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A Survey of Knowledge, Attitude, and Preventive Measures Taken by Medical and Dental Students during the COVID-19 Pandemic in Riyadh, Saudi Arabia

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Abstract

Objective: With coronavirus disease-2019 (COVID-19) becoming a global affliction, it is imperative to assess the knowledge, attitude, and practices of budding healthcare professionals toward the pandemic. Hence, this study aimed to evaluate the knowledge and attitude of medical and dental students toward COVID-19 infection. In addition, the preventive measures exercised by them during the outbreak were analyzed.

Method: This study was a prospective, cross-sectional, questionnaire-based study. It was conducted over a period of 5 months from April 15, 2021 to September 15, 2021. A well-designed and validated self-administered questionnaire was disseminated through the Google Forms platform to 726 medical and dental students of Riyadh, Saudi Arabia, after obtaining electronic informed consent.

Result: Of the 726 respondents, 490 were women and 236 were men. As per the results, >50% of the study population followed the Ministry of Health, KSA, as their source of information to obtain latest updates on COVID-19 infection, 17.8% relied on the World Health Organization updates, and 17.1% resorted to social network updates. It was found that 92.33% of the medical and dental students had adequate knowledge of the pandemic and that 96.55% demonstrated a positive attitude toward it. Furthermore, 81.84% of the participants adopted good practices with regard to the infection.

Conclusion: The present study established that the medical and dental students of Riyadh, Saudi Arabia, have an adequate knowledge about the pandemic. The students also displayed a positive attitude toward the situation. However, with the decline in the infection rate, the practice measures have been reduced.

Keywords: Knowledge; Attitude; Practice; COVID-19; Medical Students

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Introduction

Coronaviruses (CoV) are emerging respiratory viruses that are known to cause illnesses ranging from the common cold to severe acute respiratory syndrome (SARS) [1]. In severe cases, these viruses cause fatal pneumonia similar to that caused by severe acute respiratory-syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome-coronavirus (MERS-CoV), which have emerged in the past two decades sporadically all over the world [2]. Coronavirus disease-2019 (COVID-19) is spread by human-to-human transmission through droplet, feco-oral, and direct contact and has an incubation period of 2-14 days [3].

The outbreak of COVID-19 infection has swept across the world, making it the most dreaded pandemic humans have ever witnessed. On December 31, 2019, the World Health Organization (WHO) Regional Office in China was informed about pneumonia cases of unknown cause detected in Wuhan City, Hubei Province of China [4]. The Chinese authorities later announced that they had identified a new virus that triggered these outbreaks, based on genetic sequencing, and named it SARS-CoV-2. COVID-19 was declared a pandemic by WHO on March 11, 2020 as it had affected 114 countries by then [5]. As of now (October 15, 2021), there have been 239,437,517 confirmed cases of COVID-19, including 4,879,235 deaths, reported to WHO [6].

The first confirmed case of COVID-19 in Saudi Arabia was reported on March 2, 2020, which marked the beginning of country-specific preventive measures that were in line with the WHO guidelines for managing the outbreak [7]. Substantial steps, such as suspension of national and international flights, closure of malls and shopping areas across the country, except pharmacies and grocery stores, and shutting down of schools and universities, were implemented. A complete

nationwide curfew was imposed to restrict movements during most of the day hours. There have been 547,845 cases and 8,758 deaths till date (October 15, 2021) in the KSA [7]. The infection rate has declined significantly owing to the prompt and concerted steps taken by the Saudi Ministry of Health.

Healthcare workers may be unintentionally exposed to patients with COVID-19 and, thus, are at an increased risk of contracting the disease or even dying due to occupational exposure combined with long working hours, stress, and fatigue [8]. To reduce the transmission of the virus, public health organizations have advocated standard preventive measures, inclusive of using face coverings, training social distancing, preserving hand hygiene, and restricting contact with infected individuals [9]. Several preventive measures have been implemented by the government authorities to tackle this scourge and safeguard the human race.

Assessing the knowledge of the medical and dental students is important in identifying the gaps and strengthening the ongoing prevention efforts. Therefore, this study aims to assess the knowledge, attitude, and preventive measures adopted by the budding medical and dental professionals of the country.

