ORIGINAL ARTICLE

Nursing students' knowledge and practices about COVID-19: A cross-sectional survey

Aslıhan Aksu MSc[1] | Aysu Buldum MSc[1] | Tuba G. Emül PhD[2] |
Ayda Çelebioğlu PhD[3]

[1]Department of Obstetrics, Women's Health and Gynaecological Diseases Nursing, Faculty of Nursing, Mersin University, Mersin, Turkey

[2]Department of Obstetrics, and Gynaecologic Nursing, Faculty of Nursing, Mersin University, Mersin, Turkey

[3]Department of Child Health and Disease Nursing, Faculty of Nursing, Mersin University, Mersin, Turkey

Correspondence
Aslıhan Aksu, Department of Obstetrics, and Gynaecologic Nursing, Faculty of Nursing, Ciftlikkoy Campus-Mersin University, Mersin 33343, Turkey.
Email: aslihanaksu1@hotmail.com

Abstract

Background: It is important that nursing students who will be at the forefront of providing health services and be key personnel in the development of public health practices have sufficient knowledge of COVID-19 and related appropriate practices surrounding the outbreak. Thus, it is necessary to update the nursing curriculum for the changing needs in nursing education in urgent public health problems such as epidemics.

Aims: This study aims to determine the knowledge and practices of nursing students about the COVID-19 pandemic.

Methods: This study was conducted with 304 nursing students. The study data were collected using online tools consisting of a personal information form and the COVID-19 Knowledge and Practice Questionnaire.

Results: Participants had good levels of knowledge and practices regarding the COVID-19 outbreak. The students' total mean knowledge score regarding COVID-19 was 28.95 ± 4.46 and their total mean practice score was 5.85 ± 1.03.

Conclusions: It is very important that all nurse candidates, who will soon play an active role in the pandemic, have the correct knowledge and practices to prevent its spread. Therefore, the current curriculum for nurses, whom we can describe as the backbone of public health, should be equipped and enriched with evidence to support them during major events such as the COVID-19 pandemic.

KEYWORDS
COVID-19, knowledge, nursing, student

1 | INTRODUCTION

SARS-CoV-2 virus, the agent of the new coronavirus (COVID-19), has affected people more severely than any other coronavirus type because it is extremely infectious and it can be easily transmitted through respiratory droplets and direct contact.[1,2] COVID-19 became a pandemic by quickly spreading from China to other countries in 2019. The pandemic, which threatened public health, has caused many problems in many sectors, particularly the health-care industry.[3]

As COVID-19 spread, the need for health care and hospital sources increased. Nurses, who make up more than half of the health-care workforce in Turkey, were needed more and provided services on the front line.[4,5] Regarding prevention of COVID-19 and related interventions, nursing professionals have a critical role not only in providing direct services to patients and communities but also in health promotion and disease prevention strategies.[6] During the pandemic, it became necessary to protect public health and be informed about and apply various measures to minimize economic and social losses arising from the pandemic.[7,8] In this regard, a set of

measures determined by the World Health Organization (WHO) during the pandemic were implemented by the national health departments.[9] The Turkish Ministry of Health stressed that decreasing contact between people, isolating infected people and those suspected of infection, and effective and correct use of personnel protective equipment to be protected against transmission were the main points in fighting the pandemic.[10]

To cope with the pandemic, individuals should obey the measures determined by the international health authorities, have necessary and adequate information, and show appropriate behaviors.[11] As healthcare professionals, nurses are responsible for directing patients, families, and communities to advice from health-care authorities and to inform them about the current pandemic.[7] They are health-care professionals who can provide the most solid and updated information regarding the necessary precautions.[12] Nursing students who will provide health services to patients in the future should also have knowledge and skills that will provide necessary training and counseling to protect and support public health during the pandemic.[13–15] Therefore, nursing curriculum should be designed to foster a nursing workforce that follows the health recommendations.[16] It is important to analyze the knowledge and skills of nursing students, but there are very few studies in the related literature, which makes the present study significant. This article is based on a determination of nursing students' knowledge and skills and provides suggestions for training in the nursing profession that will aid nurses in responding to unforeseen destructive phenomena such as the COVID-19 outbreak.

2 | METHODS

This study reports on a cross-sectional study conducted between June 2020 and July 2020 in a nursing faculty. We used the STROBE guidelines during the preparation of this report.[17]

2.1 | Design and setting

This study used a descriptive and cross-sectional research design. We applied a cross-sectional survey study design to examine nursing students' knowledge and practices regarding the COVID-19 pandemic in a nursing faculty. In the country where this study was conducted, nursing education is provided at one level: European Qualifications Framework (EQF) at bachelor level (EQF level 6). Nursing education at bachelor level covers 4 years (240 ECTS). This educational program gives access to the title of "nurse responsible for general care" as defined in the European Directive 2013/55/EC. Within the bachelor's program, the educators guide the students' learning trajectory.

