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Knowledge levels and attitudes of university students towards COVID-19 virus, COVID-19 vaccine, and protection from COVID-19 virus

Üniversite öğrencilerinin COVID-19 virüsü, COVID-19 aşısı ve COVID-19 virüsünden korunma konusundaki bilgi düzeyleri ve tutumları

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ABSTRACT

***Aim*:** This study aims to examine the knowledge levels and attitudes of university students towards COVID-19 virus, COVID-19 vaccine, and protection from COVID-19 virus. It also aims to compare the knowledge and attitudes of students according to department, grade, worried about getting COVID-19, and following the COVID-19 cases on a daily basis.

Methods: A cross-sectional study was conducted between 22 November 2020 and 6 January 2021 with 322 university students in the health sciences school of a state university. The online survey included general information of students and items about their knowledge and attitudes towards COVID-19 pandemic.

Results*:* The students' level of knowledge about COVID-19 was high (83 ± 12 on 100 points) and their attitudes were positive and above average (3.85 ± 0.48 on 5-point Likert scale). Their attitudes towards vaccination were also found to be slightly over the average and positive. The knowledge and attitudes of the students differed significantly according to the department, grade and factors related to COVID-19 pandemic.

Conclusion: The results of this study reveal that participants have a high level of knowledge about the COVID-19 pandemic, but are hesitant about vaccination. It is recommended to improve university students' attitudes towards COVID-19 virus, vaccination, and protection in a positive way by increasing their awareness.

Keywords*:* COVID-19; knowledge; attitude; vaccines; students

ÖZET

Amaç: Bu çalışma, üniversite öğrencilerinin COVID-19 virüsü, COVID-19 aşısı ve COVID-19 virüsünden korunma konusundaki bilgi düzeylerini ve tutumlarını incelemeyi amaçlamaktadır. Ayrıca öğrencilerin bölüm, sınıf, COVID-19'a yakalanma endişesi ve günlük olarak COVID-19 vakalarını takip etme durumlarına göre bilgi ve tutumlarını karşılaştırmayı amaçlamaktadır.

Yöntem: 22 Kasım 2020-6 Ocak 2021 tarihleri arasında bir devlet üniversitesinin Sağlık Bilimleri Fakültesinde öğrenim gören 322 üniversite öğrencisi ile kesitsel bir çalışma yapılmıştır. Çevrimiçi anket öğrencilerin genel bilgilerini ve COVID-19 pandemisine karşı bilgi ve tutumlarına ilişkin maddeleri içermektedir.

Bulgular: Öğrencilerin COVID-19 hakkındaki bilgi düzeyleri yüksek (100 puan üzerinden 83 ± 12), tutumları olumlu ve ortalamanın üzerinde (5'li Likert ölçeğinde 3.85 ± 0.48) idi. Aşılamaya ilişkin tutumları ise yine ortalamanın üzerinde ve olumlu olarak bulundu. Öğrencilerin bilgi ve tutumları bölüm, sınıf ve COVID-19 pandemisi ile ilgili faktörlere göre anlamlı farklılık göstermiştir.

Sonuçlar: Bu çalışmanın sonuçları, katılımcıların COVID-19 pandemisi hakkında bilgi düzeylerinin yüksek olduğunu ancak aşılama konusunda tereddütlü olduklarını ortaya koymaktadır. Üniversite öğrencilerinin farkındalıklarının arttırılarak COVID-19 virüsü, aşı ve korunmaya yönelik tutumlarının olumlu yönde geliştirilmesi önerilmektedir.

Anahtar kelimeler*:* COVID-19; bilgi; davranış; aşı; öğrenciler

Introduction

A new type of coronavirus (COVID-19) emerged with pneumonia cases of unknown etiology in December 2019 in Wuhan, China (Chen et al., 2020). It has been suggested that COVID-19 was initially seen as endemic in bats, transmitted to humans by wild animals (Zu et al., 2020). The easy transmission of COVID-19 virus from person to person has caused the virus to spread rapidly all over the world. As a consequence, the World Health Organization (WHO) declared COVID-19 virus as a pandemic (WHO, 2020a). COVID-19 virus is even more contagious than the other coronaviruses (Middle East respiratory syndrome coronavirus [MERS-CoV], severe acute respiratory syndrome coronavirus [SARS-CoV]) identified so far. Therefore, the COVID-19 virus has greatly affected the whole world (Lu et al., 2020). To date, more than 110.7 million cases of COVID-19 and more than 2.4 million deaths have been reported to WHO worldwide (WHO, 2020b).

