

# COVID-19 anxiety and hygiene status in vocational schools of health services students in Turkey: A multicenter study

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## Abstract.

**BACKGROUND:** While the coronavirus (COVID-19) pandemic creates fear and anxiety on the students' academic achievement, the risk of an infectious disease may negatively affect education by reducing the concentration ability of students. Thus, it is essential to evaluate the knowledge, behaviors, anxiety levels, and hygiene status of students.

**OBJECTIVE:** This study aimed to investigate the knowledge, behavior change, anxiety, and hygiene status of university students about COVID-19.

**METHODS:** The investigation was conducted with students of three vocational schools of health services located in different provinces of Turkey ( $n = 1055$ ). Data collected by an online survey consisted of knowledge questions about COVID-19, items about behavior change, the hygiene behavior scale (HBS), and the Generalized Anxiety Disorder 7 (GAD-7) scale.

**RESULTS:** The knowledge scores of women were significantly higher than the scores of men. Of the students, 59.6% showed positive hygiene behaviors, and 31.5% had anxiety. Female students' total HDC scale score was significantly lower than that of men, and the total HDC scale score of those who received hand hygiene education was significantly lower than that of participants who did not receive training, which shows a positive hygiene behavior. The total GAD-7 scale score of women was significantly higher than that of men. More than half of the students showed positive hygiene behaviors, and about a third had anxiety.

**CONCLUSIONS:** Based on the study's results, psychological support and training should be provided to students.

Keywords: Behaviors, coronavirus, knowledge, psychological factors, university students

## 1. Introduction

One of the most important problems concerning public health was infectious diseases that caused millions of deaths in the past. Coronavirus (COVID-19), a recent infectious disease, has caused a pandemic in a short time, which could be overcome with

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simple hygiene measures [1]. This disease is transmitted mainly through droplets caused by coughs and sneezes of infected people. After people get in contact with these droplets with their hands, they touch their mouth, nose, or eye mucosa. Common symptoms of infection are respiratory symptoms, fever, cough, and dyspnea. Pneumonia, severe acute respiratory infection, kidney failure, and even death may occur in more serious cases [2].

The risk of health care workers being infected with COVID-19 is very high due to the way it is transmitted. In addition to long working hours, physical and psychological stress, burnout, and fatigue, infectious diseases are an additional danger for health care professionals [3]. In international classifications, it has been revealed in various national records and researches that the health sector, which is in the service sector, is a risky business line [4]. For this reason, COVID-19 is thought to cause uneasiness in health care professionals. This situation causes individuals to drift into anxiety and panic. The pandemic can affect university students physically, academically, financially, and psychologically [5]. The rapid spread of COVID-19 and implemented quarantine measures are expected to worsen mental health by causing anxiety among university students. It has been stated that 24.9% of university students in China were worried about the COVID-19 outbreak, and 87.7% of students in Bangladesh had symptoms of anxiety [6, 7]. Intense anxiety, fear, and uncertainty experienced by individuals can lead to different reactions and poor life quality. Simple measures are very effective in preventing infectious diseases. It has been reported that the failure to provide hand hygiene, which is the first step of personnel hygiene, is the most important risk in the emergence of diseases that occur in different working groups and cause problems that threaten public health [8].

One of the crucial precautions to be taken against the risks that health care professionals are exposed to at work is hand hygiene. Hand washing is also the most important step in preventing hospital infections. In this respect, it contributes significantly to reduce infection risks of health workers [9]. Taking pre-determined precautionary measures (i.e., hand hygiene, wearing a mask) to prevent the spread of COVID-19 can reduce negative psychological effects by providing a sense of security [5]. The infection rate and death statistics of COVID-19 make us think that this situation will spring an unease among students of the vocational school of health services, and this unease will have a

positive effect on the hygiene behaviors of the students.

This study aimed to investigate the knowledge status, behavioral change, hygiene, and anxiety levels of university students who will become health technicians against COVID-19.