2.2 | Sampling and participants

The students studying in the nursing department in the spring term of the 2019–2020 academic year comprised the population of the study

($N = 692$). All the male and female students could voluntarily and anonymously participate in this study. Those students who did not wish to be part of the study or did not complete the questionnaire properly were excluded. The participants were recruited through nonprobabilistic sampling. The sample consisted of 304 students who agreed to participate in the study and completed the data collection form sent online.

2.3 | Measurements tools

The study data were collected from June to July 2020 using a personal information form and the COVID-19 Knowledge and Practice questionnaires developed by the researchers.[9–11] The personal form was created based on the relevant literature and included 10 questions about the sociodemographic characteristics of the participants and the pandemic process. The COVID-19 Knowledge and Practice questionnaires consisted of items aimed at determining the knowledge and practice levels of students during the pandemic. This questionnaire included items/statements based on the WHO guidelines containing measures to prevent COVID-19 infection and slow the transmission. The questionnaire was sent to five expert faculty members to have their opinions about the items.

The questionnaire created to determine the knowledge level of the students about COVID-19 included 35 items. Of the items, 11 (6, 12, 13, 23, 27, 28, 29, 30, 31, 32, and 34) were reverse scored. Items that measure students' level of knowledge were answered as "correct," "incorrect," and "undecided." The total knowledge scores of the students were calculated by scoring "1" for correct answers and "0" for incorrect answers. Items answered "undecided" were also evaluated as incorrect and scored as "0." Accordingly, the lowest and highest total knowledge scores were "0" and "35," respectively. The Cronbach's alpha coefficient of the knowledge questionnaire was 0.822 in this study, indicating an acceptable internal consistency.

The questionnaire created to determine the health practices of students during the COVID-19 pandemic process included seven items. In the questionnaire, two items (1 and 3) were reverse scored. The items measuring the correct health practices of the students were answered as "yes" and "no." The students' total practice scores were calculated by scoring "1" for correct answers and "0" for incorrect answers. Accordingly, the lowest and highest scores that students could obtain were "0" and "7," respectively.

2.4 | Data collection procedure

The data of the study were collected by the researchers through an electronic questionnaire under the terms of legal requirements to prevent the spread of infection during the COVID-19 pandemic process. The data collection forms were sent to the e-mail addresses of the students registered in the distance education system of their university via a Google forms link created by the researchers.

2.5 | Data analysis

Data were analyzed descriptively; according to the distribution, appropriate measures of central tendency and dispersion were used. Prerequisites such as variables, homogeneity of variances, and normality were evaluated using the Shapiro-Wilk test and Levene's test. Frequency, percentages, median (maximum–minimum), mean, and standard deviation values were used to summarize the results. Differences between groups were analyzed using student's *t*-test, analysis of variance (ANOVA), and Tukey test according to the measurement level and underlying distribution. The significance level α was set at 0.05. All analyses were performed using SPSS V 20 software.

2.6 | Ethical considerations

Necessary official permissions were obtained from the Republic of Turkey Ministry of Health COVID-19 Scientific Research Platform (date: 05/10/2020, No: 2020-05-07T16-36-56) and Mersin University Clinical Research Ethics Committee (date: 10/06/2020 No: 428), and the study was carried out in accordance with the Helsinki Declaration principles. Each student received a copy of the informed consent in the invitation email. To access the online questionnaire, students needed to give their consent. They were asked to mark the statement "I agree to participate in the study" if they agreed to participate in the study. They were told that participation was on a voluntary basis. Students who completed the data collection form online were deemed to have agreed to participate in the study. The participants were also informed that they would not be charged any fees, they would not be paid any fees, and their participation would not affect their course grades. The confidentiality of their responses was ensured; the students' responses were viewed only on Google forms via e-mail that belonged to the researchers.

3 | RESULTS

3.1 | Sample description

The mean age of the participating students was 21.47 ± 2.88 and 67.1% were female. Of them, 23.4% were first year, 31.3% were second year, 23.4% were third year, and 22.0% were fourth year students. Of the students, 86.8% said they lived with their families, 53.6% went out once or twice a week, and 24% never went out during the COVID-19 pandemic. In addition, there were individuals diagnosed with COVID-19 in the immediate circle of 17.8% of the students (Table A1).

