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# Evaluating COVID-19 Knowledge, Attitudes, and Practice Among the Students of Birjand University of Medical Sciences: A Cross-sectional Survey

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## Abstract

**Background:** With the onset of the coronavirus disease 2019 (COVID-19) pandemic in December 2019, healthcare systems faced an unprecedented challenge. Medical and paramedical students are the front-line warriors in this combat.
**Objectives:** This study aimed to assess COVID-19 knowledge, attitudes, and practice among the students of Birjand University of Medical Sciences, Iran, in 2020.
**Methods:** This cross-sectional analytical study was carried out on 329 students who passed the microbiology course from October 2020 to March 2021. The data collection tool was a researcher-made questionnaire consisting of four sections: demographic data, COVID-19-related knowledge, attitudes towards COVID-19, and participants' practice. Finally, statistical analysis was performed in SPSS software version 19, and a significance level of 0.05 was considered in all tests.
**Results:** A total of 329 medical, dentistry, pharmacy, and laboratory sciences students participated in this study. The mean score of COVID-19 knowledge was 10.26 $\pm$ 1.21 (out of 12). Among the participants, 103 (31.3%) individuals expressed being in crowded places in recent days, and 324 (98.5%) of them confirmed wearing masks. More than half of the students had positive attitudes towards COVID-19 control. The average knowledge was higher in females and medical and laboratory sciences students (P = 0.008). Also, the students' knowledge was inversely related to their practice of wearing a mask (P = 0.015).
**Conclusions:** While students had a high level of COVID-19 knowledge, they had some misconceptions that should be included in educational programs. Students of medical sciences should be responsible for preventive behaviors and strive to be good role models for others.

*Keywords:* COVID-19, Knowledge, Attitude, Practice, Medical Students, Microbiology

## 1. Background

In December 2019, cases of unknown pneumonia were reported in Wuhan, China. In bronchoalveolar lavage (BAL) specimens of infected individuals, a new beta-coronavirus (2019-nCoV) was isolated and identified as the pathogen (1). Coronaviruses are a group of RNA viruses that can cause a range of diseases from a common cold to severe respiratory syndromes (2). Acute respiratory disease caused by 2019-nCoV was officially named coronavirus disease 2019 (COVID-19). Common symptoms of this infection include fever, cough, dyspnea, muscle aches, and tiredness (3). The main route of transmission of the virus is respiratory droplets (4).

According to the data of 72,314 COVID-19 cases released by the Chinese Center for Disease Control and Prevention, most definitive cases are in the age range of 30 - 79 years; 1.2% of people infected with the virus can be asymptomatic, and in most people (80.9%) the disease is mild. The overall mortality rate in COVID-19 patients was estimated to be 2.3% (5). The World Health Organization (WHO) declared the outbreak a pandemic on March 11 2020 (6). As of March 29, 2021, approximately 128 million confirmed cases of the disease were reported worldwide, of whom 2.79 million cases died (7).

Studies have shown that health centers are a highly contaminated environment for the transmission of COVID-

19, and many cases of COVID-19 infection have been reported by health professionals (8, 9). In health care training centers, medical and paramedical students have an important role to play in providing patient care. Therefore, these subpopulations are at serious risk of contracting the disease, as well as transmitting the virus. During epidemics such as COVID-19, health care systems are under great pressure, and a shortage of health care providers can encourage the participation of less experienced health care providers, such as medical students. In addition, medical students are often consulted by their relatives and have shown better knowledge than students of other disciplines in the field of health (10, 11); Therefore, medical students are expected to have a higher level of COVID-19 knowledge.

So far, the Iranian students' COVID-19 knowledge and attitudes have been studied limitedly (12). In this study, students were studied after passing a microbiology course, which is, in fact their first encounter with the basic knowledge of the COVID-19 in a university curriculum before entering the clinical field. Therefore, the results of this study can help policy-making to prepare students to serve in the COVID-19 era and control the pandemic.

## 2. Objectives

The present study aimed to investigate the COVID-19 knowledge, attitudes, and practice of students at Birjand University of Medical Sciences, Iran in 2020.

