ORIGINAL ARTICLE

# GENDER DIFFERENCE IN AWARENESS AND BEHAVIOURS OF MEDICAL AND DENTAL STUDENTS ABOUT CORONA VIRUS DISEASE (COVID-19) IN PAKISTAN

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**Background:** Medical and dental students are the future of health workforce and a potential volunteer pool in the COVID-19 crises. This study aimed to assess the level and gender differences in the awareness, attitude and behaviours of medical and dentals students about COVID-19 in Pakistan. **Methods:** An online cross-sectional survey was conducted among medical and dental undergraduate students in Khyber Pakhtunkhwa province. Data was collected using a structured questionnaire having four sections: socio-demographics, knowledge, attitude and practices. **Results:** A total of 1770 medical and dental students participated and completed the questionnaire. About 1239 (70%) of the respondents were female and 1526 (87%) were MBBS students. We found that 1685 (95%) of the students had adequate knowledge. Majority, 1565 (89%) of the students was concerned about COVID-19 and 1480 (84%) believed that disease will ultimately be controlled. Only about 1129 (64%) of the participants in our study had adequate practices. Male gender was associated with higher risk of inadequate practices. **Conclusion:** There were good knowledge and attitudes about COVID-19 among medical and dental students. However, one third of the participants did not have adequate practices and female had better practices than male students. This gap in the knowledge and practice calls for urgent interventions to improve practices.

**Keywords:** COVID-19; Gender; Awareness; Medical and Dental; Behaviours

## INTRODUCTION

COVID-19 has been emerged as the global pandemic and has the potential to create devastating social, economic and political crises. The disease originated from Wuhan, Hubei province of China where a large number of patients presented with pneumonia of unknown aetiology.[1] Later the disease spread nationwide and across the world between December 2019 to early 2020.[2] The World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern (PHEIC) on 30 January 2020, and recognized it as a pandemic on 11 March 2020.[3] Pakistan is one the more affected country with 964,490 cases and over 22,452 deaths up till 6th July, 2021.[4]

Undergraduate medical and dental students are the future caretakers of the health system and present volunteer guides for the community. Lack of proper knowledge and practices related to COVID-19 can make this important population vulnerable for contracting and transmitting the infection. Additionally, understanding gender difference in knowledge and practices about COVID-19 is also important for tailoring gender specific interventions for improvement.

Literature shows that female have better practices related to infection control and safety at work. A number of studies have reported that female health care workers are more likely to wear gloves, protective clothing, use of masks and eye protection than their male colleagues.[5–7] Similarly, sharp injuries were reported more in male workers as compared to their female colleagues.[8] Furthermore, female college students have also been found to follow better hygiene practices than male students.[9]

Assessment of awareness, attitudes and behaviours towards the current pandemic is of utmost importance; both for their own and for community's health. Literature on awareness and behaviours of medical students towards COVID-19 from Pakistan is scarce[10, 11] and most of the studies are focused on health care practitioners. We decided to conduct this study with the objective of assessing the level and gender differences in awareness and behaviours of undergraduate medical and dental students of public and private medical colleges in Khyber Pakhtunkhwa province, Pakistan about COVID-19.

## MATERIAL AND METHODS

We conducted an online cross-sectional survey among the medical students enrolled in public and private medical colleges of Khyber Pakhtunkhwa (KPK) province. Currently, there are ten public and ten private medical colleges in KPK province. There are 4500 students in public and 4250 students are enrolled in private sector colleges.[12]

Due to strict lockdown in the province for implementing social distancing to avoid spread of pandemic, it was not possible to conduct one to one interview with participants, so we decided to conduct the survey online. Convenience sampling strategy was used to enrol participants from all public and private medical colleges in KPK. Medical students were approached through a web-based self-administered questionnaire. We circulated the survey link to all the students from first to final year through email, students' WhatsApp groups and Facebook between 5th and 25th April, 2020. All public and private sector medical colleges in the province were approached and through the class representatives of each academic year, the online questionnaire was circulated to their respective batch groups to ensure maximum participation. The class representative of each medical college was given briefing about the study by the principal investigator. The class representative explained the purpose of the study to their batch mates and they were asked to fill the online form.

