Original Article

Knowledge, attitudes, and practices regarding COVID-19 among medical and allied health students in the Kingdom of Saudi Arabia

Eddieson Pasay-an[1], Ferdinand Gonzales[1], Maha Sanat Alreshidi[1], Jupiter Cajigal[1], Wireen Leila Dator[2], Petelyne Pangket[1]

[1]Maternal and Pediatric Department/Medical-Surgical Department, College of Nursing, University of Hail, Hail, Kingdom of Saudi Arabia, [2]Postgraduate Studies and Scientific Research Department, Princess Nourah Bint Abdulrahman University, Riyadh, KSA

ORCID:
Eddieson Pasay-an: 0000-0003-1257-3175;

Abstract

Context: Notwithstanding the recognizable impact on public health, knowledge regarding this virus remains inadequate.

Aims: This study aimed to determine the knowledge, attitudes, and practices of medical and allied health students regarding COVID-19 and its relationship to their demographic information.

Setting and Design: This study was conducted at the University of Hail, Hail region, Kingdom of Saudi Arabia. This study used a quantitative comparative-correlational design.

Materials and Methods: There were 232 students recruited as respondents resulting from convenience sampling. A Google Forms survey was used to collect the data from March 2, 2020, until April 15, 2020.

Statistical Analysis Used: One-way ANOVA, *t*-test, and Pearson's correlation test were used to analyze the data.

Results: The participants had good knowledge, positive attitudes, and good practices on COVID-19. Of all the variables tested, only gender ($P < 0.002$) has statistical difference to knowledge. The Pearson's results showed no significant relationship between knowledge and attitudes ($P > 0.5$), knowledge and practices ($P > 0.5$), or attitudes and practices ($P > 0.5$).

Conclusion: With the good knowledge, positive attitudes, and good practices of the participants about COVID-19, it is inferred that they can help to do information dissemination needed by the community. As females found to be more knowledgeable than males, female involvement in prevention and information of COVID-19 in the family dynamics of the Saudi context is worth considering. Moreover, male participants' knowledge should be improved through health education.

Keywords: Allied health students, Attitudes, COVID-19, Knowledge, Medical, Practices

Address for correspondence: Dr. Eddieson Pasay-an, College of Nursing, University of Hail, Hail, Saudi Arabia.
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INTRODUCTION

Since its outbreak in late December 2019, coronavirus disease (COVID-19) has become a threat to public health worldwide. On January 21, 2020, the situation report by the World Health Organization stated that the causative agents are still unknown.[1] The disease is believed to be caused by a novel virus originating from the coronavirus (CoV) group, which can spread from one person to another by means of respiratory droplets and contact routes.[2-4] Current knowledge regarding this disease is that it can affect people of all ages, but its transmission can be prevented through social distancing, isolation, and containment. Bai *et al.* reported that SARS-CoV-2 could be transmitted by people without symptoms, but people with symptoms are more contagious.[5] Notwithstanding the recognizable impact on public health, knowledge about this virus remains inadequate.[6] Although urgent measures have been taken by governmental authorities to contain the virus, the reported number of cases has increased exponentially. Limiting the worldwide spread of this viral infection is necessary; thus, control measures are urgently required.[7] The public must be educated in a timely manner to advance their knowledge, attitudes, and perceptions. The reinforcement of information on the outbreak of this disease improves the public's understanding of risk behavior and aids in a quick response to the outbreak.[8] However, it is unfortunate to note that gaps in knowledge concerning the disease and its prevention has been exacerbated by media sources providing conflicting information.[9]