## 3. Methods

### 3.1. Study Design

This cross-sectional study was conducted on students of Birjand University of Medical Sciences from November 2020 to March 2021. The target population was those who completed microbiology courses at Birjand University of Medical Sciences. The sample size was calculated by the Raosoft sample size calculator. The intended sample size was 324 with a confidence interval (CI) of 95% and a 5% margin of error. This study was conducted nine months after the onset of COVID-19 epidemic in Iran using an online questionnaire in Persian language. Random sampling method was used, and participation in the study was voluntary.

The inclusion criteria were studying at Birjand University of Medical Sciences; completed microbiology course as a university curriculum; access to online questionnaire; and informed consent to participate in the study.

### 3.2. Measurement

The questionnaire consisted of four sections: demographic data (age, gender, marital status, and field of study), COVID-19-related knowledge, attitudes towards COVID-19, and participants' COVID-19-related practice. These items were designed based on a previous study (13).

The questionnaire included 12 questions to measure COVID-19 knowledge (four about clinical presentations, three about transmission routes, and five about COVID-19 prevention and control). The options for answers were "true", "false", and "I don't know". A correct answer was given 1 point, and an incorrect/unknown answer was given 0 point. The total knowledge score ranged from 0 to 12, with a higher score indicating a better knowledge about COVID-19. The attitude towards COVID-19 was assessed by two questions about the final control of COVID-19 and the confidence in winning the battle against COVID-19. The assessment of participants' practice included two behaviors: attending crowded places and wearing a mask in public places in recent days.

The validity of the questionnaire was approved by a board of experts, including eight microbiologists and infectious disease specialists. Reliability was tested in a pilot study with 35 students using Cronbach's alpha ($\alpha = 0.72$).

### 3.3. Ethical Considerations

This study was approved by the Ethics Committee of Birjand University of Medical Sciences (Code: Ir.bums.REC.1398.156). All students participated in the study voluntarily, and they were assured that their information would remain confidential. Also, we used a code instead of a name for the questionnaires.

### 3.4. Statistical Analysis

Data were analyzed using SPSS version 19.0. Kolmogorov-Smirnov test was used to determine the normality of the distribution of main variables. Knowledge scores, attitudes, and practices of participants according to demographic characteristics were compared with Mann-Whitney U test, Kruskal-Wallis H test, as well as phi, Spearman Correlation Coefficient, and Chi-square test as appropriate. The statistical significance level was set at $P < 0.05$ (two-sided).

## 4. Results

A total of 329 students (mean age: 20.76 $\pm$ 2.6 years) participated in this study (age range: 18-35 years). Also, 181 (55%) students were female, and 148 (45%) were male. Among the participants, 203 (61.7%) were medical students, 26 (7.9%) were laboratory sciences, students, 42 (12.8%) were

pharmacy students, and 58 (17.6%) were dentistry students. Also, 294 (89.4%) students were single, and 35 (10.6%) were married. The rate of correct answers to 12 questions related to the participants' COVID-19 knowledge was 36.2 - 98.5%.

The mean score of COVID-19 knowledge was $10.26 \pm 1.21$ (min = 4 vs. max = 12; range 0 - 12). Also, the median and the first quartile of knowledge score was 10, and the third quartile was 11. There was a statistically significant difference between the mean knowledge scores of male and female students ($P < 0.05$), so that females had a higher score. Also, the mean score of knowledge in different fields of study was statistically significant ($P < 0.05$), so that laboratory sciences students and medical students had the highest scores. There was no statistically significant difference between the mean score of knowledge in terms of marital status ($P = 0.421$) (Table 1).

The students' COVID-19 knowledge had no statistically significant relationship with age ($P = 0.163$).

While most participants (235 [71.4%]) believed that COVID-19 control would eventually be successful, 94 (28.6%) students disagreed with this idea. There was a statistically significant difference between the participants' attitudes towards successful control of COVID-19 by gender and field of study ($P < 0.05$). However, there was no significant relationship between marital status, age, and COVID-19 knowledge with attitudes towards successful control of COVID-19 (Table 2).