The following hypotheses have been determined for the research:

H<sub>0</sub>: There is no difference between students' state of knowledge about COVID-19, anxiety, and hygiene behavior.

H<sub>1</sub>: There is a difference between students' state of knowledge about COVID-19, anxiety, and hygiene behavior.

## 2. Materials and methods

The population of this descriptive and cross-sectional study consisted of students studying in the vocational school of health services at three different universities in Turkey. The total number of students attending the Vocational School of Health Services in Diyarbakır Dicle University ( $n = 850$ ), Elazığ Firat University ( $n = 780$ ), and Bingöl University ( $n = 760$ ) were 2390. One of every two students was included in the study with a systematic sampling method. Out of 1195 students, 1055 were reached (Response rate 88.3%). Volunteering was taken into account in participation in the study, and non-volunteers were asked not to fill in the questionnaire and ignore the incoming message. The field study of the research was carried out with an online survey method after obtaining the ethics committee (Firat University Non-invasive Clinical Research Ethics Committee, Number: 390555, Date: 28/04/2020) approval and institutional permission.

### 2.1. Data collection tools

The questionnaire consisted of 5 sections: demographic questions, knowledge questions about COVID-19, questions about behavior change, the hygiene behavior scale, and the Generalized Anxiety Disorder 7 (GAD-7) scale. There were demographic questions in the first part of the questionnaire. In the second part of the questionnaire, the participants were asked questions about the protective practices related to COVID-19 prepared by the researchers using the questions frequently asked on the websites of the World Health Organization and the Turkish Ministry of Health, and by performing a literature

search [10–13]. One point was given for each correctly answered question. The score that could be obtained from the knowledge section varied between 0 and 6. In the third part of the questionnaire, questions were about students' perception of behavior change in their personal hygiene and social habits after COVID-19. The answers to these questions were scored as 0 points for 'I don't know,' 1 point for 'unchanged,' 2 points for 'slightly changed,' 3 points for 'moderately changed,' and 4 points for 'changed a lot.' Scores in this section could vary between 0 and 24.

### 2.2. Generalized Anxiety Disorder 7-item (GAD-7) scale

GAD-7 scale is a seven-item scale developed by Spitzer et al. in 2006 according to DSM-IV-TR criteria [14]. Its validity and reliability in the Turkish population were done by Konkan et al. [15]. Studies had reported that GAD-7 had good psychometric characteristics [16, 17]. The GAD-7 scale measures generalized anxiety levels according to DSM IV-TR criteria. GAD-7 is a self-assessment-type scale. A Likert-type scale (0 for none, 1 for some days, 2 for more than half of the number of days, 3 for almost every day) is used in the 7-items of GAD-7. The score that can be obtained from the scale can vary between 0 and 21. The total scores of 5, 10, and 15 obtained from the scale were cut points for mild, moderate, and severe anxiety, respectively.

### 2.3. Hygiene behavior scale

This scale was developed in 2015 by Coban and Bilgin and tested for validity and reliability. The Cronbach alpha internal consistency coefficient of the scale was calculated as 0.90. Therefore, this scale was sufficient in terms of psychometric characteristics. The hygiene behavior scale consists of 25 questions in total and has three sub-dimensions. There were thirteen questions about personal hygiene, six questions about handwashing, and six questions about food hygiene. The scoring of the scale was as follows: 1 point for 'always,' 2 points for 'sometimes,' 3 points for 'rare,' and 4 points for 'never.' As the scale score increases, the positive hygiene behavior decreases. The lowest total score that can be obtained from the scale was 25, and the highest score was 100. Those who scored 38 points or above were classified as having a negative hygiene behavior [18].

### 2.4. Statistical analysis

The SPSS version 22.0 statistical packaged software was used for data analysis. Descriptive values were indicated by numbers, percentages, means, and standard deviations. Normality analysis of the numerical data was performed using the Kolmogorov-Smirnov Test. The Student *t*-test was used to compare binary groups, and the one-way ANOVA test was used in the comparison of more than two groups. *Post-hoc* analysis was used to find out where the difference originated in triple groups. Pearson correlation analysis was used to compare quantitative data with each other, and  $p < 0.05$  was considered statistically significant in all analyses.

