule	11.9 (29)
Others	1.2 (3)
Can Vitamin D help in preventing the infection by SARS-CoV-2? (n'103)	
Yes	25.7(63)
No	16.3(40)
Which age group do you think is the preferred target of COVID–19? (n'244)	
Children	4.1 (10)
Adults	10.6 (26)
The Elderly	17.1 (41)
All	68.2 (167)

Do you follow the updates about COVID-19? (n'114)	
Yes	33.9 (83)
No	12.7 (31)
What is your main source of knowledge about COVID-19? (n'245)	
Social media	78.0 (191)
Family and friends	6.1 (15)
Newspaper	5.3 (13)
Television	3.7 (9)
Work/university	6.9 (17)
Do you think COVID is man-made? (n'137)	
Yes	31.4 (77)
No	24.5 (60)
Do you believe in herd immunity? (n'147)	
Yes	38.8 (95)
No	21.2 (52)
Do you think herd immunity can reduce the spread of SARS-CoV-2? (n'134)	
Yes	35.5 (87)
No	19.2 (47)
Do you think that COVID-19 frequency can be reduced by self-isolation? (n'178)	
Yes	65.3 (160)
No	7.3 (18)
Do you think COVID-19 can be reduced by awareness? (n'182)	
Yes	64.9 (159)
No	9.4 (23)
Were you familiar with the importance of sterilization before the pandemic? (n'245)	
Yes	65.7 (161)
No	34.3 (84)

* Note: There is some discrepancy is the number of responses in the above table, this is due to lack of responses by participants.

period of COVID-19 (Table 2). Moreover, our data showed that students have good knowledge and awareness about the role of masks for the prevention and spread of COVID-19 (Table 2).

In the next series of questions, students were asked about common symptoms, treatment, and availability of vaccines. Students had good awareness about symptoms of COVID-19, but most of the students had no idea about the usage of antibiotics in COVID-19 treatment (Table 2). Awareness of students regarding medical treatments for COVID-19 infection was also good but most students were not clear about the intake of vitamin D (Table 2).

Most students believe that COVID-19 affects all groups of the population (Table 2). Most students follow the social media for the updates of COVID-19. Further, the knowledge of students about conspiracy theory, herd immunity, self-isolation, and previous knowledge about sterilization has also been presented in Table 2.

Regarding the attitudes during the pandemic, most of the students cancelled or postponed their meetings with friends, dining outs, and sports events, while 201 (82.0%) students avoided coughing around people during the pandemic (Table 3). Our study showed that most students avoided people with symptoms of flu as well as

Table 3 - Attitude toward COVID-19 among university students

	Percentage of participants (absolute number)
Did you cancel or postpone meetings with friends, eating-outs and sport events?	
Yes	80 (196)
No	20.0 (49)
Did you avoid coughing around people as much as possible?	
Yes	82.0 (201)
No	18.0 (44)
If you have flu symptoms, do you avoid contact with other people?	
Yes	82.4 (202)
No	17.6 (43)
Did you start to avoid places where many people gather?	
Yes	84.1 (206)
No	15.9 (39)
Did you start to wash your hands more often than usual?	
Yes	80.8 (198)
No	19.2 (47)

Table 4 - Precautionary measures against COVID-19 among university students

	Percentage of participants (number of participants)
What are the precautionary measures adopted? (every participant could give more than one answer)	
Wearing mask	89.8 (220)
Carrying hand sanitizer	75.9 (186)
Avoid going out	44.4 (109)
Staying at home	63.2 (155)
eating healthier	37.9 (93)
Avoid handshaking	66.5 (163)
Cleaning surfaces in public	53.4 (131)
Increase fluids intake	32.6 (80)
What are the supplements that "YOU" are taking to prevent getting infected with COVID-19? (every participant could give more than one answer)	
Iron	21.6 (53)
Zinc	16.4 (40)
Multi-vitamins	24.4 (60)
Vitamin A	12.6 (31)
Vitamin B	17.5 (43)
Vitamin C	48.1 (118)
Vitamin D	31.4 (77)
Vitamin E	19.1 (47)
Vitamin K	13.5(35)

Table 5 - Relationship between COVID-19 infection and awareness among university students