3.2 | Description of the COVID-19 knowledge questionnaire's results per item

The correct response rates of the students on the COVID-19 information questionnaire ranged between 43.1% and 98.7%. Of the participants, 97% knew that the most common symptoms of COVID-19 infection are fever, cough, and shortness of breath, and 97.7% knew that the virus spreads through respiratory droplets when an infected person coughs, sneezes, or talks. Similarly, the vast majority of the students answered other statements correctly (KI 2, KI 5, KI 7, KI 11, and KI 15) that measure the level of knowledge about the transmission routes and symptoms of COVID-19. On the other hand, 23.0% of the students answered the item "KI 12. The use of vinegar prevents infection" as correct and 33.9% as undecided. Of the students, 27.0% thought that eating garlic would help treat the infection. Similarly, 27.6% of the students stated that washing the nose with salt water regularly is beneficial in preventing COVID-19 infection (Table 1).

3.3 | Description of the COVID-19 practices questionnaire's results per item

Almost all of the students wore a mask when leaving the house, covered their mouths while coughing/sneezing, and washed their hands more often when they went out. In addition, 57.6% of the students had not gone to a crowded place recently and 63.8% stated that they did not use public transportation (Table 2).

3.4 | Levels of knowledge and practices regarding the COVID-19 pandemic

The total mean knowledge score (TMKS) of the students for the COVID-19 pandemic was 28.95 ± 4.46 (min–max = 0–35). Their total mean practice score (TMPS) for the COVID-19 pandemic was 5.85 ± 1.03 (min–max = 0–7) (Table 3).

3.5 | Factors associated with levels of knowledge and practices regarding the COVID-19 pandemic

The comparison of the TMKS and TMPS by some characteristics of the students is shown in Table 4. The study found that the students living in the dormitory had a significantly lower TMKS than the students living in their family house and a student house ($p < 0.05$). The TMKS of students who did not cover their mouths while coughing or sneezing was significantly lower than those who did ($p < 0.005$).

The difference between the TMPS of the students in terms of the place of residence, the frequency of going out, the frequency of handwashing, and covering their mouths while coughing/sneezing was statistically significant ($p < 0.05$). The TMPS of the students staying in their family house was significantly higher than the other students ($p < 0.001$). During the COVID-19 pandemic, students who went out five or more times a week and those who washed their hands five times a day or less had a lower TMPS ($p < 0.05$). The TMPS of the students who covered their mouths with a tissue while

TABLE 1 Students' responses to knowledge items regarding COVID-19 (item = 35)

