

# Dental and Medical Students' Knowledge and Attitude toward COVID-19: A Cross-Sectional Study from Pakistan

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## Abstract

**Objective** The aims of this study were to investigate the awareness, knowledge, and attitudes of Pakistani medical and dental undergraduate students toward COVID-19 during the surge of its outbreak.

**Materials and Methods** The multicentered, cross-sectional study was carried out nationwide among undergraduate medical and dental students. A convenience sampling technique was used. A self-developed online questionnaire was pretested to be completed by the participants. It was distributed using social media. The survey was comprised of questions related to demographics, health status, general hygiene perception, understanding, and the learning attitudes of the students. Comparisons of the knowledge scores and the attitude responses with the demographic information were done using the independent *t*-test, one-way ANOVA, and Chi-square, as appropriate.

**Results** Of the 937 total respondents, 353 (38%) were males and 582 (62%) were females; two students did not mark their gender. Of these, 680 (73%) were dental students and 257 (27%) were medical students. The mean knowledge score of the female dental students ( $5.15 \pm 1.08$ ) was significantly higher than that of the male students ( $4.87 \pm 1.09$ ). Overall, the mean knowledge score was statistically higher among the medical students in comparison to the dental students ( $5.21 \pm 1.15$ ,  $5.05 \pm 1.09$ ;  $p = 0.054$ ), respectively.

**Conclusion** The medical and dental students were both aware of the importance of the use of a mask. The medical students had a greater awareness regarding the mode of transmission, symptoms, and origin of COVID-19. However, the dental students showed better understanding of the use of surgical masks and the correct protocol for hand washing. Social media was considered the main source for COVID-19 related information.

## Keywords

- attitude
- awareness
- COVID-19
- knowledge
- Pakistan
- students

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## Introduction

The coronavirus disease 2019 (COVID-19), a recently identified viral infection, is a contagious disease that is known for causing acute respiratory syndrome.<sup>1</sup> Severe acute respiratory syndrome coronavirus-2 (SARS-COV-2) is a ribonucleic acid (RNA) virus that has crown-like spikes identified on its cell envelope. The coronavirus can be subdivided into four subtypes:  $\alpha$ ,  $\beta$ ,  $\delta$ , and  $\gamma$ .<sup>2</sup> Coronaviruses have an exceptional semblance within their structure and genomic expression.<sup>3</sup> Initially, it was thought that these viruses only infected certain animals and birds; however, with the spread of SARS-COV-2, it is known to be transmitted from one human to another.<sup>4</sup> It can cause symptoms such as fever, sore throat, dyspnea, cough, pneumonia, and rhinorrhea. It can also involve the gastrointestinal tract, causing vomiting and diarrhea. The main route of transmission is through respiratory droplets that can broadcast through coughing or sneezing.<sup>5,6</sup> Although the World Health Organization (WHO) has delineated an incubation period for the virus as ranging from 2 to 10 days; recently conducted studies have anticipated an incubation period lasting longer than 2 weeks.<sup>7,8</sup>

The WHO identified the coronavirus as a general public health emergency on January 30, 2020.<sup>9</sup> Then, in early March, many countries from across the globe reported a tremendous increase in the number of new cases. Since March 12, 2020, among 118 different countries, approximately 142,539 cases and 5,393 deaths have been confirmed as of this writing.<sup>10</sup> The first coronavirus patient in Pakistan was reported on February 26, 2020.<sup>11</sup> Since June 17, 2020, there have been 154,760 confirmed cases; the rate of death reported is 2,975 and the number of patients recovered from this condition in the country is 58,437.<sup>12</sup>

Since the declaration of COVID-19, the government of Pakistan has been trying to reinforce safety awareness, and it has implemented lockdown measures to reduce the spread of this infection. Likewise, the WHO has recommended self-isolation, social distancing, and lockdown as important measures against the spread of this disease.<sup>13</sup>