## 3. Results

A total of 1055 students (73.5% women) participated in the study. The mean age of the students was  $21.01 \pm 2.54$  years (min = 18, max = 49). Of students, 37.0% were studying at Dicle University, 33.2% at Firat University, and 29.9% at Bingol University. On the other hand, 59.1% were first grade, and 40.9% were second grade. 56.5% of the students received infectious diseases lectures, and 66.0% had hand hygiene training. COVID-19 positivity was found only in the first- and second-degree relatives of 4.9% of the students (Table 1).

Of the students, 77.9% believed that the experts' statements about COVID-19 are true, while 83.8% believed that science and technology would solve the COVID-19 problem. Only 11.2% of the participants thought of quitting school after the COVID-19 outbreak because of the possibility of exposure to this kind of infection at work.

While students gave the most correct answers to the question 'Avoiding hand, eye, and mouth contact with the hand prevents virus infection and protects against COVID-19,' the question 'Getting infected will protect against COVID-19' had the lowest correct answers. The students' mean score of knowledge was  $5.34 \pm 1.09$ . The proportions of correct answers to the knowledge questions are shown in Table 2.

The answers given by students to the behavioral questions related to COVID-19 are shown in Table 3. Students' behaviors of avoiding handshakes and getting in touch with people, who have symptoms, have changed, and the mean of their total score was found to be  $17.30 \pm 5.83$ .

Table 1  
Sociodemographic characteristics of the participants

		Number	%
Age	≤20 age	574	54.4
	>20 age	481	45.6
Gender	Female	775	73.5
	Male	280	26.5
Years at university	First grade	624	59.1
	Second grade	431	40.9
University	Dicle University	390	37.0
	Firat University	350	33.2
	Bingol University	315	29.9
Marital status	Married	28	2.7
	Single	1027	97.3
Place of residence where he/she lived longest	City	665	63.0
	District	209	19.8
	Rural	181	17.2
Economic status of the family	High	58	5.5
	Medium	806	76.4
	Low	191	18.1

Table 2  
Students' knowledge about COVID-19 [n (%)]

Question (correct answer)	Correct answer n (%)
COVID-19 is a serious risk that threatens people's lives (yes)	910 (86.3)
Covering mouth and nose during sneezing prevents virus infection and protects against COVID-19 (yes)	923 (87.5)
Washing hands with soap and water prevents virus infection and protects against COVID-19 (yes)	992 (94.0)
Avoiding hand contact with the eye, mouth, and nose protects against COVID-19 by preventing virus infection (yes)	1004 (95.2)
Eating healthy foods and having a healthy lifestyle protects against COVID-19 (yes)	923 (87.5)
Gaining immunity by getting infected by virus protects against COVID-19 (yes)	879 (83.3)
COVID-19 knowledge score (mean ± SD)	5.34 ± 1.09

Table 3  
COVID-19 behavior questions

Questions	I don't know n (%)	Unchanged n (%)	Slightly changed n (%)	Moderately changed n (%)	Changed a lot n (%)
Hand washing behavior	33 (3.1)	275 (26.1)	209 (19.8)	209 (19.8)	329 (31.2)
Buying disinfectants	56 (5.3)	208 (19.7)	243 (23.0)	197 (18.7)	351 (33.3)
Avoiding contact with people who have symptoms	54 (5.1)	63 (6.0)	97 (9.1)	123 (11.7)	718 (68.1)
Avoiding social meetings	87 (8.2)	94 (8.9)	127 (12.0)	165 (15.6)	582 (55.3)
Avoiding handshakes	41 (3.9)	78 (7.4)	111 (10.5)	131 (12.4)	694 (65.8)
Avoiding public services	110 (10.4)	148 (14.0)	173 (16.4)	205 (19.4)	419 (39.8)

COVID-19 behavior score (mean ± SD) = 17.30 ± 5.83.