Knowledge items regarding COVID-19	Correct n (%)	Wrong n (%)	Undecided n (%)
KI 1. The virus spreads through respiratory droplets when an infected person coughs, sneezes, or talks.	297 (97.7)	2 (0.7)	5 (1.6)
KI 2. People can become infected by first touching a contaminated surface and then their eyes, mouth, or nose.	299 (98.4)	2 (0.7)	3 (1.0)
KI 3. The most effective ways to protect against the virus are washing hands with soap and water or cleaning them with an alcohol-based hand sanitizer.	275 (90.5)	4 (1.3)	25 (8.2)
KI 4. The most common symptoms are fever, cough, and shortness of breath.	295 (97.0)	2 (0.7)	7 (2.3)
KI 5. The virus may not show symptoms in some patients.	278 (91.4)	8 (2.6)	18 (5.9)
KI 6. The virus does not infect young people and children.	6 (2.0)	275 (90.5)	23 (7.6)
KI 7. Older people and those with chronic diseases (such as asthma, diabetes, or heart disease) are more vulnerable to exposure to the virus.	297 (97.7)	5 (1.6)	2 (0.7)
KI 8. The incubation period of the virus is from 2 to 14 days.	281 (92.4)	8 (2.6)	15 (4.9)
KI 9. There is no vaccine for the virus.	240 (78.9)	25 (8.2)	39 (12.8)
KI 10. Hands should be washed with soap and water for at least 20 s.	293 (96.4)	5 (1.6)	6 (2.0)
KI 11. Dormitories, enclosed areas, and public living areas are places where the virus can be more easily transmitted.	297 (97.7)	4 (1.3)	3 (1.0)
KI 12. The use of vinegar prevents infection.	70 (23.0)	131 (43.1)	103 (33.9)
KI 13. Washing the nose regularly with salt water is helpful for preventing infection.	84 (27.6)	137 (45.1)	83 (27.3)
KI 14. Before putting on the mask, hands should be washed with soap and water or cleaned with an alcohol-based hand sanitizer.	251 (82.6)	31 (10.2)	22 (7.2)
KI 15. The mask should completely cover the mouth and nose.	300 (98.7)	2 (0.7)	2 (0.7)
KI 16. As soon as the mask gets damp, it should be replaced with a new one.	283 (93.1)	5 (1.6)	16 (5.3)
KI 17. Disposable masks should not be reused.	288 (94.7)	10 (3.3)	6 (2.0)
KI 18. Touching the mask during use should be avoided.	291 (95.7)	5 (1.6)	8 (2.6)
KI 19. The mask should be removed from the back without touching the front.	291 (95.7)	5 (1.6)	8 (2.6)
KI 20. When the mask is removed, it should be thrown into a closed bin immediately.	285 (93.8)	13 (4.3)	6 (2.0)
KI 21. After taking off the mask, hands should be washed with soap and water or cleaned with an alcohol-based hand sanitizer.	294 (96.7)	4 (1.3)	6 (2.0)
KI 22. Coughing/sneezing individuals should wear a mask.	277 (91.1)	13 (4.3)	14 (4.6)
KI 23. Using a mask alone is sufficient for virus protection.	25 (8.2)	261 (85.9)	18 (5.9)
KI 24. The virus cannot travel on radio waves/mobile networks.	203 (66.8)	40 (13.2)	61 (20.1)
KI 25. Exposure to the sun or temperatures higher than 25°C does not prevent infection.	226 (74.3)	25 (8.2)	53 (17.4)
KI 26. It is possible to recover from coronavirus infection.	293 (96.4)	4 (1.3)	7 (2.3)
KI 27. Drinking alcohol provides protection against the virus.	14 (4.6)	259 (85.2)	31 (10.2)
KI 28. The virus is not transmitted in areas with hot and humid climates.	15 (4.9)	245 (80.6)	44 (14.5)
KI 29. Cold weather and snow kill the virus.	12 (3.9)	256 (84.2)	36 (11.8)
KI 30. Hot bath water prevents infection.	36 (11.8)	198 (65.1)	70 (23.0)
KI 31. Infection is transmitted by mosquito bites.	32 (10.5)	206 (67.8)	66 (21.7)
KI 32. Hand dryers are effective in killing the virus.	21 (6.9)	235 (77.3)	48 (15.8)
KI 33. Spraying alcohol or chlorine all over the body will not kill the new coronavirus.	158 (52.0)	59 (19.4)	87 (28.6)
KI 34. Eating garlic helps treat infection.	82 (27.0)	142 (46.7)	80 (26.3)
KI 35. Antibiotics are not effective in preventing and treating the virus.	166 (54.6)	73 (24.0)	65 (21.4)

TABLE 2 Practices related to prevention of COVID-19 infections (item = 7)

Practice items regarding COVID-19 infections	Yes n (%)	No n (%)
PI 1. Have you been to a crowded place recently?	129 (42.4)	175 (57.6)
PI 2. Have you worn a mask while leaving home recently?	294 (96.7)	10 (3.3)
PI 3. Have you used public transportation recently?	110 (36.2)	194 (63.8)
PI 4. Do you cover your mouth while coughing/sneezing?	297 (97.7)	7 (2.3)
PI 5. Do you wash your hands after coughing/sneezing?	263 (86.5)	41 (13.5)
PI 6. Have you paid attention to washing your hands frequently when you go out?	292 (96.1)	12 (3.9)
PI 7. Have you washed more frequently during the day recently?	265 (87.2)	39 (12.8)

TABLE 3 Students' total mean knowledge score (TMKS) and total mean practice score (TMPS) for COVID-19

	Item number	M ± SD	Min–Max
TMKS	35	28.95 ± 4.46	0–35
TMPS	7	5.85 ± 1.03	2–7

coughing/sneezing was significantly higher than the students who covered their mouths with a cloth ($p < 0.05$).

4 | DISCUSSION

COVID-19 infection, which affects the whole world, is a disease that causes a crisis both in society and in the existing health systems due to its extremely high transmission rate and symptoms, such as severe respiratory failure, which require special care. It is very important to determine the knowledge levels and behaviors of nurse candidates who will be responsible for public health in the future in the fight against COVID-19. Evaluating the knowledge of precautionary measures for disease prevention is the first step in guiding future efforts in the education process. These precautionary measures affect future behavior.[17,18] This study, conducted with 304 nursing students, found that the correct response rates of the students in the COVID-19 knowledge questionnaire ranged from 43.1% to 98.7% (Table 1). This rate is close to that reported in similar studies (between 50% and 92.7%).[19–25] Almost all the participating students gave correct answers to the items "KI 1. The virus spreads through respiratory droplets when an infected person coughs, sneezes, or talks," "KI 2. People can become infected by first touching a contaminated surface and then their eyes, mouth, or nose," "KI 4. The most common symptoms are fever, cough, and shortness of breath," "KI 7. Older people and those with chronic diseases (such as asthma, diabetes, or heart disease) are more vulnerable to exposure to the virus," "KI 11. Dormitories, enclosed areas, and public living areas are places where the virus can be more easily transmitted," and "KI 15. The mask should completely cover the mouth and nose," which measured knowledge about COVID-19. On the other hand, it is remarkable that the rate of the students' correct answers to the items "KI 12. The use of vinegar prevents infection,"