It is well known that medical and allied health students assist authorities in disseminating information about health. The medical and allied health students in this study were enrolled in medical and health courses such as medicine, nursing, dentistry, public health and informatics, pharmacy, and applied science. These students are key players in mass education campaigns because of the public's assumptions regarding the knowledge and attitudes these students have gained through their education. However, anecdotal reports have shown a lack of knowledge among medical and allied health students, compromising their ability to communicate accurate information to the public and their ability to help prevent the spread of this disease. Research by Koralek *et al.* showed that precise knowledge of disease characteristics and routes of transmission is essential at the time of an outbreak.[10] A study conducted by Koskan *et al.* suggested that students lacked knowledge regarding the details of preventative behavior and vaccines for the H1N1 disease.[11] In addition, Kanadiya and Sallar performed a study on swine flu and concluded that there is a gap in knowledge about swine flu, resulting in a lack of risk reduction and a high degree of anxiety, which requires serious attention.[12] Thus, it is paramount to understand the knowledge, attitudes, and practices of medical and allied health students. According to Koskan *et al.*, it is important to identify how to best communicate with these students in the event of a public health emergency.[11] Studies on the knowledge and attitudes toward behavior during pandemics will not only help to guide the development of important messages but also help in creating mitigation strategies for the present situation. These studies can also be used as a basis for a plan to achieve pandemic preparedness.[13] Indeed, an appropriate response at the beginning of an outbreak is dependent on public knowledge about the disease and its mode of transmission.[14]

This study is of paramount importance, as medical and allied health students are expected to help generate good public knowledge and attitudes and to display good practices in their community. This study provides the necessary information regarding the dissemination of information to the public by these students. Understanding the characteristics of the disease, including its symptoms and transmission routes, is important for preventing further spread of the pandemic. This study aims to determine the knowledge, attitudes, and practices of a population of medical and allied health students with regard to COVID-19 and to examine the relationships between the students' knowledge, attitudes, and practices.

MATERIALS AND METHODS

Design

This quantitative comparative-correlational study aimed to determine the knowledge, attitudes, and practices of medical and allied health students and their differences in demographic variables. Further, this study assesses whether their knowledge translates into attitudes and practices.

Participants

The participants consisted of 232 medical and allied health students enrolled in the second semester of the 2019–2020 school year at the University of Hail, Kingdom of Saudi Arabia. This population includes students in the colleges of nursing, medicine, dentistry, applied science, and public health and informatics. Medical and allied health students were included, provided that they were enrolled both into theory courses and practice, were willing to participate, and understood English.

Sampling

The researchers utilized snowball sampling using a link (Google Forms survey) that was sent to the identified key persons in the class and colleges. These key persons

were requested by the researchers to share the link with their classmates.

Data collection

Due to the enhanced community quarantine and social distancing, the researchers used a Google Forms survey to collect the data. The participants were invited to participate in the study through social platforms such as Messenger, WhatsApp, Twitter, and Snapchat. The participants forwarded a link to a webpage that contained the informed consent form and the study questionnaire. The students were asked to read the informed consent; if they understood the content of the informed consent and decided to participate, they were asked to proceed with the questionnaire. Data collection was conducted from March 2, 2020, until April 15, 2020.

Questionnaire

The questionnaire was adapted from Zhong *et al*.,[15] with their permission and modified by the researchers. The original questionnaire contained 12 items (four about clinical presentation, three about transmission route, and five about prevention control). In the present study, two items on prevention control with regard to handwashing were added. Scoring of the knowledge items was the same as that for the original questionnaire, with possible responses of "true," "false," and "I don't know." One point was given for every correct answer, and 0 point was awarded for an incorrect answer or "I don't know" answer. The items for attitudes and practice comprised two questions each. Responses to the attitude and practice questions were "yes" and "no." Each question regarding knowledge, attitudes, and practices was scored based on the subject's response, and higher total scores indicated better knowledge, attitudes, and practices.

The questionnaire was subjected to a content validity index (CVI). It obtained overall CVI scores of 0.81 for relevance and 0.80 for clarity, indicating a high level of content validity. Thereafter, pilot testing was conducted using 13 students from different allied health colleges to determine the reliability of the questionnaire. The questionnaire yielded a reliability coefficient of 0.74.