Students mostly used television as a source of information about COVID-19, followed by information from social media, the Ministry of Health website, the internet, the environment, and the World Health Organization website (Fig. 1).

Anxiety was observed in 31.5% of the students. Furthermore, 59.6% showed positive hygiene behaviors, 42.7% of the sub-dimensions of hygiene

behaviors showed positive personal hygiene behaviors, 61.2% showed positive hand hygiene behaviors, and 73.7% displayed positive food hygiene behaviors (Table 4).

Knowledge scores of women were significantly higher than that of men, scores of the second graders were higher than that of the first graders, and scores of those who received hand hygiene training were

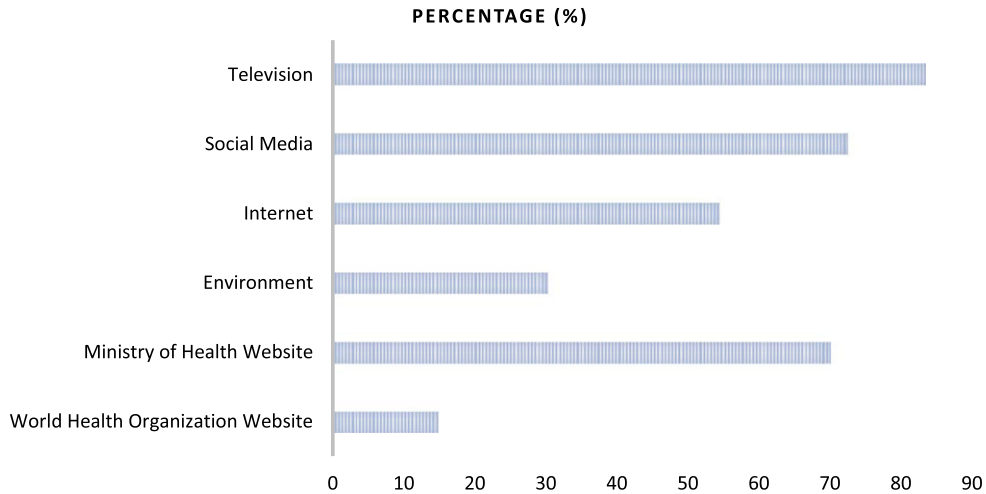


Fig. 1. COVID-19 information sources of students.

Table 4

Distribution of the students according to their anxiety status and total hygiene behavior and sub-dimensions of hygiene behavior

GAD-7 scale	n	%
Has anxiety	332	31.5
No anxiety	723	68.5
Hygiene behavior scale and sub-dimensions		
Personal hygiene		
Positive hygiene behavior	450	42.7
Negative hygiene behavior	605	57.3
Hand hygiene		
Positive hygiene behavior	646	61.2
Negative hygiene behavior	409	38.8
Food hygiene		
Positive hygiene behavior	778	73.7
Negative hygiene behavior	277	26.3
Total hygiene behavior		
Positive hygiene behavior	629	59.6
Negative hygiene behavior	426	40.4

higher than those who did not ( $p < 0.05$ ). Also, a significant difference has been found in terms of the knowledge score relationship with the university where the education was provided. This difference was caused by Dicle University and Firat University and the difference between Dicle and Bingol Universities ( $p = 0.001$ ). Behavioral scores of women were significantly higher than that of men ( $p = 0.002$ ). The mean total generalized anxiety disorder score was  $7.55 \pm 5.98$ , and the mean total hygiene behavior scale score was  $37.57 \pm 8.98$ .

