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Research article

Impact of the COVID-19 pandemic on pharmacy students: A comprehensive survey

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Abstract

The COVID-19 pandemic has caused numerous changes in all aspects of human life and behavior, especially in the education system. Because of these reasons, our study aimed to evaluate the approaches and attitudes of pharmacy faculty students to the COVID-19 pandemic as a survey study. This study is an analytical cross-sectional study. It was conducted with the online questionnaire technique. The questionnaire form consists of 5 different sections, and the participants were asked questions aiming to determine the level of knowledge, behavioral patterns, and approaches to online education of pharmacy faculty students against the COVID-19 pandemic, along with socio-demographic questions. 151 pharmacy students, 99 (65.6%) female and 52 (34.4%) male, participated in our study. When the participants with COVID-19 infection were asked about their post-infection approach, 31 (50%) of the participants stated that "no change in the ways of protection", 20 (32.3%) felt the need for more protection, and 11 (17.7%) also announced that he had loosened the protection measures. It has been shown that there is an increase in students' anxiety during the pandemic. In addition, it was determined that a high rate of vaccination and vaccines were relied upon. Our data show that the COVID-19 pandemic has brought about some changes in the attitudes and behaviors of pharmacy students. Time will tell the long-term results of this study, in which we showed how these changes caused by the pandemic affect pharmacy students in the short term.

Keywords: *COVID-19; pandemic effect; pharmacy students; survey*

1. Introduction

It was understood that the source of the epidemic, which started in December 2019 with pneumonia of unknown etiology and associated with the seafood and wet animal market in Wuhan, China, is a new type of coronavirus. The disease caused by the virus, called severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses, has been defined as "coronavirus disease-2019" (COVID-19) by the World Health Organization (WHO) (Jiang et al., 2020). With the rapid spread of SARS-CoV-2 to many countries of the world and the increase in deaths due to COVID-19 cases, WHO declared the COVID-19 epidemic as a pandemic on 12th March 2020 (WHO, 2020a). The COVID-19 pandemic, caused by the SARS-CoV-2, maintains high morbidity and mortality worldwide (Chen et al., 2024). As of February 4, 2024, worldwide; 774,593,066 confirmed cases of SARS-CoV-2 infection were reported, resulting in 7,028,881 deaths (WHO, 2024). As stated in the guidelines of WHO, Centers for Disease Control and Prevention

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(CDC), and T.C. Ministry of Health, the most effective protection method is the mask, social distancing, and hand hygiene (WHO, 2020b; CDC, 2022; Turkish Republic Ministry of the Health, 2022; Erkencioglu et al., 2023). However, it is seen that compliance with the prevention methods in society has decreased in the time approaching two years and with the confidence given by the vaccination. However, the COVID-19 pandemic has caused numerous changes in all aspects of human life and behavior, especially in the education system. In a study conducted at Hokkaido University, when three education types (face-to-face, online and mixed) were investigated on medical school students during COVID-19, the online/mixed education method produced better academic results compared to face-to-face education (Goudarzi et al., 2024). In another study investigating the effects of the COVID-19 pandemic on the mental health of nursing students, the negative effects of the pandemic in terms of mental health were mentioned (Jardon and Choi, 2024). In this context, our study aimed to evaluate the approaches and attitudes of Bezmialem Vakıf University Faculty of Pharmacy students to the COVID-19 pandemic as a survey study. In addition to demographic data, the survey includes questions about the sources and level of students' access to information about the COVID-19 pandemic, their anxiety and stress status, their approach to COVID-19 vaccines, and their thoughts on education during the pandemic period, and it is aimed to answer all the questions of pharmacy students.

2. Materials and methods

This study is an analytical type of cross-sectional study conducted with the questionnaire application technique on the online platform. Our study was carried out between 03 March-30 April 2022 at Bezmialem Vakıf University (BVU), Faculty of Pharmacy. It is designed to cover all grade students. Since our study is based on volunteerism, the volunteers who participated in the survey were included in the study. During the application phase of the questionnaire, it was ensured that the text regarding the purpose of the study and confidentiality principles was included before the volunteers answered the questions. The identity information of the volunteers and the questions that would reveal their identities were not included in the questionnaires. Care was taken not to direct the patients to respond positively or negatively to the statements in the data collection forms.

Along with the demographic data of the students (age, gender, class, COVID-19 history), their attitudes and behaviors related to the pandemic process, their attitudes and behaviours regarding the vaccine, and their views on education during the pandemic period were evaluated. During the evaluation, the students were asked to mark the appropriate option among the options "strongly disagree", "disagree", "undecided", "agree", and "strongly agree".