To prevent the further spread, research conducted by Qian et al identified three basic strategies that should be followed: (1) monitoring the causative factors responsible for spreading the disease, (2) preventing the further transmission, and (3) providing protection to vulnerable populations.<sup>14</sup> Along with initiating a general public awareness drive, Pakistan's National Institute of Health has played an essential role in formulating and disseminating protocols against the prevention and transmission of COVID-19. This has encompassed providing information regarding the use of personal protective equipment and face masks as well as following an adequate hand and general body hygiene regime.<sup>15</sup> As of this writing, no antiviral medication or vaccine is available for providing protection against COVID-19. However, symptomatic treatment options are available that should be followed in case of susceptibility.<sup>16</sup>

Healthcare workers are at great risk during this COVID-19 outbreak.<sup>17</sup> A study by Ikhlaq et al on the medical

undergraduate students enrolled in Lahore Medical College identified adequate knowledge and awareness regarding COVID-19.<sup>18</sup> Likewise, research conducted by Ahmed et al, among the undergraduate dental and medical students of three institutes of Karachi, revealed that the students had adequate information regarding COVID-19; however, they were quite concerned regarding the safety and diagnostic measures required for coronavirus.<sup>19</sup> This current study is directed toward determining the level of knowledge, attitude, and perception among the dental and medical undergraduate students across Pakistan.

## Materials and Methods

The multicentered, cross-sectional investigation was performed among undergraduate students studying in various medical and dental colleges across Pakistan. Verbal consent to fill out the questionnaires was obtained from the students. The questionnaires were anonymous, for the privacy and confidentiality of all of the information stated in the research. Ethical approval of the study was obtained from the Ethical Review Committee of the Bahria University Medical and Dental College, Karachi, Pakistan (ERC 55/2020). The study was in accord with the Helsinki Convention.

Due to strict lockdown, an online survey form was formulated on Google Forms (Alphabet; Mountain View, California, United States). It was distributed through social media to students across the country. Data were collected from March to May 2020. A convenience sampling technique was used, which resulted in a sample size of 937 participants. These participants included the entire roster of dental and medical students enrolled from the first year onward and the interns/house officers who gave consent for participation; students who did not provide consent were excluded from the study.

A questionnaire was developed, pretested, and validated twice during the research period. The study instrument was directed primarily toward senior medical and dental health-care professionals who had research experience in providing their perspectives regarding the simplicity, relativity, and significance of the content of questionnaires. A pilot study was executed using a smaller sample of medical and dental students ( $n = 50$ ). The records from the pilot study were not used in our final investigation.

The initial part of the survey focused on the demographic details of the participants; these included gender, age, geographical location, field, and year of study. The next part of the questionnaire was divided into five sections. The first had questions related to the smoking and medical status of the participants. The second section focused on queries related to oral hygiene, the frequency and duration of hand washing, the temperature of the water used for hand washing, the frequency of washing, and touching the face. The third had questions assessing the knowledge regarding the symptoms and transmission route of COVID-19. The fourth section related to different personal protection equipment that can be used and the related protocols. The last section focused on

evaluating the general learning attitude of the participants toward the current pandemic.

## Statistical Analysis

A convenience sampling technique was used for this study. Responses from online software were first exported to an Excel data sheet, then coded, and transformed to SPSS v26 IBM software for analytical purposes. Descriptive statistics (frequency, percentages, and mean standard deviation) were calculated. Comparisons of the knowledge score and attitude responses with demographic information were done using the independent *t*-test, one-way ANOVA, and Chi-square tests, as appropriate. The associations between the hygiene awareness with the knowledge status and attitude responses among the medical and dental students were described using Spearman's correlation; a *p*-value less than 0.05 was considered statistically significant.

## Results

Of the 937 study participants, there were 353 (38%) males and 582 (62%) females; two students did not mark their gender. Among these, 680 (73%) were dental students and 257 (27%) were medical students, with an average of  $20.79 \pm 2.1$  and  $22.13 \pm 2.1$  years, respectively.

The demographic information regarding the participants in terms of percentages is presented in ► **Table 1**. About 87% of the dental students claimed to be medically fit and well, while 4% reported heart disease and 9% suffered from arthritis. Although the majority of the medical students were also found to be medically fit and well, 9% reported arthritis and 2% had heart problems.