Our study was powered to determine the proportion of adequate knowledge and practices. 'Adequacy' refers to being aware of and practicing key set of standards. We used 50% as the anticipated proportion of adequate knowledge and practice because it would give the largest sample size, with 95% confidence interval and 2.5% margin of error, a minimum sample of 1523 was required. For association of gender with practices, we used prevalence of inadequate practices among male and female students 23% and 30% respectively.[13] At 95% confidence level and 80% power to detect the difference, a sample of 1274 participants were required. We inflated our sample by 15% to account for missing information, so the final sample required was 1752 participants.

The questionnaire was designed by consulting and reviewing currently available guidelines of international health agencies including WHO and Centre for Disease Control, US (CDC-US). The questionnaire was divided into 4 sections and had a total of 26 questions. The 1st section contained socio-demographic information (age, gender, medical college, degree enrolled & year of study) whereas the 2nd, 3rd and 4th sections assessed the knowledge, attitude and practices of medical students regarding COVID-19 respectively.

Awareness regarding COVID-19 was assessed on following aspects: causative organism; incubation period and duration of symptoms; most common signs and symptoms; mode of transmission; treatment and preventive measures and awareness about high-risk population. If the medical students mentioned 4 key signs and symptoms of COVID-19 out of 6 listed, they were characterized to have adequate knowledge about sign and symptoms. We determined the mode of transmission regarding COVID-19, medical students identifying at least 4 or more important routes out of 7 were labelled as having adequate knowledge. We also determined the frequency of incorrect concepts about treatment including taking early symptomatic support and herbal medicines. Those who had at least two correct responses were labelled as adequate knowledge about treatment of COVID-19. The adequacy of knowledge about high-risk population was based on correct identification of following: age ≥65 years, age <5 years, presence of chronic diseases (diabetes, hypertension, asthma & chronic obstructive pulmonary disease), pregnancy, people in crowded places, having skin disorders and seasonal flu. Medical students identifying at least 4 high risk populations out of 7 were labelled as having adequate knowledge about high-risk population. Those who correctly identified both preventive measures asked in the survey against COVID-19 were considered to have adequate knowledge on prevention. We had a total of 10 major sections on knowledge assessment, if the participants had adequate knowledge on 7 or more sections, they were considered to have 'adequate knowledge'.

Attitude regarding COVID-19: Attitude was assessed based on a set of 4 attitude items which were reported on a 5-point Likert scale from 'strongly disagree' to 'strongly agree'. These items were related to prevention by restricting travel, work and believing in successful control against COVID-19. The 5-point Likert scale were converted into 3-point responses such as: 'strongly disagree' and 'disagree' were merged as 'disagree'; 'strongly agree' and 'agree' were merged as 'agree'; and a middle category was 'don't know'.

To assess the behaviours regarding COVID-19 prevention, we asked about four practice items regarding respiratory hygiene (coughing and sneezing in appropriate manner), hand-washing, staying at home and wearing face mask. These items were recorded on a 3-point Likert scale ('never', 'sometimes', and 'always'). If the participant practiced 'always' on at least three practices items,

they were considered to have adequate practice against COVID-19.

Data was downloaded as Microsoft Excel sheet and then imported to IBM SPSS for Windows, v. 22.0 (IBM Corp., Armonk, USA) SPSS -22 for analysis. Quantitative variables such as age were reported as mean and standard deviations. Categorical variables such as gender, type of medical college, degree enrolled, and year of study were expressed as frequencies and percentages. The proportion for the adequate knowledge and practices was determined using frequencies of individual questions and the cut-offs described above. Univariate and multivariable logistic regression were performed to determine the factors associated with inadequate awareness and behaviours among medical and dental students. The covariates were, age, gender, type of degree, type of institution, academic level and concerned about COVID-19. Adjusted odds ratios (AOR) with their 95% confidence intervals (CI) were calculated by multivariate logistic regression. *p*-value of ≤0.05 was considered as statistically significant.