"KI 13. Washing the nose regularly with salt water is helpful for preventing infection," "KI 32. Hand dryers are effective in killing the virus," and "KI 33. Spraying alcohol or chlorine all over the body will not kill the new coronavirus" was relatively lower than other items (Table 1). In the literature, it is seen that these items (KI 12, KI 13, KI 32, and KI 33) are used in studies measuring information on COVID-19 and, similar to our study, the correct response rate for these items is low.[26–28] Although students in this study generally had good levels of knowledge regarding the COVID-19 pandemic, these responses are significant. It can be argued that this is because the data were collected in the early stages of the pandemic, the information regarding COVID-19 was not yet clear, and the misinformation from infodemics produced all over the world among individuals in societies for protection from infection proliferated particularly through social media. These infodemics make it difficult for individuals to distinguish correct information from incorrect information. This finding from our study reveals that it is necessary to provide updated and correct information on emergency issues such as the pandemic that relate to public health and to integrate such information into the nursing curriculum.

On examining the practices of students for the COVID-19 pandemic, this study found that they performed highly correct practices (Table 2). Similarly, studies show that students in the field of health frequently practice protective behaviors such as washing their hands, wearing a mask, and covering their mouths while coughing/sneezing.[25,29–31] Nursing students' education in the field of health and their knowledge of protection from COVID-19 may have affected this result.

Participants had good levels of knowledge and practices regarding the COVID-19 pandemic (Table 3). In this context, it is a pleasing finding that nursing students reported correct information and good precautionary measures at the expected level regarding the COVID-19 pandemic, although the study was conducted in the early stages of the pandemic. The Turkish Ministry of Health informed the public about the pandemic rules, which were prepared based on the protective measures determined by the WHO after the emergence of the pandemic, and individuals were asked to obey, which may have effectively contributed to this result. In addition, this result may be due to the students' education in the field of health and their high level of awareness about this issue. Studies in the literature

TABLE 4 Comparison of the total mean knowledge score (TMKS) and total mean practice score (TMPS) for COVID-19 by some sociodemographic characteristics of the students

Sociodemographic characteristic	n	TMKS M ± SD	t/F	p	TMPS M ± SD	t/F	p
Gender[*]							
Female	204	28.96 ± 4.73	0.020	0.983	5.93 ± 1.00	1.949	0.052
Male	100	28.95 ± 3.85			5.69 ± 1.09		
Nursing school year[**]							
1st year	71	28.67 ± 4.25	2.111	0.892	5.84 ± 1.00	0.207	0.099
2nd year	95	28.26 ± 4.30			5.85 ± 1.08		
3rd year	71	29.21 ± 4.10			5.92 ± 1.04		
4th year	67	29.97 ± 5.09			5.79 ± 1.02		
Perceived income level[**]							
Income less than expenses	104	29.71 ± 3.91	2.281	0.104	5.71 ± 1.06	1.516	0.221
Income equal to expenses	183	28.55 ± 4.82			5.92 ± 1.02		
Income more than expenses	17	28.64 ± 2.76			5.94 ± 1.02		
Place of residence[**]							
Family house (a)	264	29.07 ± 4.00	4.475	0.012 a–c, b, c	5.95 ± 0.99	11.000	0.000 a, b, a–c
Student's house (b)	28	29.39 ± 5.37			5.07 ± 1.27		
Dormitory (c)	12	25.25 ± 8.88			5.41 ± 0.51		
Frequency of going out per week[**]							
I never go out (a)	73	29.34 ± 3.56	0.980	0.402	6.12 ± 0.89	5.469	0.001 a–c, a–d
1–2 times (b)	163	29.08 ± 4.22			5.90 ± 1.07		
3–4 times (c)	35	28.60 ± 5.12			5.54 ± 0.98		
5 times or more (d)	33	27.84 ± 6.30			5.36 ± 1.02		
Frequency of washing hands per day[**]							
5 times or less (a)	25	29.40 ± 3.79	0.323	0.724	5.32 ± 1.21	4.103	0.017 a–c
6–10 times (b)	146	28.76 ± 4.53			5.84 ± 1.01		
11 times or more (c)	133	29.09 ± 4.51			5.96 ± 1.01		
Covering mouth while coughing/sneezing[**]							
I do not cover (a)	5	20.60 ± 11.73	4.200	0.001 a, b, a–c, a–d, a–e	4.80 ± 1.30	4.334	0.000 d, e
With a hand (b)	12	29.33 ± 3.67			5.25 ± 0.96		
Inside the elbow (c)	196	29.26 ± 4.26			5.87 ± 0.99		
With a cloth (d)	14	28.42 ± 6.59			5.14 ± 1.09		
With a disposable tissue or napkin (e)	77	28.76 ± 3.32			6.10 ± 1.03		
Presence of an individual diagnosed with COVID-19 in the immediate vicinity[*]							
Yes	54	28.38 ± 4.23	1.032	0.373	5.74 ± 1.03	0.892	0.303
No	250	29.08 ± 4.50			5.88 ± 1.04		