Statistical analysis was done with IBM SPSS 20.0 (IBM Corp., Armonk, NY, USA) package program and Microsoft Excel version 2013. In the analysis of the collected data, frequency (n), percentage (%), and mean values were determined. This study was approved by the Ministry of Health's COVID-19 Scientific Research Evaluation Commission on 25/12/2021. Ethics committee approval of the study was obtained with the decision dated 02.03.2022 and numbered 53294 by T.C. BVU, Non-Interventional Research Ethics Committee. The informed consent form was obtained during the study.

3. Results

A total of 151 pharmacy students, 99 (65.6%) female, and 52 (34.4%) male, were included in our study. The demographic data of the participants and their distribution by period are shown in Table 1. When the participants with COVID-19 infection were asked about their post-infection approach, 29 (51.7%) of the participants stated that there was no change in the ways of protection, 18 (32.2%) felt the need for more protection, 9 (16.1%) announced that he had loosened the protection measures. When participants want to get the most up-to-date information about the COVID-19 pandemic, the most frequently referenced source is the T.C. Ministry of Health (n:119, 78.8%) (Fig.).

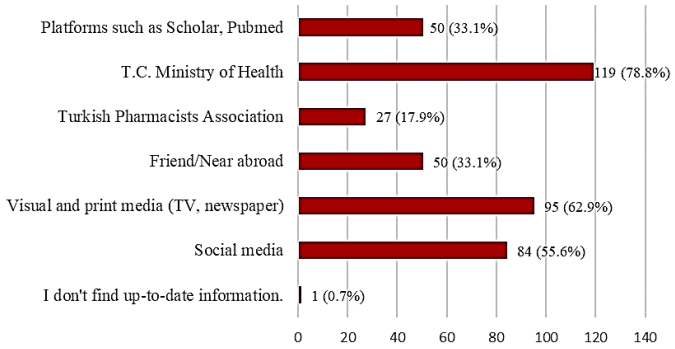

Fig. Where do you find up-to-date information about COVID-19? (151 Answers).

Table 1
Demographic data and COVID-19 history of volunteers participating in the study.

Demographic Data	n (%)
Gender	
Female	99 (65.6%)
Male	52 (34.4%)
Age (mean ± SD)	21
Class	
Term I	49 (32.5%)
Term II	18 (11.5%)
Term III	13 (8.6%)
Term IV	29 (19.2%)
Term V	42 (27.5%)
COVID-19 History and Severity (n:56)	
Mild	29 (51.7%)
Moderate	24 (42.9%)
Severe	3 (5.4%)
Family history of COVID-19 (n:83)	
Mother	27 (32.1%)
Father	20 (23.8%)
Sibling	21 (25%)
Other	15 (22.1%)

3.1. Attitudes and behaviors related to the pandemic

43 (28.5%) of the participants stated that the virus originated from the laboratory, 82 (54.2%) stated that the new variants formed as a result of the SARS-CoV-2 mutation worried them, 80 (53%) stated that they were concerned about contracting COVID-19, 122 (80.8%) stated that they were afraid of losing their relatives during the pandemic process, 115 (76.1%) stated that the pandemic process caused their stress levels to increase, 43 (28.4%) stated that they had difficulty in

Table 2
Questions and answers in the section on attitudes and behaviors related to the pandemic process.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I think the SARS-CoV-2 virus originated in the laboratory.	15(9.9%)	44 (29.1%)	49 (32.5%)	33 (21.9%)	10 (6.6%)
The new variants resulting from the SARS-CoV-2 mutation worry me.	7 (4.6%)	23 (15.2%)	39 (25.8%)	72 (47.7%)	10 (6.6%)
I am worried about contracting COVID-19.	16 (10.6%)	24 (15.9%)	31 (20.5%)	71 (47%)	9 (6%)
I am afraid of losing my relatives during the pandemic process.	6 (4%)	11 (7.3%)	12 (7.9%)	85 (56.3%)	37 (24.5%)
The pandemic process has caused the stress level to increase.	6 (4%)	12 (7.9%)	18 (11.9%)	47 (31.1%)	68 (45%)
I'm having trouble keeping up with current data on the pandemic.	12 (7.9%)	52 (34.4%)	44 (29.1%)	36 (23.8%)	7 (4.6%)
I do not follow the prominent new information about the pandemic.	16 (10.6%)	70 (46.4%)	36 (23.8%)	24 (15.9%)	5 (3.3%)
Even if the COVID-19 pandemic ends, I think we will experience similar pandemic processes in the coming years.	2 (1.3%)	10 (6.6%)	35 (23.2%)	80 (53%)	24 (15.9%)