Ethical consideration

Ethical approval was obtained from the Ethical Review Board of the University of Hail (H-2020-097). The researchers observed the ethical principles of the World Medical Association Declaration of Helsinki in conducting research involving humans. Written informed consent was obtained from all participants.

Statistical analysis

Frequency and percentage values were calculated to describe the demographic data and the knowledge, attitude, and practice data. One-way ANOVA was used to determine differences in age, while the *t*-test was used for gender and availability of home/mobile Internet. Pearson's correlation coefficient was used to identify significant relationships between knowledge, attitudes, and practices. All statistical analyses were performed using (SPSS v. 22, IBM Software Group, Chicago, IL, USA) 25 at a 0.05 level of significance.

RESULTS

The majority of the respondents (83.2%) were 21–30 years old, and the next largest group was 20 years old and below. The respondents were predominantly male (51.3%). Most of the respondents had an access of home or mobile Internet connection (77.6%) [Table 1].

The knowledge displayed by the medical and allied health students was high, with an average of 87.29% correct responses. The correct response rate was high for nearly all knowledge items. A 100% correct response rate was obtained for items 1 and 11, which pertained to the main clinical symptoms of COVID-19 and the isolation and treatment of people who are infected with COVID-19, respectively. The item with the lowest correct response rate of 60.8% pertained to children and young adults taking measures to prevent infection by the COVID-19 virus. Conversely, the correct response rates of the medical and allied health students for the attitudes and practice items were not as high with results of 73.2% and 58.4%, respectively [Table 2].

Age ($P > 0.34$) and home/mobile Internet ($P > 0.62$) were found not to be significant; however, there was a statistically significant difference between the level of knowledge and gender ($P < 0.002$).

Concerning attitude, there was no significant differences on age ($P > 0.66$), gender ($P > 0.73$), and home/mobile Internet ($P > 0.64$).

Table 1: Demographic information of the respondents

Variable	Frequency (%)
Age (years)	
20 and below	28 (12.1)
21-30	193 (83.2)
31 and above	11 (4.7)
Sex	
Male	119 (51.3)
Female	113 (48.7)
Home/mobile Internet access	
Yes	180 (77.6)
No	52 (22.4)

On practices, there were no significant differences found in age ($P > 0.24$), gender ($P > 0.99$), and home/mobile Internet ($P > 0.86$) [Table 3].

Pearson's correlation coefficient shows no significant relationship between respondents' knowledge and attitudes ($P > 0.5$).

Pearson's correlation coefficient shows no significant relationship between the knowledge and practices of the respondents ($P > 0.5$).

Pearson's correlation coefficient shows no significant relationship between the attitudes and practices of the respondents ($P > 0.5$) [Table 4].

DISCUSSION

This study aimed to determine the knowledge, attitudes, and practices of medical and allied health students and the differences in demographic variables. It also aimed to predict relationships between the students' knowledge, attitudes, and practices. The findings of this study suggest that medical and allied health students have good knowledge, positive attitudes, and good practices concerning COVID-19. The findings regarding good knowledge, positive attitudes, and good practices among medical and allied health students were expected because these students' courses explain the mechanisms and characteristics of diseases, disease prevention, and health promotion. In general, these results are similar to those of Erfani *et al*., whose respondents showed good knowledge, positive attitudes, and reasonable practices.[16] The results pertaining to good knowledge from the current study are also similar to the findings of Zhong *et al*. and Erfani *et al*. whose respondents had overall correct response rates of 90% and 85%, respectively.[15,16] It is worth mentioning that the respondents showed a full understanding of the main clinical symptoms of the disease and the need for isolating and treating people who are infected with COVID-19, as those items had 100% correct response rates. Furthermore, the positive attitudes and good practices of the medical and allied health students were similar to the findings of a previous study.[15] In addition, the students had a positive attitude concerning MERS-CoV.[16] The results of this study indicate that medical and allied health students can contribute to the dissemination of accurate information to help decrease the anxiety and stress in their communities. Moreover, the good knowledge, positive attitudes, and practices of medical and allied health