The ethical approval of the study was sought from Ethics Review Committee of Women Medical College, Abbottabad (20203-2 CMD-ERC-20). The first page of the online form described the purpose of the study and consent was taken on that page from all the students.

## RESULTS

Our study sample consisted of 1770 medical and dental students. The mean age of the participants was 21.91±2.66 years, 1239 (70.4%) were females and 1526 (86.7%) were enrolled in Bachelor of Medicine and Bachelor of surgery (MBBS). (Table-1)

Table-2 presents the knowledge of medical and dental students about COVID-19. Around three-fourth, 1313 (74.6%) of the students had correct knowledge regarding causative agent. The majority of the students (80-96.6%) had correct knowledge about the common sign and symptoms of COVID-19. Higher proportion of study participants (90%)

believed that early symptomatic and supportive treatment can help most patients recover from the infection. Furthermore, 33.5 % believed that use of onion, lemon or garlic is helpful in treating COVID-19. Majority of the students 84–94% agreed that use of face masks by general public and washing hand with soap or alcohol-based rub can decrease the risk of diseases transmission.

Computing the overall awareness of COVID-19 infection among medical students showed an adequate knowledge of 95% in our study participants.

Table-3 reports the attitude of the medical students towards COVID-19 prevention. Majority of the students 89% and 90% agreed that were really worried about disease threat and they should avoid normal activities if they develop flu like symptoms.

More than half of the medical students (54%) always practiced to cover their nose and mouth while sneezing or coughing. Similarly, most of the students 64% cleaned hands with soap or alcohol-based hand sanitizer. Moreover, 75–84% medical students always tried to stay at home. About 64% of the students had adequate practices of COVID-19 prevention.

Table-4 presents association of socio-demographic variables with inadequate awareness, and behaviours among medical and dental students. Studying in private institution and belonging the basic level of academic years were more likely to have inadequate knowledge about COVID-19 as compared to public institution and studying in clinical years (AOR 2.92 95% CI: 1.72–4.93; and AOR 1.96 95% CI: 1.15–3.34), respectively. Males were more likely to have inadequate behaviours related to COVID-19 prevention as compared to females (AOR 1.81 95% CI: 1.45–2.25). Studying in private institution was found out be protective factor for inadequate behaviours as compared to public institution (AOR 0.68 95% CI: 0.55–0.83).

**Table-1: Socio-demographic characteristics of medical students enrolled in the study (n=1770)**

| Characteristics | n = 1770 | % |
|---|---|---|
| **Gender** | | |
| Male | 522 | 29.6 |
| Female | 1239 | 70.4 |
| **Age (Years) Mean (SD)** | 21.91±2.66 | |
| **Degree program** | | |
| MBBS | 1526 | 86.7 |
| BDS | 235 | 13.3 |
| **Type of Medical College** | | |
| Government Medical Colleges | 816 | 46.3 |
| Private Medical Colleges | 945 | 53.7 |
| **Year of study** | | |
| First Year | 270 | 15.3 |
| Second Year | 234 | 13.3 |
| Third Year | 345 | 19.6 |
| Fourth Year | 489 | 27.8 |
| Final Year | 423 | 24.0 |