The total HBS score of female students was significantly lower than that of men, and the HBS scale score of students aged 20 years and less was substantially lower than that of those over 20 years. Also, the score of those who received hand hygiene education was

lower than those who did not ( $p < 0.05$ ). A significant difference was found regarding the total HBS score and the university where the education was provided. This difference originated between Firat University and Dicle University ( $p = 0.003$ ). The total GAD-7 scale score of women was significantly higher than that of the men, while the total GAD-7 scale of students in the second grade was substantially higher than that of students in the first grade ( $p < 0.05$ ). Additionally, a significant difference was found between the level of perception of the family's economic status and the total GAD-7 scale, which was caused by the difference between those who gave their answer as 'high' and those as 'medium' ( $p = 0.022$ ) (Table 5).

A positive relationship was found between mean age and total HBS scores, while a negative relationship was observed between age and GAD-7 scale scores. A significant positive correlation was found between the total HBS and GAD-7 scores and a negative correlation between total HBS scores and knowledge and behavior scores. Besides, a positive relationship was seen between the knowledge and behavior scores (Table 6).

The distribution of students' HBS and GAD-7 scores by gender is indicated in Fig. 2.

#### 4. Discussion

There was a difference in the knowledge, anxiety, and hygiene behaviors about COVID-19 among the participating students. Hence, the  $H_0$  hypothesis was rejected, and the  $H_1$  hypothesis was accepted.

Table 5  
Comparing students' behavior, knowledge, and scale scores according to various variables

		n	Knowledge score		Behavior score		GAD-7		HBS	
			Mean±SD	Test	Mean±SD	Test	Mean±SD	Test	Mean±SD	Test
Age*	20 years and under	574	5.34 ± 1.09	t = 0.24, p = 0.808	17.39 ± 5.66	t = 0.58, p = 0.562	7.81 ± 6.11	t = 1.55, p = 0.120	37.05 ± 8.31	t = -2.03, p = <b>0.042</b>
	Over 20 years old	481	5.33 ± 1.11		17.18 ± 6.02		7.23 ± 5.81		38.20 ± 9.71	
Gender*	Female	775	5.46 ± 0.97	t = 5.17, p < <b>0.001</b>	17.64 ± 5.72	t = 3.17, p = <b>0.002</b>	7.85 ± 5.99	t = 2.70, p = <b>0.007</b>	36.45 ± 8.50	t = -6.88, p < <b>0.001</b>
	Male	280	5.01 ± 1.33		16.35 ± 6.02		6.72 ± 5.90		40.68 ± 9.58	
Years at university*	First grade	624	5.30 ± 1.10	t = -1.23, p = <b>0.044</b>	17.04 ± 6.00	t = -1.71, p = 0.087	7.22 ± 6.05	t = -2.11, p = <b>0.034</b>	37.18 ± 8.54	t = -1.72, p = 0.085
	Second grade	431	5.39 ± 1.09		17.66 ± 5.55		8.02 ± 5.86		38.15 ± 9.59	
University**	Dicle Univ.	390	5.18 ± 1.27 <sup>a,b</sup>	F = 6.63, p = <b>0.001</b>	16.84 ± 5.89	F = 1.89, p = 0.150	7.54 ± 5.80	F = 1.24, p = 0.287	38.75 ± 10.41 <sup>a</sup>	F = 5.69, p = <b>0.003</b>
	Firat Univ.	350	5.45 ± 0.97 <sup>a</sup>		17.58 ± 5.72		7.20 ± 6.01		36.61 ± 7.82 <sup>a</sup>	
	Bingol Univ.	315	5.41 ± 0.97 <sup>b</sup>		17.54 ± 5.85		7.94 ± 6.16		37.19 ± 8.12	
Marital status*	Married	28	5.36 ± 0.99	t = 0.09, p = 0.923	16.79 ± 6.43	t = -0.47, p = 0.638	6.00 ± 5.35	t = -1.38, p = 0.165	41.21 ± 11.58	t = 1.69, p = 0.101
	Single	1027	5.34 ± 1.10		17.31 ± 5.81		7.59 ± 5.99		37.48 ± 8.89	
Place of residence where he/she lived longest**	City	665	5.30 ± 1.09	F = 1.09, p = 0.335	17.50 ± 5.82	F = 1.63, p = 0.195	7.69 ± 6.01	F = 0.67, p = 0.509	37.55 ± 9.34	F = 0.12, p = 0.887
	District	209	5.41 ± 1.07		17.24 ± 5.82		7.48 ± 5.92		37.42 ± 8.40	
	Rural	181	5.40 ± 1.15		16.62 ± 5.84		7.11 ± 5.96		37.85 ± 8.33	
Economic status of the family**	High	58	5.33 ± 1.25	F = 0.20, p = 0.819	16.40 ± 6.67	F = 0.78, p = 0.457	8.97 ± 6.32 <sup>a</sup>	F = 3.81, p = <b>0.022</b>	38.50 ± 11.03	F = 1.99, p = 0.137
	Medium	806	5.35 ± 1.07		17.32 ± 5.78		7.28 ± 5.85 <sup>a</sup>		37.27 ± 8.73	
	Low	191	5.29 ± 1.16		17.47 ± 5.78		8.26 ± 6.33		38.59 ± 9.34	
Received infectious diseases training*	Yes	596	5.38 ± 1.04	t = 1.35, p = 0.176	17.34 ± 5.82	t = 0.30, p = 0.764	7.68 ± 6.06	t = 0.81, p = 0.415	37.36 ± 8.64	t = -0.87, p = 0.383
	No	459	5.29 ± 1.16		17.24 ± 5.84		7.38 ± 5.88		37.85 ± 9.43	
Received hand hygiene training*	Yes	696	5.39 ± 1.01	t = 2.18, p = <b>0.029</b>	17.45 ± 5.70	t = 1.17, p = 0.240	7.73 ± 6.02	t = 1.41, p = 0.159	37.19 ± 8.49	t = -1.95, p = <b>0.042</b>
	No	359	5.23 ± 1.24		17.00 ± 6.06		7.19 ± 5.89		38.33 ± 9.85	
COVID-19 positivity in relatives*	Yes	52	4.94 ± 1.59	t = -1.86, p = 0.068	17.08 ± 5.79	t = -0.27, p = 0.780	8.81 ± 6.49	t = 1.55, p = 0.119	38.98 ± 12.19	t = 1.15, p = 0.247
	No	1003	5.36 ± 1.06		17.31 ± 5.83		7.48 ± 5.95		37.50 ± 8.79	