Table 2: Knowledge, attitudes, and practices of medical and allied health students regarding COVID-19

Knowledge	Correct (%)	Incorrect (%)
K1. The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia	232 (100)	-
K2. Unlike the common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the COVID-19 virus	220 (94.8)	12 (5.2)
K3. There currently is no effective cure for COVID-2019, but early symptomatic and supportive treatment can help most patients recover from the infection	229 (98.7)	3 (1.3)
K4. Not all persons with COVID-2019 will develop to severe cases. Only those who are elderly, have chronic illnesses, and are obese are more likely to be severe cases	224 (96.6)	8 (3.4)
K5. Eating or contacting wild animals would result in infection by the COVID-19 virus	184 (78.4)	50 (21.6)
K6. Persons with COVID-2019 cannot transmit the virus to others when a fever is not present	164 (70.7)	68 (29.3)
K7. The COVID-19 virus spreads via respiratory droplets from infected individuals	190 (81.9)	42 (18.1)
K8. Ordinary residents can wear general medical masks to prevent infection by the COVID-19 virus	151 (65.1)	81 (34.9)
K9. It is not necessary for children and young adults to take measures to prevent infection by the COVID-19 virus	141 (60.8)	91 (39.2)
K10. To prevent infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportations	228 (98.3)	4 (1.7)
K11. Isolation and treatment of people who are infected with COVID-19 are effective ways to reduce the spread of the virus	232 (100)	-
K12. People who have contact with someone infected with the 2019 novel coronavirus should be immediately isolated in a proper place. In general, the observation period is 14 days	213 (91.8)	19 (8.2)
K13. Frequent handwashing with soap and water for at least 20s, especially after you have been in a public place or after blowing your nose, coughing, or sneezing, is recommended to prevent the spread of the disease	209 (90.1)	23 (9.9)
K14. Hand rubbing with hand sanitizer that contains at least 60% alcohol can be used if soap and water are not readily available	220 (94.8)	12 (5.2)
Average	(87.29)	(12.71)
Attitude	**Yes (%)**	**No (%)**
A1. Do you agree that COVID-19 will finally be successfully controlled?	144 (62.1)	88 (37.9)
A2. Do you have confidence that Saudi Arabia can win the battle against the COVID-19 virus?	196 (84.5)	36 (15.5)
Average	(73.2)	(26.7)
Practice	**Yes (%)**	**No (%)**
P1. In recent days, have you gone to any crowded places?	71 (30.6)	161 (69.4)
P2. In recent days, have you worn a mask when leaving home?	122 (52.6)	110 (47.4)
Average	(41.6)	(58.4)

Table 3: Differences in age, sex, Internet/mobile at home on knowledge, attitudes, and practices

Variable	Mean±SD	Test value	df	*P*
Knowledge				
Age				
20 and below	10.54±1.77	*F* (1.12)	SSb=2	0.34
21-30 old	10.97±1.38		SSw=228	
31 and above	10.91±1.38		SSt=230	
Sex				
Male	10.63±1.47	*t* (−3.16)	229	0.002*
Female	11.21±1.33			
Mobile/home Internet				
Yes	11.00±1.31	*t* (0.49)	229	0.62
No	10.89±1.46			
Attitude				
Age				
20 and below	1.43±0.69	*F* (0.41)	SSb=2	0.66
21-30 old	1.40±0.67		SSw=229	
31 and above	1.60±0.74		SSt=230	
Sex				
Male	1.43±1.47	*t* (0.34)	230	0.73
Female	1.40±1.33			
Mobile/home Internet				
Yes	1.37±0.53	*t* (−0.469)	230	0.64
No	1.42±0.72			
Practices				
Age				
20 and below	0.71±0.71	*F* (1.45)	SSb=2	0.24
21-30 old	0.86±0.72		SSw=229	
31 and above	0.55±0.69		SSt=230	
Sex				
Male	0.83±0.75	*t* (0.001)	230	0.99
Female	0.83±0.69			
Mobile/home Internet				
Yes	0.83±0.71	*t* (−0.06)	230	0.96
No	0.83±0.73			