**Table-2: Awareness of COVID-19 infection among medical and dental students in Pakistan (n=1770)**

| Variables | n = 1770 | % |
|---|---|---|
| **Corona Virus Disease is caused by SARS-CoV-2 (Correct Response)** | 1313 | 74.6 |
| **Close contact with infected person is most important risk factor (Correct Response)** | 1740 | 98.8 |
| **How many days for corona virus symptoms to appear after person gets exposed (1-14 days) (Correct Response)** | 1306 | 74.2 |
| **Awareness of signs and symptoms of COVID-19 (Correct Response)** | | |
| Fever (Yes) | 1692 | 96.1 |
| Cough (Yes) | 1702 | 96.6 |
| Shortness of breath (Yes) | 1691 | 96.0 |
| Haemoptysis (No) | 1412 | 80.2 |
| Sore throat (No) | 480 | 27.3 |
| Joint/muscle pain (Yes) | 1201 | 68.2 |
| **Awareness about mode of transmission of COVID-19 (Correct Response)** | | |
| Touching soiled (contaminated) objects (Yes) | 1454 | 82.1 |
| Coughing and sneezing (Yes) | 1750 | 98.9 |
| Dust (No) | 1387 | 78.4 |
| Blood transfusion (No) | 1235 | 69.8 |
| Shaking hands (Yes) | 1686 | 95.3 |
| Having sexual contact with an infected person (No) | 923 | 52.1 |
| **Awareness about treatment of COVID-19 (Correct Response)** | | |
| Currently there is no effective cure for COVID-19. Yes | 1344 | 75.9 |
| Early symptomatic and supportive treatment can help most patients recover from the infection. YES | 1588 | 89.7 |
| Using onion, lemon or garlic is protective against COVID-19 (No) | 1195 | 67.5 |
| **Awareness of high risk segment of population (Correct Response)** | | |
| Age more than 65 years (Yes) | 1728 | 97.6 |
| Age less than 5 years (No) | 383 | 21.6 |
| Chronic diseases (Diabetes, hypertension, Asthma, COPD      (Yes) | 1665 | 94.1 |
| Pregnancy (No) | 867 | 49.0 |
| Those in crowded places (Yes) | 1640 | 92.7 |
| Skin disorders (No) | 1442 | 81.5 |
| Seasonal flu (No) | 1139 | 64.4 |
| **If a person comes in contact with corona virus patient, does he/she require quarantine? (Yes)** | 1730 | 97.7 |
| **Duration of quarantine after having contacted with corona virus patient. (14 days)** | 1506 | 85.1 |
| **General public can wear face masks to prevent the infection by COVID-19 (Yes)** | 1498 | 84.6 |
| **Washing hands with soap or alcohol based rub can decrease the risk of diseases transmission. (Yes)** | 1664 | 94.0 |
| Composite Awareness | | |
| Adequate | 95.2% | |
| Inadequate | 4.8 % | |

**Table-3: Attitude and behaviours towards COVID-19 infection among medical and dental students in Pakistan (n=1770)**

| Attitudes | | | |
|---|---|---|---|
| Variable | Agree n (%) | Disagree n (%) | Don't know n (%) |
| I am very much concern about Corona virus disease 2019 | 1565 (88.9) | 94 (5.3) | 102 (5.8) |
| If I develop flu like symptoms, I must avoid normal activities such as going to work, travel and shopping | 1581 (89.8) | 134 (7.6) | 46 (2.6) |
| I believe that COVID-19 will finally be successfully controlled? | 1480 (84.0) | 58 (3.3) | 223 (12.7) |
| I am confident that Pakistan can win the battle against the COVID-19. | 1400 (79.5) | 134 (7.6) | 227 (12.9) |
| **Behaviours** | | | |
| Variables | Always n (%) | Sometimes n (%) | Never n (%) |
| I cover my nose and mouth with the bend of elbow or tissue during sneezing or coughing. | 948 (53.8) | 795 (45.1) | 18(1.0) |
| I wash my hands often with soap and water for at least 20 seconds, or use an alcohol-based hand sanitizer. | 1132 (64.3) | 615 (34.9) | 14(0.8) |
| I try to stay at home as much as I can until unless needed to go out for some urgent work. | 1477 (83.9) | 278 (15.8) | 6 (0.3) |
| I use face mask to cover my nose and mouth in crowded places. | 1323 (75.1) | 410 (23.3) | 28 (1.6) |
| **Composite Behaviour** | | | |
| Adequate | 63.8 % | | |
| Inadequate | 36.2 % | | |