GAD-7: Generalized Anxiety Disorder 7-item scale, HBS: Hygiene behavior scale. \*Student *t*-test, \*\*One-way ANOVA test. <sup>a,b</sup>Each superscript letter denotes a subset of categories whose means do not differ significantly from each other at the 0.05 level.

Table 6  
Correlation between scale and knowledge scores

		Age	HBS total	GAD-7	Knowledge score
HBS total	r	<b>0.086</b>			
	p	<b>0.005</b>			
GAD-7	r	<b>-0.061</b>	<b>0.077</b>		
	p	<b>0.049</b>	<b>0.012</b>		
Knowledge score	r	-0.005	<b>-0.273</b>	-0.036	
	p	0.877	<b>0.000</b>	0.244	
Behavior score	r	0.005	<b>-0.144</b>	0.036	<b>0.166</b>
	p	0.874	<b>&lt;0.001</b>	0.247	<b>&lt;0.001</b>

Contrary to our expectations, the knowledge and behavior change scores of the students about COVID-19 were high. It was revealed that the disease causes anxiety in students. It has been demonstrated that more than half of the students also showed positive hygiene behaviors in the face of this situation.

The mean knowledge score of the students was  $5.34 \pm 1.09$  from a maximum of six points. Our results showed high knowledge levels and positive behaviors against the COVID-19 outbreak among the students. It has been reported that Iranian medical students had a high level of relevant knowledge and high performance in COVID-19 preventive behaviors [19]. It is important to have a good knowledge of the COVID-19 clinical picture, recognize the disease, and obtain appropriate measurements to save lives. Among students' responses to behavioral questions related to COVID-19, the behaviors of avoiding people with disease symptoms and avoiding handshake had changed the most. Students' taking the subject seriously as a vulnerable group had an impact on their behavioral practices. It is essential to fol-

low preventive measures, including handwashing, as well as avoiding handshaking and sneezing to prevent infection [13].