*Significant at the 0.05 level. SD: Standard deviation, df: Degree of freedom

Table 4: Relationships between knowledge, attitudes, and practices (*n*=232)

Variables	Knowledge	Attitudes	Practices
Knowledge	-	−0.88	0.10
Attitude	−0.88	-	−0.11
Practices	0.10	−0.11	-

*Significant at the 0.05 level

students can help slow the rates of "infodemics" concerning COVID-19.

This study found a significant difference in the knowledge between genders. This study suggests that females have higher scores than males. Previous studies explored the reasons why females perform far better than males and found that females display a better perception of educating themselves and self-control.[17,18] This finding is similar to that of Asaad *et al*., who noted a significant difference in knowledge between genders, where females scored higher than their male counterparts.[19] The findings of this study contribute to the identification of educational strategies that aim to improve the knowledge of COVID-19 in both males and females. Having proper knowledge, such as knowing precautionary measures, can be used to protect oneself, regardless of gender. Conversely, the participants' age and those with home/mobile Internet were found to be insignificant to the level of knowledge. Moreover, age, gender, and home/mobile Internet were not significantly associated with attitudes and practices. Overall, these specific findings suggest that these variables were not determinants of knowledge (apart from gender), attitudes, and practices. It is important to note, however, that educational needs, regardless of the demographic variables, must be considered to create educational strategies. This can improve the understanding of the medical and allied health students on their roles in the challenges presented by COVID-19.

The present study found no significant relationships between knowledge, attitudes, and practices with regard to COVID-19. This finding suggests that knowledge does not translate to attitudes or practices and that attitudes do not translate to practices. In contrast to the current findings, Erfani *et al*. found that higher knowledge of COVID-19 was significantly related to positive attitudes and good practices; thus, they proposed that good knowledge translates to positive attitudes and good practices.[16] On the other hand, insignificant or weak associations between knowledge, attitudes, and practices were explored in earlier studies with regard to different topics.[20-22] In the present study, the respondents showed good knowledge (98.3%) about the prevention of COVID-19 with respect to avoiding crowded places; however, 30.6% of the respondents had recently gone to a crowded place. As such, medical and allied health students have good knowledge of COVID-19, but this is not reflected in their practices. Sadeghi and Hakimi have similar views regarding the gap between theory and practice.[23] This finding is important to aid educators in developing strategies that can help students put their knowledge into action and practice. Indeed, this is a way educators can contribute to the formation of the skills necessary for allied health students to become responsible health professionals who cater to the health needs of society.

The study findings highlight the good knowledge, attitudes, and practices of medical and allied health students; however, this does not translate to practice. Therefore, it is recommended that part of the curriculum is revised to ensure that the theory-practice gap is filled. This can be achieved by strategizing evident learning outcomes, reinforcement, and the alignment of theory and practice.

Limitations of the study

One of the limitations of the study was that the researchers did not include the year level of the medical and health allied students, which can be significant to the knowledge, attitudes, and practices on COVID-19. Moreover, since

the questionnaire was in English, there was an exclusion of students that have difficulty with English. As such, these factors require examination in future studies as they directly identify the educational needs of these students regarding COVID-19.

CONCLUSION

Medical and allied health students have good knowledge, positive attitudes, and good practices with regard to COVID-19. There were no significant relationships between knowledge, attitudes, and practices. Therefore, knowledge of COVID-19 in this context does not translate to attitudes or practices.

Conflicts of interest

There are no conflicts of interest.

Authors' contribution

EP, FG, and MSA were responsible for the study conception and design, while JC, WLD, and PP were responsible for the acquisition of data. EP, WLD, PP analyzed and interpreted the data. All of the authors drafted the manuscript and critically revised it. Further, all authors give final approval of the version submitted in this journal.

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