The mean knowledge score among the female dental students ( $5.15 \pm 1.08$ ) was significantly higher than that of the male students ( $4.87 \pm 1.09$ ), while the knowledge score was not significant between the male and female dental students ( $5.25 \pm 1.24$  and  $5.18 \pm 1.08$ , respectively). It is clear from ► **Table 2** that as the education level goes higher, the mean scores increase significantly; a similar pattern is noted for the dental and the medical students. The knowledge score was not significantly different among the places of residence (various locations) for the dental and medical students ( $p = 0.833$ ,  $p = 0.55$ , respectively). The highest mean score was found in the medical students from Azad Jammu and Kashmir ( $5.54 \pm 1.19$ ), whereas an above average score was recorded in Balochistan and Gilgit Baltistan's dental students ( $5.33 \pm 1.113$ ). The overall mean knowledge score was statistically higher in medical students as compared with dental students ( $5.21 \pm 1.15$ ,  $5.05 \pm 1.09$ ;  $p = 0.054$ , respectively). Overall, 74% of the medical students answered correctly to all of the knowledge questions related to COVID-19, while 71% of the dental students gave the correct answers; these responses are presented in ► **Fig. 1**.

Both the male and the female dental students displayed a statistically significant association with the fact that COVID-19 is a life-threatening disease. ► **Table 3** shows that most of the

**Table 1** Demographic information of dental and medical participants

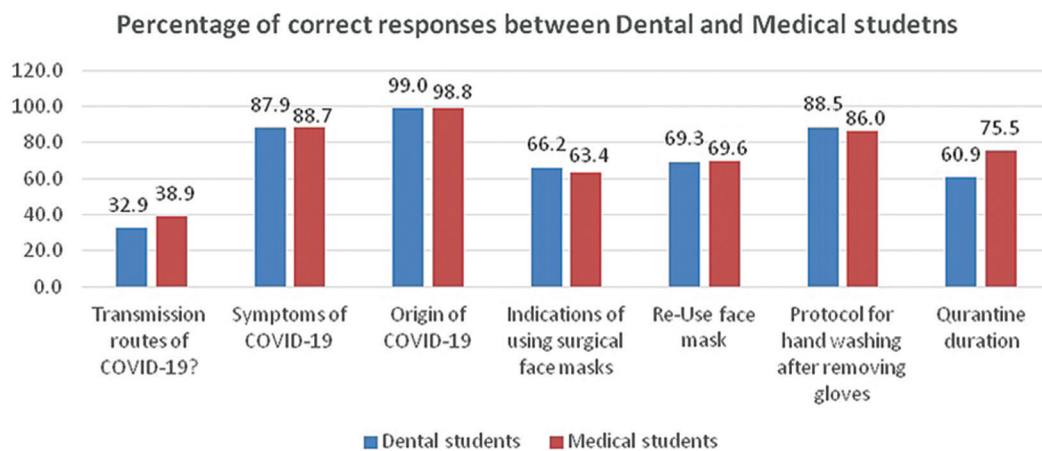
	Dental students n (%)	Medical students n (%)
Gender		
Male	244 (36)	109 (43)
Female	436 (64)	146 (57)
Location		
Khyber Pakhtunkhwa	316 (47)	163 (63)
Punjab	108 (16)	33 (13)
Sindh	216 (32)	38 (19)
Baluchistan	15 (2)	7 (3)
Azad Jammu and Kashmir	20 (3)	13 (5)
Gilgit Baltistan	3 (0.4)	3 (1)
Year of study level		
First	233 (34)	38 (15)
Second	219 (32)	41 (16)
Third	117 (17)	58 (23)
Fourth	70 (10)	51 (20)
Fifth	4 (0.6)	50 (19)
Interns/house officers	37 (5.4)	19 (7)
Smoking status		
Yes	23 (3)	18 (7)
No	620 (91)	221 (86)
Occasional smoker	26 (4)	13 (5)
Past smoker	11 (2)	5 (2)
Frequency of smoke		
1–5 cigarette	37 (93)	15 (83)
More than 10 cigarettes	3 (7)	3 (17)
Other type		
Naswar	22 (73)	15 (65)
Hukah/shesha	8 (27)	8 (35)