**Table-4: Factors associated with inadequate awareness, and behaviours among medical and dental students**

| Factor | Awareness | | Behaviours | |
|---|---|---|---|---|
| | Adjusted[@] OR (95% CI) | *p*-value | Adjusted[@] OR (95% CI) | *p*-value |
| **Age[©]** | 0.98 (0.87 – 1.10) | 0.748 | 0.99 (0.95 – 1.04) | 0.881 |
| **Gender** | | | | |
| Female | 1 | | 1 | |
| Male | 0.90 (0.52 – 1.56) | 0.716 | 1.81 (1.45 – 2.25) | <0.001 |
| **Degree program** | | | | |
| MBBS | 1 | | 1 | |
| BDS | 1.04 (0.58 – 1.87) | 0.895 | 1.11 (0.82 – 1.51) | 0.499 |
| **Type of institution** | | | | |
| Pubic | 1 | | 1 | |
| Private | 2.92 (1.72 – 4.93) | <0.001 | 0.68 (0.55 – 0.83) | <0.001 |
| **Academic level** | | | | |
| Clinical | 1 | | 1 | |
| Basic | 1.96 (1.15 – 3.34) | 0.014 | 0.98 (0.78 – 1.22) | 0.836 |
| **Concerned about COVID-19** | | | | |
| Concerned | | | 1 | |
| Non concerned | -- | -- | 1.51 (1.11 – 2.04) | 0.008 |
| [@] Mutually adjusted for each other. | | | | |
| [©] Continuous variable | | | | |

## DISCUSSION

We conducted this study to assess the awareness, behaviours and explore gender difference of medical and dental students in Khyber Pakhtunkhwa province of Pakistan, which is one of its kind as very limited data is available on undergraduate medical and dental students about COVID-19. Our study revealed that most of the medical and dental students are aware about COVID-19 but the behaviours related with the prevention of COVID-19 were not adequate as around 36% reported to be having inadequate behaviours. On the other hand, females were also observed to have better behaviours than males.

We found that about 75% of the participants had correct knowledge about the agent (SARS-CoV-2) in our study. In contrast to our study, another study from Pakistan reported that 94% of the university students were aware of agent of COVID-19.[14] However, a study from India where only 11% of medical and 5% of dental students could identify the agent.[15] This could be due to complexity of the question in Indian study where two options were actually correct while third response was considered correct which listed both as correct. Another study from China reported about 97% of university students correctly identified the agent.[16] Close contact is an important risk factor for disease transmission. In our study, about 99% reported this to be a major risk factor. This finding is similar to Bangladesh where 97% of university students reported person to person transmission is possible.[17] A study among medical and allied health sciences students in Pakistan reported that 95% of the students were aware of close contact as risk factor.[14] In our study about 74% were aware of incubation period. This finding is different from two other studies from Pakistan 94% and 55%.[10,14] These differences across the studies could

be due to differences in study population and the time during which studies were conducted.

Awareness about common symptoms of COVID-19 was high in our study which is similar to findings from studies conducted in different parts of Pakistan.[10,11,14] A study among Jordanian medical and non-medical students about COVID-19 also reported a high level of knowledge about common symptoms; fever 94%, cough 90% and difficulty of breathing 92%.[18] Knowledge about common modes of transmission was high; touching contaminated objects 82% and coughing and sneezing (respiratory droplets) 99% in our study. This is higher than reported among medical students in India 70%[15] and similar to Pakistan, China and Bangladesh 94%, 99% and 98% respectively[10,16,17]. Another important finding in this study is misconceptions about transmission of COVID-19 such as transmission through dust 22%, blood transfusion 30% and sexual contact 48%. This indicates urgent need for training to improve knowledge about epidemiological and pathophysiological characteristics of the disease. About treatment, 75% of the students reported that there is no specific cure for the disease. Another study among medical and allied sciences students from Pakistan reported that only 46% of the students had correct knowledge about the treatment.[14] This difference could be due to fact that in our study only medical and dental students were recruited while the other study also included allied medical sciences student who may have lower knowledge about the treatment of COVID-19. A study from Jordan reported higher level of knowledge 79% among medical students.[18] Furthermore in our study about 32% also reported some home remedies as treatment of COVID-19. Similarly, 51% of our participants assumed pregnant women as high-risk group for

COVID-19. A high proportion, 95% of the medical and dental students in our study had adequate knowledge. This is expected, given the large scale spread of the disease and widespread availability information through various media.