For proper information management, disease control authorities should develop effective channels to receive and share disease-related information. Our study determined that students preferred television in the first place, social media in the second place, and the Ministry of Health website in the third place to obtain information about COVID-19. Similar to our findings, it was reported that the participants generally received information about infectious diseases from television and the internet [13, 20]. In Turkey, the Ministry of Health strives to educate people about COVID-19 on television and social media through scientists.

Anxiety was found in approximately one-third of the students. In China, 24.9% of university students experienced anxiety due to the COVID-19 outbreak, 0.9% had severe anxiety, and 21.3% had mild anxiety [6]. In a similar study conducted in Bangladesh, it was stated that 87.7% of the students had mild to severe anxiety symptoms [7]. While there were regional differences in anxiety rates, students not knowing the effects of the virus and being at risk of infectious diseases may have an increase in anxiety.

According to the total hygiene behavior of the students, the rate of showing positive hygiene behavior was determined as 59.6%. Of the university students in China, 84.04% think that they comply with their personal hygiene behaviors and believe that they contribute to the government's health policies [21]. Numerous reports from different countries have shown that the hand hygiene compliance rate was estimated at around 40%, while the compliance rate

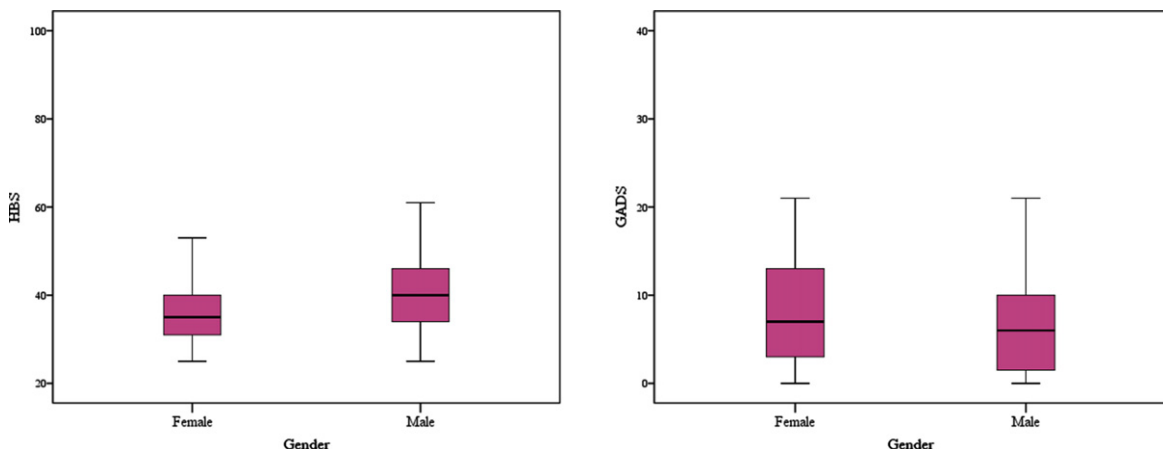


Fig. 2. The distribution of HBS and GAD-7 scores by gender.

in critical care units was only 46.25% [22, 23]. The current pandemic has made handwashing a focus of attention. Now we have to keep this focus going.

Both the knowledge and behavioral change scores of women about COVID-19 were significantly higher than that of men. In a study on the SARS outbreak in Hong Kong by Leung et al., it was reported that men are less likely to engage in self-defense behaviors than women [24]. Zandian et al. mentioned in their study with university students that the knowledge of women was higher than that of men [25]. Women demonstrated good practices in general attitudes and behavior towards disease prevention measures and responses in the event of infection. The more sensitive character of women also manifests itself in pandemics that may be associated with COVID-19. The knowledge score of second graders was significantly higher than the score of first graders ( $p < 0.05$ ). In the study conducted by Peng et al. with undergraduate students, it was observed that the COVID-19 knowledge was better in women and individuals in higher grades [26]. In a study conducted in Jordan, postgraduate students had significantly higher knowledge scores compared to undergraduate ones [27]. In line with the literature, our findings showed that the higher the education level, the higher the knowledge scores.