The attitudes of students towards Iran's victory in the battle against the COVID-19 based on demographic data is shown in Table 3. As can be seen, there was no statistically significant difference in terms of gender, marital status, field of study, and COVID-19 knowledge; however, the age of the participants influenced their attitudes towards Iran's victory in the battle against the COVID-19 ($P < 0.05$).

The practice of students about going to crowded places during the pandemic based on demographic variables is shown in Table 4. As can be seen, there was a statistically significant difference based on the gender and age of participants ($P < 0.05$). However, marital status, field of study, and COVID-19 knowledge did not affect their practice.

The participants performed very well in wearing a mask when leaving home (Table 5). In this regard, there was no statistically significant difference in terms of gender, marital status, field of study, and age. However, there was a significant difference between the knowledge of students and their practice in wearing a mask ($P < 0.05$). A weak correlation ($P = -0.135$) was found between the knowledge and wearing a mask; the significant point was their inverse correlation.

## 5. Discussion

Medical and paramedical students in health care centers are the front-line warriors against diseases. They have always been at risk of infectious diseases, and the new coronavirus has worsened this risk. Medical education officials and professionals must ensure that students are prepared to deal with epidemics and provide care during the COVID-19 pandemic. Therefore, it is important to evaluate their attitudes towards COVID-19, their knowledge of the nature of the virus and disease, and preventive actions.

In this study, the students' COVID-19 knowledge was at a high level. Our findings were consistent with the results of some similar studies on medical students in Iran, Pakistan, and China and on nursing students in Saudi Arabia (14-17). Most students were aware of the common clinical symptoms of COVID-19, which is consistent with the results of a recent study (18). The students were well-informed about the ways of transmitting the coronavirus, and they knew that the COVID-19 virus could be spread through the respiratory droplets of infected people. This finding is consistent with the findings of a recent study (19). The lowest correct response rate was for the item "Eating or contacting wild animals would result in the infection by the COVID-19 virus"; the zoonotic transmission of COVID-19 is less discussed in studies; so, this finding is expected. In a similar study in Jordan, 42.5% of students thought that animals could be a source of new coronavirus transmission (20). It is suggested that students be provided with specialized information about the COVID-19 zoonotic transmission in microbiology courses.

In questions regarding COVID-19 knowledge, we did not evaluate the students' clinical knowledge, which is very important. In a similar study among senior medical students in Turkey, students showed moderate levels of knowledge in response to questions about swab sampling, oxygenation, and intubation (21). Future studies might evaluate the students' relevant clinical knowledge; and if necessary, clinical skills workshops and mental health protection and crisis decision-making should be held for them.

In our study, female students had a higher level of COVID-19 knowledge. This finding is consistent with the results of two studies in China and Saudi Arabia (17, 18). In both studies, female students made up the majority of respondents; but in our study, the percentage of male and female students was closer to each other. The reason for this finding could be that women are more likely to follow COVID-19-related news and scientific content due to their curiosity, concern, and more use of social media. The average knowledge of medical and laboratory science students was significantly higher than the average knowledge

**Table 1.** Comparison of Individuals' Knowledge Scores in Terms of Demographic Variables

| Variables | No. (%) | Average [a] (Std Deviation) | Test Statistics | P-Value |
|---|---|---|---|---|
| **Gender** | | | 11145.5 | 0.006 [b] |
| Female | 181 (55.01) | 10.46 (1.05) | | |
| Male | 148 (44.98) | 10.03 (1.35) | | |
| **Marital status** | | | 4733 | 0.421 [b] |
| Single | 294 (89.36) | 10.28 (1.23) | | |
| Married | 35 (10.63) | 10.17 (1.07) | | |
| **Field of study** | | | 11.838 | 0.008 [c] |
| Laboratory sciences | 26 (89.65) | 10.31 (1.46) | | |
| Medicine | 203 (61.70) | 10.41 (1.15) | | |
| Pharmacy | 42 (12.76) | 9.98 (1.24) | | |
| Dentistry | 58 (17.62) | 9.95 (1.21) | | |