About 89% of medical and dental students were concerned about the COVID-19 pandemic. A study from China reported that about 93% of university students were scared with human-to-human transmission of COVID-19.[16] Similar study from Pakistan also reported that about 72% of the students were afraid of disease.[14] The major reasons of fear reported were highly contagious nature and no available cure of disease. Majority 84% had positive attitude about control of pandemic in our study which is slightly higher than reported from China 77%.[16] Possible explanation could be that higher proportion (95%) of the medical students had adequate knowledge and as a result they feel confident that the pandemic will finally be successfully controlled.

The behaviours among our study participants were not sufficient as only 64% had adequate behaviours. Always cleaning hands with soap or alcohol rub was reported by 64% of the students and 35% reported to clean their hands sometimes. This is important finding, indicating a wide gap in the practice as cleaning hands is basic precaution for infection control. Another study from Pakistan reported better hand washing practices 97% among medical students.[10] A study from Bangladesh reported higher proportion 89% of students reported washing their hands.[17] Even higher proportion 99% was reported from Jordan.[18] These reported higher proportions of students from Bangladesh and Jordan who washed their hands compared to our study could be due to fact that in our study we asked question with frequency of practice. While other studies asked as simple "yes" and "no" question which may overlook frequency of washing hands.

Female gender has consistently been reported to be associated with better practices related to safety and infection control.[6,7,19] This was found to be true in case of COVID-19 also. We found that there was no significant difference in the knowledge with respect to the gender; however, male gender was associated with inadequate practices. Another study from Pakistan reported that there was no significant difference in the knowledge with respect to gender among medical students. However, female dental students showed better knowledge then male dental students.[11] A study from China reported that there was no difference in the knowledge and practices between two genders.[16] A number of hypotheses have been postulated to explain gender differences in infection control practices which range from biological to social factors.[7] This is an important

consideration for academicians and policy makers. They need to focus on gender differences in attitude and behaviours related to safety and infection control. Curriculum and medical teaching both, basic and continued, need to be redesigned to address this gender difference. Awareness was better among medical and dental students in public sector institutions while behaviours were better in private sector students. A previous study among medical students in Pakistan found that knowledge and practices related to infection control in private institute students were better compared to public sector institutes.[20] Awareness increased with increasing academic year which is similar to another study from Pakistan[11], while behaviours showed decline with increase in academic year. These gaps between awareness and behaviours across public and private institutions and academic years need further investigations.

This study assessed levels and gender difference in KAP of a fairly high proportion and representative sample of the total number of students from government (46.3%) and private (53.7%) medical colleges from KPK province using a structured questionnaire. The results of this study can help the policy makers & stakeholders to design an effective behaviour change communication strategy for the future health care professionals.

There are some limitations which need to be considered while interpreting results of this study. First sample was drawn from one province of Pakistan which may affect generalizability of the results to other provinces. However, we assume this to minimally affect generalizability, as all medical and dental colleges in Pakistan are regulated by Pakistan Medical and Dental Council which sets standards of medical education. Therefore, medical and dental students across the country are expected to be similar. Secondly, this was an online survey for which we cannot assure response rate.

## CONCLUSION

Our study found the gap between awareness and behaviours related to COVID-19 among medical and dental students which requires interventions by policy makers. Females were having better behaviour related to COVID-19 as compared to males. Policy makers should take into consideration this behaviour difference among males and females and try to figure out standardization of practices among both genders. Proper attention to adequate training and provision of adequate resources should be given in order to improve the behaviours related to COVID-19.

**Conflict of Interest:** Authors declare that there is no conflict of interest.

## AUTHORS' CONTRIBUTION

AAK, FSL, UR: Conceptualized the study idea and developed methodology. FSL, SA, AL: Data collection. AAK, UR: Data analysis. FSL, UR, SI, AAK: Drafting. AAK, FSL, UR. Supervised all the process. All authors critically revied and approved the final manuscript.

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