In our study, the total score of women on the GAD-7 scale was significantly higher than that of men ( $p < 0.05$ ). Similar to our findings, female students were shown to have more fear and anxiety about the disease [28, 29]. Wang et al. reported that the COVID-19 outbreak had a greater psychological effect on women and had higher levels of stress, anxiety, and depression [5]. Biological gender differences, culture, diet, hormonal changes, and educational status of women were some factors contributing to higher anxiety and depression rates [30]. Outbreaks were expected to cause anxiety in individuals. It is stated that students working in the emergency unit may be affected by many psychological conditions that can be expressed as fear and anxiety [31]. It was important to know the factors related to anxiety and help people by intervening and reducing their anxiety levels. Anxiety levels also increased in those who perceived the family's economic status as high. Liu et al. stated that increasing psychological and financial pressure due to stagnation in family income during the COVID-19 crisis was an important factor in students' anxiety [32]. Because of the pandemic, some families will lose their income sources, so students may get worried about paying tuition fees [33]. While COVID-19 causes fear and anxiety over the academic achieve-

ment of university students, it can negatively affect their education by causing students to avoid their learning activities and by reducing their concentration.

The total HBS score of female students was significantly lower than that of men, and the HBS scale score of students aged 20 years and under was markedly lower than that of those who were over 20 years old, and the HBS score of those who did receive hand hygiene education was lower than that of those who did not ( $p < 0.05$ ). This indicated positive hygiene behavior. In a study conducted among students studying in medical and non-medical departments in the United Arab Emirates, it was reported that most of the students had an increase in hand hygiene (85%) and the use of hand sanitizer (85.5%) and that medical students performed better hand hygiene practices [34]. In the research conducted by Kwok et al. in Hong Kong, the most effective method of preventing the COVID-19 epidemic was seen as increasing personal hygiene practices [35]. In another study, although personal hygiene was emphasized very much, it was reported that there was a small proportion (14.89%) of students who perceived not paying more attention to personal hygiene than before [21]. For the current COVID-19 outbreak, training and information were provided on hygiene behaviors for both health care professionals and the public. Health care professionals must follow the 5 recommendations made by WHO for hand hygiene: They must wash their hands before touching a patient, before clean or aseptic procedures, after exposure to body fluids, after touching a patient, or touching the patient's environment [36].

In our study, a significant negative correlation was found between the total HBS score and the knowledge and behavior scores. This showed that as the knowledge score increases, there was an increase in positive hygiene behaviors. In a study conducted in Nigeria, higher COVID-19 knowledge was associated with higher precautionary behaviors (handwashing habits, social distance, etc.) [37]. From this perspective, our findings were compatible with the literature.

#### 4.1. Limitations

Since this was a cross-sectional study, a causal relationship could not be established between dependent and independent variables. Although the survey was multi-centered, the fact that it does not cover all health services vocational schools in Turkey could be considered another limitation.



## 5. Conclusions

In conclusion, students' knowledge and behavior change scores regarding COVID-19 were high. Approximately one-third of the students had anxiety, and more than half showed positive hygiene behaviors. Women's knowledge and behavior scores were higher, and they were more sensitive about their hygiene behaviors and anxiety perceptions. In line with these results, psychological support programs can be created for health care students during the infectious disease outbreak. In these challenging times, students will also be able to exercise at home, work at home, read books, listen to music, etc. They can manage their own psychological processes with these activities and by communicating with their friends and family. In addition, training should be carried out on this subject by paying more attention to positive hygiene behaviors.

## Conflict of interest

No potential conflict of interest relevant to this article was reported.

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