[a] R= 0 - 12
[b] Mann-Whitney U
[c] Kruskal Wallis Test

**Table 2.** Attitudes of Students Towards Successful Control of COVID-19 Based on Demographic Data

| Variables | Do You Agree That COVID-19 Will Finally Be Successfully Controlled? No. (%) | | Test Results | | |
|---|---|---|---|---|---|
| | Agree | Disagree, I Don't Know | The Correlation Coefficient | $X^2$ | P-Value |
| **Gender** | | | - | 5.189 | 0.023 |
| Female | 120 (66.3) | 61 (33.7) | | | |
| Male | 115 (77.7) | 33 (22.3) | | | |
| **Marital status** | | | - | 1.41 | 0.235 |
| Single | 213 (72.4) | 81 (27.6) | | | |
| Married | 22 (62.9) | 13 (38.1) | | | |
| **Field of study** | | | - | 17.815 | 0.000 |
| Laboratory sciences | 11 (42.3) | 15 (57.7) | | | |
| Medicine | 142 (70) | 61 (30) | | | |
| Pharmacy | 37 (88.1) | 5 (11.9) | | | |
| Dentistry | 45 (77.6) | 13 (22.4) | | | |

of dental and pharmacy students. This was to be expected since the number of virology courses in the laboratory science curriculum is higher and more specialized than other disciplines, and medical students are more likely than other disciplines to face COVID-19 patients in the clinic (22). There was no significant relationship between the participants' COVID-19 knowledge with their age and marital status.

We found that the majority of respondents had a positive attitude towards the successful control of COVID-19, which is consistent with the results of a recent study in China (18); however, it is contrary to the results of a study in Saudi Arabia, in which only 22% of students had a positive attitude towards COVID-19 control (23). This difference can be due to cultural differences and media policies in different countries. Females and students in the fields of pharmacy and dentistry had a more positive attitude towards the end of COVID-19 control. Explaining the reason for this difference, we can say that women generally have a more optimistic outlook. Also, basic sciences, pharmacy, and dentistry students are usually away from clinical setting compared to medical and laboratory sciences students.

According to our findings, more than half of the participants were confident about Iran's victory in the battle against COVID-19. In a similar study in Saudi Arabia, 89%

**Table 3.** Attitudes of Students Towards Iran's Victory in the Battle Against the COVID-19 Based on Demographic Data

| Variables | Are You Confident That Iran Can Win the Battle Against the COVID-19? No. (%) | | Test Results | |
|---|---|---|---|---|
| | Yes | No | $X^2$ | P-Value |
| **Gender** | | | 0.933 | 0.334 |
| Female | 108 (59.7) | 73 (40.3) | | |
| Male | 96 (64.9) | 52 (35.1) | | |
| **Marital status** | | | 0.991 | 0.32 |
| Single | 185 (62.9) | 109 (37.1) | | |
| Married | 19 (54.3) | 16 (45.7) | | |
| **Field of study** | | | 6.803 | 0.078 |
| Laboratory sciences | 12 (46.2) | 14 (53.8) | | |
| Medicine | 132 (65) | 71 (35) | | |
| Pharmacy | 21 (50) | 21 (50) | | |
| Dentistry | 39 (67.2) | 19 (32.8) | | |

**Table 4.** Practice of Students About Going to Crowded Places During the Pandemic Based on Demographic Variables

| Variables | In Recent Days, Have You Attended Crowded Places? No. (%) | | Test Results | |
|---|---|---|---|---|
| | Yes | No | $X^2$ | P-Value |
| **Gender** | | | 14.015 | 0.000 |
| Female | 41 (22.7) | 140 (77.3) | | |
| Male | 62 (41.9) | 86 (58.1) | | |
| **Marital status** | | | 0.57 | 0.45 |
| Single | 94 (32) | 200 (68) | | |
| Married | 9 (25.7) | 26 (74.3) | | |
| **Field of study** | | | 3.097 | 0.377 |
| Laboratory sciences | 5 (19.2) | 21 (80.8) | | |
| Medicine | 64 (31.5) | 139 (68.5) | | |
| Pharmacy | 12 (28.6) | 30 (71.4) | | |
| Dentistry | 22 (37.9) | 36 (62.1) | | |

of students trusted the government's performance in combating COVID-19 (17); but in another study in Pakistan, 79.2% of students did not believe in the government's ability to control the epidemic (15). Strengthening confidence in the country's victory in controlling the pandemic requires government and health officials to plan to improve relations with people. This can be done through social media, seminars, transparency of actions, and awareness campaigns. Also, age affected the students' attitudes, so that older students were more pessimistic. Since most of the participants in this study were in a close age range some unknown factors distorted the results.