Table 3
Questions and answers in the section on attitudes and behaviors related to the COVID-19 vaccine.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I felt safe after getting vaccinated.	5 (3.3%)	24 (15.9%)	33 (21.9%)	68 (45%)	21 (13.9%)
After getting vaccinated, I was able to move safely in eating and drinking places, indoor areas, and public transportation.	16 (10.6%)	34 (22.5%)	35 (23.2%)	56 (37.1%)	10 (6.6%)
After getting vaccinated, I continue to pay attention to my hand hygiene.	2 (1.3%)	11 (7.3%)	17 (11.3%)	72 (47.7%)	49 (32.5%)
After getting vaccinated, I also continue to pay attention to the use of masks.	3 (2%)	23 (15.2%)	16 (10.6%)	61 (40.4%)	48 (31.8%)
After getting vaccinated, I also pay attention to social distance.	4 (2.6%)	31 (20.5%)	22 (14.6%)	55 (36.4%)	39 (25.8%)
After getting vaccinated, my social life normalized.	20 (13.2%)	48 (31.8%)	47 (31.1%)	28 (18.5%)	8 (5.3%)
I think vaccines save lives in the fight against the pandemic.	4 (2.6%)	5 (3.3%)	25 (16.6%)	80 (53%)	37 (24.5%)
I can have the reminder dose vaccine at the time intervals recommended by the ministry.	7 (4.6%)	9 (6%)	42 (27.8%)	67 (44.4%)	26 (17.2%)
I trust COVID-19 vaccines.	5 (3.3%)	10 (6.6%)	43 (28.5%)	74 (49%)	19 (12.5%)
I encourage people around me to get vaccinated.	3 (2%)	15 (9.9%)	52 (34.4%)	55 (36.4%)	26 (17.2%)

Table 4
Questions and answers in the education status section during the pandemic process.

	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I think it was the right decision to close universities at the beginning of the pandemic.	8 (5.3%)	17 (11.3%)	17 (11.3%)	37 (25.2%)	71 (47%)
I think that the process of opening universities in the pandemic took longer than I expected.	68 (45%)	17 (11.3%)	16 (10.6%)	68 (45%)	45 (29.8%)
I think the pandemic has negatively affected my university life.	4 (2.6%)	10 (6.6%)	15 (9.9%)	52 (34.4%)	70 (46.4%)
I think that academicians easily adapt to the online education process.	16 (10.6%)	43 (28.5%)	58 (38.4%)	27 (17.9%)	7 (4.6%)
I think that students adapt easily to the online education process.	31 (20.5%)	54 (35.8%)	37 (24.5%)	23 (15.2%)	6 (4%)
I think that online education is more efficient in theoretical courses.	40 (26.5%)	44 (29.1%)	40 (26.5%)	18 (11.9%)	9 (6%)
I think that theoretical lessons should be given as online education after the pandemic.	45 (29.8%)	42 (27.8%)	40 (26.5%)	16 (10.6%)	8 (5.3%)
I find it risky to continue face-to-face education during the pandemic process.	24 (15.9%)	51 (33.8%)	44 (29.1%)	25 (16.6%)	7 (4.6%)
During the pandemic process, I pay great attention to personal protection precautions (mask, distance, hygiene) in face-to-face education conditions.	3 (2%)	3 (2%)	16 (10.6%)	97 (64.2%)	32 (21.2%)

following the current data about the pandemic, 29 (19.2%) stated that they did not follow the prominent new information about the pandemic, 104 (68.9%) stated that they think that similar pandemic processes will occur in the coming years even if the COVID-19 pandemic ends, 63 (41.7%) of the participants stated that the use of masks should continue until the number of active cases is reset all over the world, while 58 (38.4%) stated that the use of masks should continue only in closed areas. Opinions about this subsection are presented in Table 2.

3.2. Vaccination-related attitudes and behaviors

It was determined that 146 (96.7%) of the participants were vaccinated against COVID-19, and the remaining 5 participants were not vaccinated because they had just had the infection. 89 (58.9%) of the participants stated that they felt safe after being vaccinated, 66 (43.7%) stated that they could move safely in eating and drinking places, indoor areas, and public transportation after vaccination, 121 (80.2%) stated that they pay

attention to hand hygiene even after vaccination, 109 (72.2%) stated that they continue to use masks even after vaccination, 94 (62.2%) stated that they pay attention to social distance as well after vaccination, 36 (23.8%) stated that their social life normalized after vaccination, 117 (77.5%) stated that the vaccines were life-saving, 93 (61.6%) stated that they could receive a reminder dose at the time intervals recommended by the ministry and that they trusted the COVID-19 vaccines, 81 (53.6%) stated that they encouraged vaccination of the people around them. Opinions about this subsection are presented in Table 3.

3.3. Education status during the pandemic process

109 (72.2%) of the participants stated that it was the right decision to close the universities at the beginning of the pandemic, 113 (74.8%) stated that the opening of universities took longer than they expected, 122 (80.8%) stated that the pandemic had a negative impact on their university life, 34 (22.5%) stated that academicians easily adapt to the online education process, 29 (19.2%) stated that students easily adapt to the online education process, 27 (17.9%) stated that online education is more efficient in theoretical courses, 24 (15.9%) stated that the theoretical courses should be given as online training after the pandemic, 32 (21.2%) stated that they found it risky to continue face-to-face education during the pandemic process, 129 (85.4%) of the participants stated that they paid great attention to personal protection measures (mask, distance, hygiene) in face-to-face training conditions during the pandemic process (Table 4).