female dental students (68%) were tired of hearing about COVID-19 comparisons to the male students (38%). Although the COVID-19 as life threatening and tired of hearing percentage was also high in the female medical students, it was not significantly associated. Obtaining more information regarding COVID-19 was found higher in junior dental students (first year = 34% and second year = 33%), whereas the percentage was high among senior medical students (third year = 24%, fourth and fifth year = 19%). A similar pattern was observed among both the medical and the dental students being tired of hearing about COVID-19. Although the geographic location was significantly associated with attitude toward COVID-19 among the medical students, it was not statistically significant among the dental students. The major source of COVID-19 related information for both the medical and the dental participants was through social media at 371 (39%), television/radio (29%), print media (newspaper), and friends/family (25%) were

**Table 2** Knowledge score comparison between dental and medical participants with demographic characteristics

		Dental students	p-Value	Medical students	p-Value
Gender	Male	4.87 ± 1.09	0.001 <sup>a</sup>	5.25 ± 1.24	0.634
	Female	5.15 ± 1.08		5.18 ± 1.08	
Education level	First	5.02 ± 1.05	0.003 <sup>a</sup>	4.92 ± 1.282	0.02 <sup>a</sup>
	Second	4.9 ± 1.173		5.05 ± 1.048	
	Third	5.17 ± 1.147		5.1 ± 1.003	
	Fourth	5.06 ± 0.915		5.2 ± 1.149	
	Fifth	5.75 ± 0.5		5.42 ± 1.23	
	Interns/house officers	5.62 ± 0.861		5.95 ± 1.026	
Location	Khyber Pakhtunkhwa	5.03 ± 1.073	0.833	5.23 ± 1.092	0.55
	Punjab	4.98 ± 1.127		5.06 ± 1.248	
	Sindh	5.09 ± 1.125		5.26 ± 1.288	
	Baluchistan	5.33 ± 1.113		4.57 ± 1.397	
	Azad Jammu and Kashmir	5.1 ± 0.912		5.54 ± 1.198	
	Gilgit Baltistan	5.33 ± 1.155		5 ± 0	
Overall COVID-19 Score	Dental students	5.05 ± 1.09	0.045 <sup>a</sup>		
	Medical students	5.21 ± 1.15			

<sup>a</sup>Statistically significant.

**Fig. 1** Percentage of correct responses between dental and medical.

the next major sources providing relevant and preventative information regarding the virus.

The comparisons between the general hygiene awareness regarding COVID-19 among the dental and the medical students are shown in ►Table 4. The level of hygiene awareness between the two groups is almost the same. The only proportional difference noticed between the medical and the dental students was in the use of liquid soap: 125 (18%) and 26 (10%).

## Discussion

COVID-19 is a global condition affecting millions of people worldwide. In considering the current trend of transmission of COVID-19, this study was undertaken to understand the

level of awareness, knowledge, and attitude of undergraduate medical and dental students in Pakistan.

In this study, the majority of the participants were females and belonged to the Khyber Pakhtunkhwa (KPK) followed by the Sindh province. These findings are comparable to a study conducted by Khader et al, who stated that the females were generally more inclined toward admission in the medical and dental programs.<sup>20</sup> They were also better at participating in the current research activity.

Smokers are considered to be at high risk of acquiring the COVID-19 infection, which can lead to compromised functioning capacity of the lungs and cause diseases such as emphysema, chronic obstructive pulmonary disease, chronic bronchitis, and lung cancer.<sup>21</sup> A small number of the study