[*]Tukey test.
[**]ANOVA.

emphasize that the knowledge and practice levels of the students studying in the field of health are higher than other students.[26,27,32] Although the present study found that most participants had a good level of information and knowledge of applications, the present questionnaire indicated that there is a need to rearrange well-planned and appropriate education policies equipped with updated information related to the pandemic.

Factors that affect the knowledge and behavior of individuals in the fight against the COVID 19 pandemic are also important. In the study, the TMKS and TMPS of the students staying in their family house were significantly higher than the students staying in the dormitory (Table 4). Due to the risk of contracting COVID-19 to the students' family members, students who staying at their family home during the pandemic may be more concerned. This may have contributed to the result obtained in our study.

In this study, the TMKS and TMPS of the students who covered their mouths while coughing or sneezing were higher than those who did not. The students who had a high level of knowledge about COVID-19 infection and who practiced protective behaviors more often cover their mouths when coughing or sneezing. A study conducted with university students in Bangladesh found that the students' knowledge about covering their mouths while coughing or sneezing was quite high.[26] The WHO reports that one of the most important transmission routes of COVID-19 is saliva that spreads into the environment during coughing or sneezing. Also, the delivery of public advertisements prepared by the Ministry of Health through mass media and social media during the pandemic process could have also played a role in this result.

5 | CONCLUSION

The participants had sufficient knowledge about COVID-19 and applied the right practices against it. It is very important to equip all nursing students, who will be at the forefront of providing health services in the future, with the correct knowledge and practices regarding the pandemic. Although limited historical information about transmission and prevention is included surveillance in the nursing curriculum, COVID-19 revealed the need for more content on infection control and public health. Schools that provide nursing education can prepare a flexible emergency intervention plan that will support teaching and learning activities by using technological developments in emergency cases such as infectious diseases that rapidly spread and threaten public health. Nursing curriculum should be adjusted to include online modalities with recorded content accessible to all students across the country to meet their learning needs about COVID-19. In addition, the curriculum should be arranged to increase the number of elective and compulsory courses related to pandemic management. It can be suggested to discuss scientific papers related to the COVID-19 pandemic by creating interactive class groups in these courses. In addition, in online classes, healthcare professionals working in the COVID-19 service can share their clinical experiences with the students in combating the COVID-19 pandemic

5.1 | Limitations

This study has several limitations. The participants were recruited by nonprobabilistic sampling, so the results might not be generalizable to all nursing students. As is often the case in this type of research, it is difficult to extrapolate the results to larger populations or, from different contexts, to draw general or far-reaching conclusions from a descriptive study. Generalization of the results was not the purpose of this study, but instead the intent was to promote reflection on an aspect of nursing education. In addition, the measurement used in this study was a self-reported questionnaire, which may introduce certain measurement errors.

The results of this study were presented at the "3rd International Clinical Nursing Research Congress," December 8–10th, 2021 in Australia and Turkey.

ORCID

Aslıhan Aksu ![ORCID] http://orcid.org/0000-0002-8416-3055
Aysu Buldum ![ORCID] http://orcid.org/0000-0003-2663-3167
Tuba G. Emül ![ORCID] https://orcid.org/0000-0002-6284-9419
Ayda Çelebioğlu ![ORCID] http://orcid.org/0000-0002-5610-9801

REFERENCES

1. Chinese Center for Disease Control and Prevention: The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. Epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China. *J. Epidemiol.* 2020;41: 145-151. doi:10.3760/cma.j.issn.0254-6450.2020.02.003

2. Al-Tawfiq JA. Middle East respiratory syndrome-coronavirus infection: an overview. *J Infect Public Health.* 2013;6(5):319-322.