In this study, most students did not attend crowded places during the pandemic. In a review, 83.8% of people avoided crowded neighborhoods (24). It can be said that the strict rules and advertising to stay at home and tolerate social distance conditions have decreased more than a year after the pandemic. The results also showed that presence in crowded places was significantly different based on age so that older students were less observant. The participants' gender, marital status, and field of study did not affect their practice in going to crowded places. This difference is probably due to the fact that older students have more daily commutes due to more job-related issues and social activities. In addition, the majority of older students are interns, and their presence in a crowded clinical setting is inevitable during the COVID-19 epidemic. The interesting result was that participants' knowledge had no effect

**Table 5.** Practice of Students Wearing a Mask When Leaving Home Based on Demographic Variables

| Variables | In Recent Days, Have You Been Wearing a Mask When Leaving Home? No. (%) | | Test Results | |
|---|---|---|---|---|
| | Yes | No | $X^2$ | P-Value |
| **Gender** | | | 0.463 | 0.661 |
| Female | 179 (98.9) | 2 (1.1) | | |
| Male | 145 (98) | 3 (2) | | |
| **Marital status** | | | 0.468 | 0.432 |
| Single | 290 (98.6) | 4 (1.4) | | |
| Married | 34 (97.1) | 1 (2.9) | | |
| **Field of study** | | | 5.405 | 0.091 |
| Laboratory sciences | 25 (96.2) | 1 (3.8) | | |
| Medicine | 202 (99.5) | 1 (0.5) | | |
| Pharmacy | 41 (97.6) | 1 (2.4) | | |
| Dentistry | 56 (96.6) | 2 (3.4) | | |

on going to crowded places.

The results of our study showed that most students wore masks when leaving home, which agrees with the results of two large studies in China (13, 16) and contrasts with a similar study in Jordan (39%) (20). This may be due to differences in regulations or strict government limits, cultural experience in previous epidemics, and the education systems. The use of masks in the gender groups was almost the same. Also, in different groups in terms of marital status and field of study, no significant difference was found in the performance of individuals in terms of using a mask when leaving home. Contrary to expectations, there was an inverse relationship between individuals' knowledge and their performance in using the mask. In statistical analysis, this relationship was weak. It can be said that education is to some extent effective in preventive actions; over time and with more exposure to information received, people become indifferent and careless and rely on their knowledge. So, they are less worried about contracting the virus.

Our research had some limitations. This study had a cross-sectional design. Therefore, it is difficult to make definitive conclusions based on the findings. Future studies with larger sample size and in a multicenter manner should be conducted to confirm the results. Also, more questions in the questionnaire should evaluate the attitudes and preventive measures. We suggest that the COVID-19-related knowledge sources, clinical skills, as well as approach to COVID-19 patients be assessed in future studies.

### *5.1. Conclusions*

The findings of this study can provide valuable information about the knowledge, attitudes, and practice of medical and laboratory science students involved in the fight against COVID-19. Our results can help health policy makers to plan for the education and preparation of these students in the event of an epidemic. Students should learn up-to-date and reliable information about COVID-19 while correcting common misconceptions. The medical students should not rely on their higher knowledge and be role models in preventive behaviors as the representatives of medical sciences.

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## Footnotes

**Authors' Contribution:** Study concept and design: M. Z., H. A., and A. E.; Analysis and interpretation of data: M. R., M. Z., and H. E.; Drafting of the manuscript: H. E.; Critical revision of the manuscript for important intellectual content: M. Z. and A. E.; Statistical analysis: M. R.

**Conflict of Interests:** The authors state that there is no conflict of interest in the present study.

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