**Table 3** Association between demographic information and attitude toward COVID-19

		Dental students			Medical students		
		Like to have more information <i>n</i> (% of yes)	Tired of listening about COVID-19 <i>n</i> (% of yes)	Agree with statement that COVID-19 is life threatening <i>n</i> (% of yes)	Like to have more information <i>n</i> (% of yes)	Tired of listening about COVID-19 <i>n</i> (% of yes)	Agree with statement that COVID-19 is life threatening <i>n</i> (% of yes)
Gender	Male	154 (35)	175 (38)	154 (32)	73 (42)	66 (40)	74 (42)
	Female	289 (65)	287 (62)	323 (68) <sup>a</sup>	101 (58)	100 (60)	101 (58)
Education level	First	150 (34)	165 (36)	171 (36)	23 (13)	25 (15)	26 (15)
	Second	148 (33)	143 (31)	143 (30)	29 (17)	25 (15)	23 (13)
	Third	77 (17)	82 (18)	85 (18)	43 (24)	42 (25)	39 (22)
	Fourth	43 (10)	48 (10)	50 (11)	34 (19)	30 (18)	35 (20)
	Fifth	1 (0.2)	4 (0.9)	4 (0.8)	34 (19)	33 (20)	38 (22)
	Interns/house officers	24 (5)	20 (4)	24 (5)	13 (7)	11 (7)	16 (9)
Location	Khyber PakhtunKhwa	201 (45)	222 (48)	221 (46)	123 (70)	106 (64)	119 (67)
	Punjab	76 (17)	67 (15)	78 (16)	18 (10)	22 (13)	24 (14)
	Sindh	139 (31)	140 (30)	152 (32)	21 (23)	22 (13)	21 (12)
	Baluchistan	9 (2)	11 (2)	8 (2)	4 (2)	5 (3)	3 (2)
	Azad Jammu and Kashmir	14 (3)	17 (4)	16 (3)	10 (6) <sup>a</sup>	8 (5)	10 (6) <sup>a</sup>
	Gilgit Baltistan	3 (0.7)	3 (0.7)	2 (0.4)	0 (0)	3 (2)	0 (0)

<sup>a</sup>Statistically significant.**Table 4** Comparison of hygiene awareness between dental and medical students

Questions		Dental students <i>n</i> (%)	Medical students <i>n</i> (%)	<i>p</i> -Values
How many times do you wash your hands?	Once a day	10 (2)	3 (1)	0.398
	Twice a day	21 (3)	11 (4)	
	Multiple times a day	614 (90)	226 (88)	
	Without soap (Wudu)	35 (5)	17 (6)	
How many times do you wash your face?	Once a day	23 (3)	3 (4)	0.886
	Twice a day	78 (12)	11 (11)	
	Multiple times a day	245 (36)	226 (39)	
	Five times Wudu (Wuzu)	321 (47)	1 (44)	
	Not regularly (occasionally)	12 (2)	16 (2)	
What is the duration of hand washing?	10 s	217 (32)	85 (33)	0.534
	10–20 s	364 (54)	134 (52)	
	More than 20 s	78 (12)	32 (13)	
	1 min	17 (2)	0 (0)	
	2 min	3 (0.4)	5 (2)	
What kind of soap do you use?	Plain soap	196 (29)	103 (40)	0.001 <sup>a</sup>
	Antibacterial soap	355 (52)	126 (49)	
	Cloth washing soap	2 (0.3)	1 (0.4)	
	Liquid soap	125 (18)	26 (10)	
Are you aware of hand washing technique?	Yes	624 (92)	240 (93)	0.407
	No	21 (3)	12 (5)	
	Not sure	34 (5)	4 (2)	

<sup>a</sup>Statistically significant.



participants answered smoking more than 10 cigarettes per day, that is, dental (7%), medical (17%) as compared with one to five cigarettes per day dental (93%), medical (83%) students, respectively. This is a positive finding since the study conducted by Liu et al identified severe consequences for COVID-19 positive patients having a history of smoking.<sup>22</sup> Moreover, with lockdown, family members can be exposed to the passive smoking; therefore, smoking cessation is the utmost strategy that should be followed.

Various routes of transmission of COVID-19 infection have been identified, including human-to-human contact, aerosol, and through an endogenous route.<sup>23</sup> In our study, medical students had a better understanding regarding the mode of transmission, as compared with the dental students. These results are consistent with a study led by Khan et al, who found that healthcare workers have better knowledge.<sup>24</sup> This can be additionally attributed to the fact that medical students study different diseases in detail and thus have greater knowledge. Therefore, more attention needs to be directed toward the dental students to enhance their education level in this regard.