Methods

This survey was a prospective cross-sectional study that aimed to evaluate the medical and dental students of Riyadh, Saudi Arabia, from April 15 to September 15, 2021. An online-based questionnaire developed using Google Forms was disseminated via social media apps, such as WhatsApp, Facebook, Twitter, and personal email, to the government and private medical and dental college students. The sample size of the study population was calculated with the Raosoft sample size calculator. The required sample size was 367 to achieve the confidence level of 95%, with a margin of error of 5% and response distribution of 50%, for the present survey. Moreover, to improve the study's generalizability and validity the researchers blanketed as many contributors as possible. The external validity and generalizability can be enhanced by increasing the target sample size [10]. The exclusion criterion was students <18 years of age, and the inclusion criterion was medical students and dental students.

A well-designed and validated questionnaire designed by Noreen K, et al. (2020) [11], to evaluate the knowledge, attitudes, and preventive practices (KAP) with regard to the COVID-19 pandemic among the medical students was used after obtaining formal permission.

Students studying in medical or dental universities of Riyadh in Saudi Arabia who were ≥18 years of age filled up the questionnaire after completely understanding it. Electronic informed consent was obtained before proceeding with the questionnaire. The participants' anonymity on publishing their data was assured. Institutional Review Board (IRB) approval for this study was obtained from College of Medicine, Dar Al Uloom University, prior to its execution.

The questionnaire consisted of 4 parts:

1. Demographics, which covered the participants' demographic information, along with gender, age, and academic year of education;
2. Knowledge of the students about COVID-19 (K1-K13);
3. Attitudes of the students in the direction of COVID-19 (A1-A4);
4. Practices of the students pertinent to COVID-19 (P1-P6).

All the KAP questions had 3 options, namely "true/false/not sure." There had been thirteen questions primarily based totally on knowledge, and for every item, a rating of 1 was given for true and 0 for false and not sure. An individual rating of 1-9 was considered inadequate, whilst a rating of 10-13 was considered as adequate. Four questions were related to attitudes, and the rankings presented were +1 for true and −1 for false and not sure. Hence, the student's ought to a scoring range from −4 to +4. The plus rankings were considered as positive attitudes, whilst the minus rankings were designated as negative attitudes. For questions regarding the practice, 2 points were presented for yes, 1 for sometimes, and 0 for no, and scores ≥6 were considered as adequate and those<6 as inadequate [11].

The participants' responses in Google Forms have been exported to Microsoft Excel, after which imported to IBM SPSS model 26.0 (IBM Corp. Armonk, New York, USA). In this study COVID-19-associated KAP have been the quantitative variables. Descriptive statistics, which includes frequencies and proportions, were generated.

Results

In the present study, there were 726 respondents in total, out of which 490 were women and 236 were men. The demographics of the participants are shown in Table 1. More than half of the study population followed the Ministry of Health, KSA, as their information source to obtain any latest updates on COVID-19 infection, while 17.8% depended on WHO updates and 17.1% on social network updates, as shown in Figure 1.

Knowledge

For questions related to knowledge (Table 2), it was observed that 91% of the study population was well informed of the mode of dissemination of COVID-19 infection, 80.9% knew that an asymptomatic COVID-19 carrier can transmit the infection, and 87.5% of them were of the opinion that the isolation period for infected

Table 1: Demographics of the study participants.

Gender	Number	Percentage
Male	236	32.50%
Female	490	67.50%
Age-wise distribution		
18- 19	55	7.60%
20-21	222	30.60%
22-23	238	32.80%
24-25	119	16.40%
26-27	92	12.70%

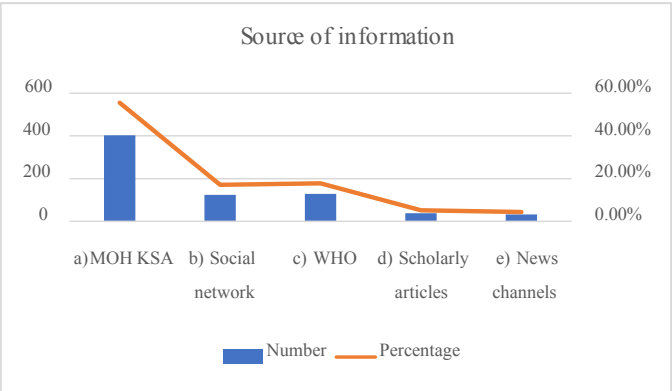

Figure 1: Source of information.

Table 2: Questions relating to knowledge.