		Gender		P-value
		Female	Male	
Have you got infected with COVID-19?	No	70.6% (149)	29.4% (62)	0.725
	Yes	67.6% (23)	32.4% (11)	
		Does the mask give full protection?		P-value
Have you got infected with COVID-19?		No	Yes	
	No	89.3% (134)	10.7% (16)	0.018
	Yes	72.0% (18)	28.0% (7)	
		Do you think COVID-19 can be reduced by self-isolation?		P-value
Have you got infected with COVID-19?		No	Yes	
	No	11.8% (16)	88.2% (136)	0.416
	Yes	17.2% (2)	82.8% (24)	
		Do you follow the update of COVID-19?		P-value
		No	Yes	
Have you got infected with COVID-19?	No	28.4% (27)	71.6% (68)	0.51
	Yes	21.1% (4)	78.9% (15)	
		Do you think COVID-19 is man-made?		P-value
		No	Yes	
Have you got infected with COVID-19?	No	46.0% (52)	54.0% (61)	0.255
	Yes	33.31% (8)	66.7% (16)	
		Did you start to avoid places where many people are gathered?		P-value
		No	Yes	0.07
Have you got infected with COVID-19?	No	14.2% (30)	85.8% (181)	
	Yes	26.5% (9)	73.5% (25)	
		Did you start to wash your hands more often than usual		P-value
Have you got infected with COVID-19?		No	Yes	
	No	19.0% (40)	81.0% (171)	0.823
	Yes	20.6% (7)	79.4% (27)	

*Note: There is some discrepancy is the number of responses in the above table, this is due to lack of responses by participants.

avoided crowded places (Table 3).

Table 4 shows the data about precautionary measures that had been taken by the students. Moreover, most of the students took vitamin C as a supplement to boost their immunity (Table 4).

Table 5 shows the relationship between COVID-19 infection and knowledge about this disease among university students of Bahrain.

Discussion and conclusions

This study provides an understanding of the level of knowledge, attitude, and perception among university students during the global COVID-19 pandemic. In this study, participants' demographical characteristics were analyzed based on COVID-19 infection, where females showed more cases of COVID-19 infection. This

contrasts with previous studies where males were more infected than females (11). It has been described that females have higher macrophage and neutrophil activity, as well as high antibody production, so men thus have a high risk of COVID-19 infection and a higher mortality rate (21).

In a similar study conducted in China, it was observed that the overall knowledge of participants about COVID-19 was 90% which is more than that of our study (17). In that study, it was also found that 98% of participants wore masks when going outside, which indicates a very responsible attitude towards COVID-19 (17). Interestingly, a KAP study in Ethiopia showed poor participant knowledge ats 48% (22). This was confirmed by another KAP study (23) in which it was observed that some of the key factors associated with low levels of knowledge included living in a rural area, being divorced, and being female.

A South Korean COVID-19 KAP study with 970 participants showed that attitudes and practices are mainly influenced by knowledge (24). In the study, it was observed that efficacy belief was the most powerful factor in preventive behaviors. In contrast to the study of (23), Lee et al found that females exhibited a higher level of knowledge as compared to males (24).

In this study, 59.6% of students thought that samples for the detection of COVID-19 infections are taken from the nasopharyngeal route, while 36.3% selected both nasopharyngeal and oropharyngeal routes. It has been shown that the nasopharyngeal route has a significantly higher COVID-19 detection rate, sensitivity, and viral load than the oropharyngeal route, which resulted in excessive usage of the nasopharyngeal route in hospitals and home-kits for the diagnosis of COVID-19 (25). Similar to our study, it has been described that masks provide protection and function as a barrier to lower the chances of entry of the virus into the respiratory tract (26).

It has been observed that awareness of students was good regarding the treatment used against COVID-19. Most student knew that antibiotics and antivirals are not recommended for treating COVID-19 infection as antibiotics are only used when a bacterial infection is present or suspected (27).

This study also assessed the sources of information used by students. The primary source of information for 78% of students was shown to be social media by Similarly, a KAP study with the Pakistani population showed that 86.7% of participants obtained information from social media (28). This should alert students to the importance of accessing accurate information on social media. Students should use medical websites such as PubMed that contain research and peer-reviewed published studies. These reliable sources confirm the information that the students have increased their awareness level (29).

Regarding the conspiracy beliefs, most students believe that COVID-19 is man-made. According to one previous study related to the effects of conspiracy beliefs on the behavior of individuals, the beliefs resulted in have positive pandemic behaviors such as disinfecting, avoiding social contacts, not touching the face and avoiding crowds. Such actions would thus indicate a higher level of awareness and decrease the risk of getting infected with COVID-19 (30). However, our study indicated the exact opposite with regard to the students who got infected and shared conspiracy beliefs. Conspiracy beliefs also mentioned the belief of herd immunity as more students believed that herd immunity has the ability to decrease the spreading of COVID-19 (31). Even though herd immunity provides an indirect immunity to the population, it's difficult to occur in a large population with a variety of immunity levels and the different ways of transmission (21, 22).