3. Çevirme A, Kurt A. COVID-19 Pandemisi ve Hemşirelik Mesleğine Yansımaları [COVID-19 pandemia and its reflections to nursing profession]. *Eur J Res Soc Econ* 2020;7:46-52.

4. Nayna Schwerdtle P, Connell CJ, Lee S, et al. Nurse expertise: a critical resource in the COVID-19 pandemic response. *Ann Glob Health*. 2020;86(1):1-5. doi:10.5334/aogh.2898

5. Anders RL. Engaging nurses in health policy in the era of COVID-19. *Nurs Forum*. 2021;56(1):89-94. doi:10.1111/nuf.12514

6. Bolina AF, Bomfim E, Lopes-Júnior LC. Frontline nursing care: the COVID-19 pandemic and the Brazilian Health System. *SAGE Open Nurs*. 2020;6:1-6. doi:10.1177/2377960820963771

7. American Nurses Association. Public Health Nursing2020. https://www.nursingworld.org/practice-policy/workforce/public-health-nursing/

8. Yerköy Ateş A, Okur F. COVID-19 Pandemisinde gizli kahramanlar: Hemşire liderler. [Hidden Heroes in the COVID-19 Pandemic: Nurse Leaders]. *Int J Health Manag Strat Res*. 2020;6(3):625-638.

9. World Health Organization. Global Research on Coronavirus Disease 2020. https://www.who.int/health-topics/coronavirus/coronavirus#tab=tab_1

10. Türkiye Cumhuriyeti Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü, Bilim KuruluÇalışması [Republic of Turkey Ministry of Health General Directorate of Public Health,Scientific Committee Study-COVID-19 (2019-N Covid) Rehberi [COVID-19 Disease Guide], 2022. https://covid19.saglik.gov.tr/TR-66301/covid-19-rehberi.html

11. Dikmen AU, Kına MH, Özkan S, İlhan MN. COVID-19 Epidemiyolojisi: Pandemiden ne öğrendik? [Epidemiology of COVID-19: what we learn from pandemic]. *J Biotech Strategic Health Res*. 2020;4:29-36.

12. Rismayanti IDA, Waloejo CS, Iswat S. Family empowerment in the COVID-19 pandemic with the family-centered nursing approach and the utilization of family medicinal plants: a systematic review. *Syst Rev Pharm*. 2020;11(7):636-647.

13. Jackson D, Bradbury-Jones C, Baptiste D, et al. Life in the pandemic: some reflections on nursing in the context of COVID-19. *J Clin Nurs*. 2020;29:1-3. doi:10.1111/jocn.15257

14. Hofmeyer A, Taylor R, Kennedy K. Knowledge for nurses to better care for themselves so they can better care for others during the Covid-19 pandemic and beyond. *Nurse Educ Today*. 2020;94:1045032. doi:10.1016/j.nedt.2020.104503

15. Dewart G, Corcoran L, Thirsk L, Petrovic K. Nursing education in a pandemic: academic challenges in response to COVID-19. *Nurse Educ Today*. 2020;92:104471. doi:10.1016/j.nedt.2020.104471

16. Seah B, Ang ENK, Liaw SY, Lau ST, Wang W. Curriculum changes for pre-registration nursing education in times of COVID-19: for the better or worse? *Nurse Educ Today*. 2021;98:1-4. doi:10.1016/j.nedt.2020.104743

17. Vandenbroucke JP, Von Elm E, Altman DG, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE): explanation and elaboration. *PLoS Med*. 2007;4(10):e297-35. doi:10.1097/EDE.0b013e3181577511

18. Alfahan A, Alhabib S, Abdulmajeed I, Rahman S, Bamuhair S. In the era of coronavirus: healthcare professionals' knowledge, attitudes, and practice of hand hygiene in Saudi primary care centers: a cross sectional study. *J Commun Hosp Intern Med Perspect*. 2016;6:32151. doi:10.3402/Jchimp.V6.32151

19. Modi P, Nair G, Uppe A, et al. COVID-19 awareness among healthcare students and professionals in Mumbai metropolitan region: a questionnaire-based survey. *Cureus*. 2020;12(4):E7514. doi:10.7759/Cureus.7514

20. Uzuntarla Y, Ceyhan S. Investigatıon of undergraduates knowledge, attitude and behaviors in the Covıd-19 era Turkey table of content. *EJMR*. 2020;7(2):157-164. doi:10.24041/ejmr2020.27

21. Maheshwari S, Gupta P, Sinha R, Rawat P. Knowledge, attitude, and practice towards coronavirus disease 2019 (COVID-19) among medical students: a cross-sectional study. *J Acute Dis*. 2020;9(3):100-104. doi:10.4103/2221-6189.283886

22. Salman M, Mustafa ZU, Asif N, et al. Knowledge, attitude and preventive practices related to COVID-19: a cross-sectional study in two Pakistani university populations. *Drugs Ther Perspect*. 2020;36:319-325. doi:10.1007/S40267-020-00737-7.