Question	Statement	Frequency	Percentage
	KNOWLEDGE	Correct Answer	
K1	COVID-19 infection is caused by SARS-CoV-2.	475	65.4%
K2	COVID-19 infection is spread via respiratory droplets of the infected person.	664	91.5%
K3	All community members are equally at risk for COVID-19.	344	47.4%
K4	The best way of preventing the spread of COVID-19 is social distancing	615	84.7%
K5	Any type of group activity may spread this infection	584	80.4%
K6	An asymptomatic COVID-19 patient can transmit infection	587	80.9%
K7	The risk of getting infected when traveling by Airplane is higher	408	56.2%
K8	This virus infection can be avoided by frequent hand washings by soap	628	86.5%
K9	Advising Quarantine to passengers coming from infected areas is a good practice to avoid the spread of infection	660	90.0%
K10	Lockdown all over the country will control the spread of this virus	527	72.6%
K11	Closing teaching institutions and shopping malls are effective ways of social distancing	510	70.2%
K12	The most common cause of the spread of this infection in any country is a traveler from the infected area	548	75.5%
K13	Isolation period for infected people and those exposed to infection is 14 days	635	87.5%

Table 3: Medical and dental students' knowledge.

Knowledge	Adequate (10-13)	Inadequate (1-9)
Number	553	173
Percentage	92.33%	7.67%

people and those exposed to the COVID-19 infection was 14 days. Furthermore, two-thirds of the study participants considered travelers from an infected area as the most common cause of the COVID-19 spread. Moreover, 84.7% recognized social distancing as the best way of preventing COVID-19 infection, 80.4% were of the opinion that any group activity may spread this infection, and 86.5% believed that the viral infection can be avoided by frequently washing the hands with soap. Additionally, 90% of the study participants considered that advising quarantine to passengers coming from infected areas was a good practice to avoid the spread of the infection, and nearly two-thirds opined that nationwide lockdown along with the closure of teaching institutions and shopping malls would control the spread of this virus. Also, 56.2% of the participants felt that the risk of acquiring infection when traveling by an airplane was high.

However, 34.6% of the respondents were unaware that SARS-CoV-2 is the causative agent of COVID-19 infection, and half of the study population did not consider that the risk for COVID-19 infection was equal amongst all the community members.

Overall, it was found that 92.33% of the medical and dental students in Riyadh had adequate knowledge about COVID-19 infection, as shown in Table 3 and Figure 2.

Attitude

For questions related to attitude (Table 4), >90% of the students considered that it was their social responsibility to adopt safety measures in order to reduce the spread of the infection and that the infection is highly contagious and this problem could be overcome by taking precautionary steps. More than half of the study population expressed the opinion that COVID-19 infection would be overcome soon.

Overall, it was observed that 96.55% of the medical and dental students in Riyadh had a positive attitude toward COVID-19 infection, as shown in Table 5 and Figure 3.

Practice

Regarding the questions related to the practices (Table 6) of the medical and dental students, it was recorded that 88.2% of the

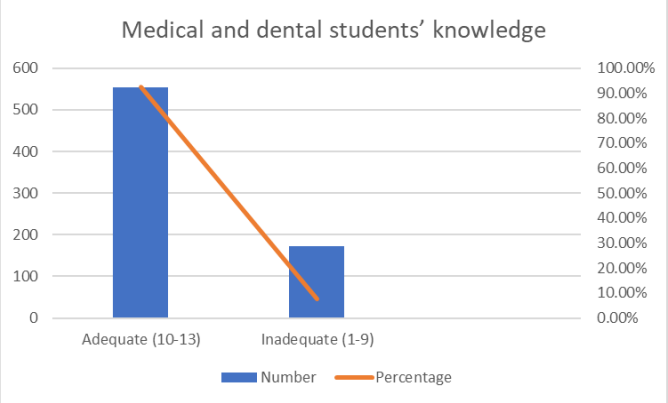

Figure 2: Medical and dental students' knowledge.

Table 4: Questions related to attitude.

Question	Statement	Frequency	Percentage
	ATTITUDE	Correct Answer	
A1	I am sure that COVID-19 infection will be overcome soon.	428	59%
A2	We can overcome this problem by taking precautionary steps	645	88.8%
A3	I understand that this infection is highly contagious	674	92.8%
A4	It is my social responsibility to take safety measures in controlling the spread of this infection.	681	93.8%

Table 5: Medical and dental students' attitude.