4. Discussion

The COVID-19 pandemic has brought serious educational and social repercussions, including the closure of university campuses and the transition to online learning at universities. University students had to forego the social advantages of the "university experience" (i.e. social gatherings, group work, and face-to-face lectures and meetings) as well as face-to-face education. This study presents the perspectives of pharmacy students regarding the pandemic and education during a period when the devastating effects of the COVID-19 epidemic were felt, and face-to-face education was cancelled.

According to UNESCO data, schools were partially or completely closed in 45 countries until 11 March 2020, after the World Health Organization decided on an epidemic on March 11, between March 12 and April 10, there was a period in which school closures on a national scale peaked all over the world (UNICEF, 2022). After the first case was reported in Turkey on March 11, 2020, face-to-face education was interrupted for approximately 1.5 years. When the results in the first part of our study are evaluated, it is seen that the students have a high level of anxiety. Similarly, in a study conducted at the University of Vermont in the USA, it was shown that there are permanent negative effects on the behavioral and emotional functions of students during the pandemic process (Copeland et al., 2021). At the same time, it has been shown that the findings they obtained are compatible with studies conducted among students who experienced natural disasters (Gutierrez et al., 2005; Davis et al., 2010; Carter et al., 2014; Copeland et al., 2021). In a study conducted among nursing students, it was stated that many unusual new developments experienced during the pandemic process increased the stress level of students (Aslan and Pekince, 2021). During the time of the COVID-19 pandemic in the UK, especially with restrictions, students reported that they felt their mental health was affected "quite a lot" or "really a lot", with 70% of respondents reporting that they were concerned about contracting the virus. However, participants also reported that their family members were worried about contracting the virus (Evans et al., 2021). In a study reported by Peru, nursing and pharmacy students reportedly affected the mental health of the COVID-19 epidemic (Horton et al., 2024). When our data on attitudes and behaviors related to the pandemic are evaluated, it is seen that students from different countries and different departments have the same anxiety and concern.

Since there is no effective treatment in combating SARS-CoV-2 infection, vaccines based on many different techniques have been developed recently for prevention. Among them, vaccines based on mRNA technology were used for the first time in the COVID-19 pandemic, and it brought along various discussions. In our study, it is seen that 96.7% of our students preferred to be vaccinated, and 53% of them contributed to public health by stating that they encouraged their relatives to be vaccinated. In a study conducted among students in China, it was reported that 87.4% accepted the COVID-19 vaccine and 10.1% of the participants had a change in their attitudes after vaccination (Li et al., 2022). In our study, it is seen that our vaccination rate is higher than those reported by students in some other countries such as Japan (69.8%), Egypt (34.9%), and Jordan (28.8%), however, it is seen that our vaccination rate is close to Saudi Arabia (83.6%) and Italy (86.1%) (Barello et al., 2020; Bari et al., 2021; Bou Hamdan et al., 2021; Saied et al., 2021; Sallam et al., 2021; Khalafalla et al., 2022; Tsutsumi et al., 2022). Regardless of the student population, the vaccine acceptance rate appears to vary around the world. We think that this difference may be due to cultural backgrounds, teaching habits, government policies, social environments, and other potential factors.

During the pandemic period, online education was started at our university on March 19, 2020, and before the pandemic, students had never experienced online education. Although the students of our faculty supported the universities to take a break from face-to-face education during the pandemic process, they stated that both academicians and they had difficulties in adapting to this process. However, despite the increasing digitalization in the current period, it is remarkable that students still prefer traditional education. In some studies, it has been reported that the online education experience is not suitable for most medical students due to limitations related to technology, and the traditional face-to-face teaching method is preferred for various reasons (Sindiani et al., 2020; Samannodi et al., 2022). Considering that intensive laboratory practices are also included in pharmacy education, it is understandable that faculty students prefer face-to-face education.

5. Conclusion

Due to factors such as the increase in the world population, increased human mobility, and climate change, new pandemics are expected to occur in the following processes. In this context, the experiences and data obtained in the COVID-19 pandemic that started in 2019 are quite significant. The results of our study are important in terms of addressing the education preferences, stress levels, preferred sources of information, and approaches to vaccines of the pharmacist candidates, who will be at the forefront of the struggle against pandemics, during the COVID-

19 pandemic. We think that careful monitoring of the stress levels and demands of pharmacy faculty students, who are the public health soldiers of the future, is of critical significance in terms of protecting both their own and the public's health.

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