This study also showed that ≥80% of students have a positive attitude against

COVID-19. Other studies showed a more positive attitude regarding handshaking, hand washing and avoiding coughing as participants showed ≥90% positive attitude (17, 23, 27, 28, 32).

The present study has several limitations: for example, the data collection did not achieve the calculated sample size; however, it was comparable to similar published studies. Furthermore, the study population is a good representative of the young educated Bahraini population. Another limitation was the descriptive nature of the study, as it aimed at describing the university students' general knowledge, risk perception, preventive behaviors, and practices in relation to the COVID-19 pandemic. The use of an unvalidated questionnaire was another important limitation with self-reported information. In addition, we should take into consideration all the intrinsic limits of a cross-sectional study design. The potential selection bias is due to voluntary enrolment and because of social network dissemination. Indeed, this implies that people without social networks could not take part in the survey. The study was based on self-reported questionnaire, which is subject to social desirability bias. However, the questionnaire was anonymous, and the return time was restricted to 10 minutes, which will significantly reduce such bias.

This study draws a general picture of the Bahraini university students' knowledge and attitudes towards COVID-19. In conclusion, most of the students showed positive awareness, attitudes, and precautionary measures towards COVID-19. However, misconceptions and wrong beliefs were also common, such as regarding the treatment and the origin of the virus, which need to be addressed. Although the students were not distressed or panicked at the time of questionnaire dissemination, it is anticipated that the distress level would rise in case of a community outbreaks or just an increase in cases. Therefore, psychological preparedness should become part of the governmental preparatory plan. The main recommendation of this study is to revise the governmental educational and media campaign, as it is evident from our data that students depend heavily on social media rather than on formal procedures. To control this pandemic, it is important to educate each member of society about COVID-19 to develop a positive attitude and acceptance of preventive practices to reduce and ultimately restrain the transmission of SARS-CoV-2.

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Riassunto

Consapevolezza, atteggiamenti e misure preventive nei confronti della COVID-19 tra gli studenti universitari del Bahrein

Introduzione. L'infezione da SARS-CoV-2 è stata segnalata per la prima volta in Cina nel Dicembre 2019 ed è diventata pandemia a inizio del 2020. Il presente studio ha valutato il livello di consapevolezza e attenzione in studenti universitari riguardo alle possibilità di contrarre la COVID-19. I livelli di consapevolezza ed i comportamenti degli studenti sono stati registrati utilizzando un questionario online in un gruppo totale di 300 soggetti.

Risultati. I risultati ottenuti hanno mostrato una risposta positiva riguardo alla consapevolezza sui sintomi del COVID-19 in più del 70% degli studenti; il 62% ha convenuto che la mascherina non fornisce una protezione completa contro l'infezione; circa il 30% degli studenti era concorde sul fatto che antibiotici e antivirali non sono adatti al trattamento della malattia, mentre il 62% degli studenti ha ritenuto utile la vitamina C nel trattamento dei sintomi comuni della COVID-19. Inoltre, circa il 31% degli studenti credeva che il SARS-CoV-2 fosse un virus prodotto dall'uomo, tuttavia gli studenti che hanno contratto l'infezione ritenevano che la maschera fornisse una protezione completa ($p < 0.05$). Riguardo ai comportamenti messi in atto, l'80% degli studenti ha annullato o rinviato gli incontri con gli amici, il 90% ha convenuto che indossare la mascherina è la misura precauzionale più utile per prevenire l'infezione. In aggiunta, l'82% degli studenti ha evitato di tossire in pubblico, l'82% ha evitato contatti

sociali qualora avesse avvertito sintomi simili all'influenza e l'80% si è lavato le mani molto più frequentemente di quanto facesse prima di questa pandemia. È interessante notare che il 76% degli studenti porta con sé un disinfettante per le mani, il 66,5% evita la stretta di mano.

Conclusioni. Questo studio ha mostrato una forte consapevolezza positiva riguardo alla trasmissione, ai sintomi e ai trattamenti del COVID-19 tra gli studenti universitari. Tuttavia, sono risultate abbastanza comuni anche convinzioni sbagliate, per esempio a proposito dell'origine del virus e del trattamento della malattia, che devono essere corrette. Il nostro studio offre una base per creare programmi di sorveglianza e per aiutare le Autorità Sanitarie locali a migliorare i piani di emergenza anti-pandemie, in particolare per quanto riguarda l'educazione sanitaria e l'informazione medica.

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