Attitude	Positive (+ score)	Negative (-score)
Number	701	25
Percentage	96.55%	3.44%

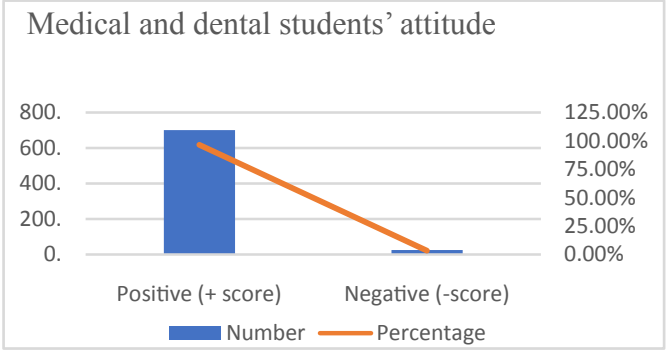

Figure 3: Medical and dental students' attitude.

Table 6: Questions related to practice.

Question	Statement	Frequency	Percentage
	PRACTICE	Correct answer	
P1	I am avoiding meeting my friends and relatives	223	30.7%
P2	I am avoiding visiting crowded place	429	59.1%
P3	I am frequently using sanitizer to sanitize my hands often	523	72%
P4	I prefer to walk by stairs then using lift	375	51.7%
P5	I am using face mask outside the home	640	88.2%
P6	I am using soap frequently for handwashing	606	83.5%

respondents used face masks outside the home, 83.5% used soap frequently for handwashing, 72% used sanitizers often to clean their hands, and >50% avoided visiting crowded places and preferred to take the stairs rather than use the lift. However, only 30.7% avoided meeting friends and relatives.

Overall, it was noted that 81.84% of the medical and dental students had good practices toward COVID-19 infection, as shown in Table 7 and Figure 4.

Table 7: Medical and dental students' practice.

Practice	Good (>6)	Poor (<6)
Number	595	131
Percentage	81.84 %	18.019%

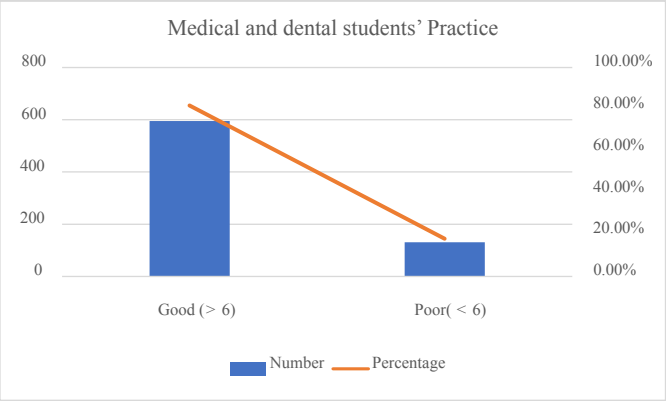

Figure 4: Medical and dental students' practice.

Discussion

This study has provided an insight into the knowledge, attitude, and practices of the medical and dental students of Riyadh city in Saudi Arabia toward COVID-19. With the spread of the infection in several countries across the globe, including Saudi Arabia, the government officials were mandated to adopt social distancing measures and guidelines to curtail the transmission. KAP influences the adherence of the community to the guidelines.

An assessment of current knowledge among the dental and medical students regarding COVID-19 infection will not only help in obtaining information but also in restricting the spread of the infection. Furthermore, it would bridge the gap between knowledge and its application concerning COVID-19 in dental and medical practice. The study respondents had adequate knowledge about the causative agent, modes of transmission, incubation period, and preventive measures. These findings agree with the results of a study conducted in Japan [12]. Similarly, in a study involving Indian students, >90% of the participants were aware of the mode of transmission of the infection [13]. Furthermore, 85% of the respondents agreed that the best way of preventing the spread of COVID-19 was social distancing, which is similar to the results of a study conducted in Indonesia [14].

More than two-thirds of the study respondents agreed that any type of group activity might spread this infection, as clearly mentioned in a study carried out in China, which led to the extension of the lunar-year holidays to prevent mass gatherings [15]. In this context, mass gatherings can significantly increase the risk of transmission of infectious diseases, such as airborne viruses, due to high concentration of people temporally and spatially [16]. In the present study, 80.9% of the participants were aware that asymptomatic COVID-19 carriers can also transmit the infection, which agrees with the findings of a systematic review of asymptomatic COVID-19 infections [17].