23. Peng Y, Pei C, Zheng Y, et al. Knowledge, attitude and practice associated with COVID-19 among university students: a cross-sectional survey in China. *BMC Public Health*. 2020;1-24. doi:10.21203/rs.3.rs-21185/v1

24. Yakar B, Öztürk Kaygusuz T, Pirincci E, Onalan E, Ertekin YH. Knowledge, attitude and anxiety of medical students about the current COVID-19 outbreak in Turkey. *Family Prac Palliative Care*. 2020;5(2):36-44. doi:10.22391/Fppc.737469

25. Ikhlag A, Bint-E-Riaz H, Bashir I, Ijaz F. Awareness and attitude of undergraduate medical students towards 2019-novel coronavirus. *Pak J Med Sci*. 2020;36(S4):S32-S36. doi:10.12669/pjms.36.COVID19-S4.2636

26. Wadood A, Rafi A, Mamun A, Islam A. Knowledge, attitude, practice and perception regarding COVID-19 among students in Bangladesh: survey in Rajshahi university. *MEDVRIXS*. 2020. doi:10.1101/2020.04.21.20074757

27. Joshi KP, Jamadar D. Knowledge, attitude and practices regarding COVID-19 among medical students—a cross sectional study. *Int J Adv Commu Med*. 2020;3(2):1-5. doi:10.33545/comed.v.i.142

28. Saefi M, Fauzi A, Kristiana E, et al. Survey data of COVID-19-related knowledge, attitude, and practices among Indonesian undergraduate students. *Data Brief*. 2020;31:105855. doi:10.1016/j.dib.2020.105855

29. Cihan E, Pirinçci CS, Gerçek H, Ünüvar SB, Demirdel E. Türkiye'de sağlik öğrencilerinin COVID-19 üzerine bilgi düzeyleri, koruyucu davranişlari ve risk algilari [The knowledge levels, preventive behavior and risk perception on COVID-19 of the healthcare students in Turkey]. *SDÜ Sağlık Bilimleri Dergisi [SDU J. Health Sci.]*. 2020;11(3):342-347. doi:10.22312/sdusbed.765212

30. Alshdefat A, Natarajan J, Joseph AM, Baker R. Knowledge, attitude and practice of nursing students towards COVID-19 pandemic in Oman. *Int J Nurs Educ*. 2021;13(1):23-30. doi:10.5001/omj.2019.36

31. Mena-Tudela D, González-Chordá VM, Andreu-Pejó L, Mouzo-Bellés VM, Cervera-Gasch A. Spanish nursing and medical students' knowledge, confidence and willingness about COVID-19: a cross-sectional study. *Nurse Educ Today*. 2021;103:104957. doi:10.1016/j.nedt.2021.104957

32. Zhong BL, Luo W, Li HM, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci*. 2020;16(10):1745-1752. doi:10.7150/ijbs.45221

APPENDIX A:

TABLE A1 Sample description

Sample description	$\bar{X}$ ± S. S.	Min–Max
Age	21.47 ± 2.88	17–46
Number of individuals in the household	4.91 ± 2.39	1–15
	n	**%**
Gender		
Female	204	67.1
Male	100	32.9
Nursing school year		
1st year	71	23.4
2nd year	95	31.3
3rd year	71	23.4
4th year	67	22.0
Perceived income level		
Income less than expenses	104	34.2
Income equal to expenses	183	60.2
Income more than expenses	17	5.6
Place of residence		
Family house	264	86.8
Student's house	28	9.2
Dormitory	12	3.9

TABLE A1 (Continued)

Sample description	$\bar{X}$ ± S. S.	Min–Max
Frequency of going out per week		
I never go out	73	24.0
1–2 times	163	53.6
3–4 times	35	11.5
5 times or more	33	10.9
Frequency of washing hands per day		
5 times or less	25	8.2
6–10 times	146	48.0
11 times or more	133	43.8
Covering mouth while coughing/sneezing		
I do not cover	5	1.6
With a hand	12	3.9
Inside the elbow	196	64.5
With a cloth	14	4.6
With a disposable tissue or napkin	77	25.3
Presence of an individual diagnosed with COVID-19 in the immediate vicinity		
Yes	54	17.8
No	250	82.2