Fever, headache, and sore throat are a few of the most frequently identified indicators of COVID-19. Medical students had more knowledge regarding the symptoms than the dental students. These results are comparable to a survey conducted by Bhagavathula et al, who highlighted that doctors have better understanding.<sup>25</sup> However, these results differ from those of a study conducted by Khader et al, who noted that dentists had adequate information in relation to the symptoms that play a crucial role in preventing the spread of the disease.<sup>20</sup>

Dental students routinely use face masks while treating patients for various dental problems. In our study, when compared with the medical students, the dental students had better understanding regarding the usage of surgical face masks. Comparable results were noted by Vinita et al, who noted that dentists have better understanding regarding the correct usage of surgical face masks, as dentists are more familiar with their role in protecting against infections.<sup>26</sup> The dental students also had a better understanding in following the correct protocol for handwashing, as they have higher patient contact and a lot of emphasis is placed on hand washing after every patient. These results contradict the study led by Basurrah and Madani, who noted better adherence to hand hygiene by healthcare workers.<sup>27</sup>

Both medical and dental students had sufficient familiarity about the origin of COVID-19. These results are consistent with a study led by Mubeen et al in which participants correctly identified China as the origin of the current pandemic.<sup>28</sup>

Adequate knowledge regarding the usage of a face mask in providing protection against COVID-19 was seen among the participants. These results are consistent with a study conducted in China, where the majority of the participants preferred using a mask to protect themselves.<sup>29</sup> Another survey conducted by Baloran, in Philippines, reported that 90% of the studied population understood the importance of face masks in providing protection against this viral infection.<sup>30</sup>

In this current study, statistically significant results were noted with respect to the hand washing principles among the medical and dental students. Hand hygiene plays a crucial role in providing safety against different infections. The study results revealed a positive approach of students in following proper hand washing techniques, washing the hands for the required duration of time, and using antibacterial soap for washing. These results are in agreement with a study conducted by Alzoubi et al, who also highlighted hand washing as an important method involved in providing protection against COVID-19.<sup>31</sup>

Social media platforms provide significant information; among them, with approximately 40 million users in 2019, Facebook is the main social means utilized by users all over the world.<sup>32</sup> It is noteworthy that approximately 40% of our participants preferred gathering facts regarding the pandemic from social media, followed by radio and television. These results are in agreement with a study conducted by Huynh et al in China, where approximately 91% of the participants gathered information through social media, followed by television. These results show that people currently prefer social media as opposed to official government websites for getting facts.<sup>33</sup>

The majority of the female dental participants recognized COVID-19 as a life-threatening condition. These results are consistent with surveys conducted by Abdelhafiz et al and Li et al, who also considered COVID-19 as a serious infection;<sup>34,35</sup> hence, requiring that proper infection control protocols be followed. After collecting data from all of the provinces of Pakistan, the highest response rate was received from the KPK province, where many dental students were tired of hearing news regarding the coronavirus.

The main strength of the current study is in its large sample size, which was enrolled during a precarious time of the initial stage of the outbreak of the COVID-19 pandemic. However, it has higher representation by females and dental students.

## Limitations

The limitations of this study include that questionnaire studies without interviews give an over or under estimation of the responses, so the results may not be generalized. Additionally, only those students who had access to the internet, were in contact with their peers and teachers, and had social app accounts would have been aware of the study, which is a selection bias. Furthermore, the response rate was low from the male gender, medical students (as compared with their large number strength), in comparison to the dental students. The sample size was also lower in number than expected in some provinces.

## Recommendations

Concerted efforts are required through institutional, educational, and health promotion campaigns using current social media platforms and webinars by experts in public health, infection control, and healthcare policy makers targeting the

medical and dental students to substantiate their knowledge to reflect in their practices in the near future with confidence and professional integrity.

Future studies may consider a larger representative sample size, pre- and post-health care awareness campaigns, and feedback assessments. Better participation and higher numbers are needed for the medical and dental student participants. Future studies may focus on a representative student sample from throughout the country.

## Conclusion

Pakistani medical and dental students were aware of the importance of use of face masks in preventing COVID-19. Medical students were also aware of the mode of transmission and the symptoms of COVID-19; they had sufficient knowledge of its origin. In comparison, dental students showed better understanding of the use of surgical masks and the correct protocol for hand washing. Social media proved to be the main source of information regarding the pandemic for the students. The majority of the participants were females and from the KPK province.

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### Conflict of Interest

None declared.

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