Over half of the respondents expressed the view that the possibility of getting infected when traveling by airplane was high. It has been reported in a study done by Chen J, et al. (2020) [18], that 16 passengers unprotected by face mask were infected with SARS-CoV-2 while traveling from Singapore to Hangzhou International Airport in Zhejiang, China, in January 2020, out of a total of 335 passengers and crew members in the aircraft. It also mentioned temporal, spatial, and exposure evidence suggested that SARS-CoV-2 transmission may have occurred during the flight [18].

Approximately 90% of the study participants agreed that advising quarantine to passengers coming from infected areas is a good practice to avoid the spread of infection. This result agrees with a Cochrane review stating that the disease incidence and mortality is lowered most importantly by implementing quarantine and, its effectiveness is ensured by prompt implementation along with other preventive mass measures [19].

Approximately two-thirds of the study participants thought that imposing lockdown in the country during the pandemic was an effective measure to curb the spread of the infection. A study in China reported a reduction in the average number of contacts in the cities of Wuhan by 86% and Shanghai by 89% as a result of adopting similar measures [20].

Moreover, approximately 70% of the respondents viewed the closing of teaching institutions and shopping malls as an effective way of social distancing. The authors of a preprint study concluded that school closures likely contributed to the control of COVID-19 in China as part of broad quarantine measures [21]. Although the evidence on its effectiveness is mixed, school closure has been promoted as an effective mitigation strategy during pandemics [22].

In the present study, it was observed that 92.33% of the study participants had adequate knowledge on COVID-19 infection, which is similar to the results of a study involving Japanese students (96%) [12]. The high level of knowledge among the medical and dental students of Riyadh can be attributed to the steps taken by the Ministry of Health, KSA, including timely updates, and also to the adequate amount of exposure and several publications made available over a period of one-and-a-half years.

According to the results, 96% of the medical and dental students had a positive attitude toward COVID-19 infection. More than half of the participants believed that the infection could be overcome. Moreover, approximately 90% of the students believed that the pandemic could be curtailed by taking appropriate precautionary steps. The respondents were also aware of the contagious nature of the disease and realized that it was their social responsibility to adopt safety measures for controlling

the spread of this infection. The high level of positive attitude of the medical and dental students could be attributed to the concerted measures taken by the Saudi government, such as lockdown, closure of malls and schools, creation of COVID-19 testing centers, and prompt treatment facilities. However, this result differs from the findings of a study involving the healthcare students of Vietnam in which a low level of positive attitude (68.8%) was recorded [23].

It was observed in the present study that only 81.84% of the medical and dental students practiced preventive measures, which could be because the rates of infection and transmission were very low in the country by the time the study was conducted. These findings are similar to the results of a study carried out in United Arab Emirates in January 2021 where the University students obtained a practice score of 85% [24].

More than half of the study participants avoided crowded places and preferred using the staircase instead of the lift. There were relaxations in rules concerning social gatherings, and the citizens could move around; therefore, only 30.7% refrained from meeting their friends and relatives.

Additionally, it was noted that two-thirds of the study participants practiced frequent handwashing, sanitizing, and wearing face masks. These results are similar to a study involving undergraduate students in Indonesia [25]. The reason behind this observation could be that masks have become a major strategy, in combination with other interventions such as washing hands and social distancing, to reduce the spread of infections resulting from unintentional close contact with infected individuals [26].

Conclusion

With the world continuing to be in the grip of the COVID-19 pandemic, it is essential to evaluate the integrity of the pandemic awareness programs to ensure that people are aware and alert. The present study revealed that the medical and dental students of Riyadh, Saudi Arabia, have adequate knowledge about COVID-19. Furthermore, the students expressed a positive attitude toward the ongoing pandemic. However, with the decline in the infection rate, the practice measures have reduced. The understanding of these factors and trends may help the university experts and policymakers in planning countermeasures that would control the further spread of the disease among the medical and dental students of Riyadh as well as the larger community.

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Ethical Approval Number

The study was approved by the Institutional Review Board (IRB) of College of Medicine, Dar Al Uloom University, Riyadh, Saudi Arabia. IRB Number- Pro 21030011.

Conflict of Interests

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

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