COVID-19 disease has been occurred with symptoms of high fever, cough, fatigue, muscle pain, and shortness of breath (Rodriguez-Morales et al., 2020). In addition to respiratory tract infection symptoms, serious complications such as acute respiratory distress, septic shock, metabolic acidosis, and coagulation disorder were reported in 18.5% of patients (Chen et al., 2020). However, while adults and children usually survive the disease with mild symptoms, the disease is more severe especially in the elderly or individuals with a chronic disease such as cardiovascular disease, obesity, cancer and diabetes (Guan et al., 2020; Xie & Chen, 2020).

The highly contagious nature of COVID-19 virus makes it difficult to control (Jiang et al., 2020). The main transmission

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route of COVID-19 virus is person to person by droplets emanating from the mouth or nose of infected people by sneezing or coughing (Jiang et al., 2020; WHOa, 2020; Xie & Chen, 2020). Other transmission routes of COVID-19 virus occur through contact with virus-contaminated surfaces and asymptomatic individuals. The incubation period of the disease has also been reported as 1-14 days (WHOa, 2020). The most effective way of preventing the disease is preventing the spread and transmission of the virus (Cortegiani et al., 2020). Therefore, which is the only way to control the COVID-19 pandemic, it is important to determine the attitudes and knowledge levels of university students on social distance, hand washing, wearing masks, adequate hygiene, vaccination, and transmission route. It is also important to investigate the factors affecting the university students' attitudes towards COVID-19 virus, COVID-19 vaccine, and protection from COVID-19 virus.

Several studies have been conducted to assess the knowledge level of university students about Covid-19 pandemic. The findings of these studies have been mixed, with some indicating a relatively high level of knowledge and others indicating a lower level of knowledge. For example, a study conducted in China in 2020 found that university students had a good understanding of Covid-19 transmission and prevention measures (Yang et al., 2020).

Similarly, a study conducted in Saudi Arabia found that university students had a high level of knowledge about Covid-19 symptoms and transmission (Al-Hanawi et al., 2020). However, other studies have found that university students have a lower level of knowledge about Covid-19. A study conducted in India in 2020 found that many university students had misconceptions about Covid-19 and its transmission, and lacked knowledge about the correct preventive measures (Gudi et al., 2020). Overall, the knowledge level of university students about Covid-19 pandemic varies depending on the country, region, and individual factors such as education level, age, and previous exposure to health education related fields.

From this point, this study aims to determine the university students' knowledge level about COVID-19 pandemic and attitudes towards COVID-19 virus, COVID-19 vaccine, and protection from COVID-19 virus. Second aim is to examine whether knowledge level and attitudes of university students about COVID-19 pandemic differ significantly in terms of department, grade, having a family member in the COVID-19 risk group, worried about getting COVID-19, worried about family members getting COVID-19 virus, and following the COVID-19 cases on a daily basis.

Table 1. General features of participants

Characteristics	n	%
Gender		
Female	280	86.96
Male	42	13.04
Department		
Healthcare management	138	42.86
Nursing	68	21.12
Social work	116	36.02
Grade		
First grade	109	33.85
Second grade	102	31.68
Third grade	66	20.50
Fourth grade	45	13.98
Being Covid-19 positive (at any time)		
No	288	89.44
Yes	34	10.56
Having relatives with Covid-19 positive (at any time)		
No	73	22.67
Yes	249	77.33
Having a chronic disease		
No	298	92.55
Yes	24	7.45
Having a family member with chronic disease or in the Covid-19 risk group		
No	108	33.54
Yes	214	66.46
Worried about getting Covid-19 virus		
No	69	21.43
Yes	253	78.57
Worried about family members getting Covid-19 virus		
No	17	5.28
Yes	305	94.72
Following the Covid-19 cases on a daily basis		
No	107	33.23
Yes	215	66.77

Methods

Sample and procedure

The study population consisted of 784 university students at a health sciences faculty of a public university. After, ethical approval and necessary permission for this study were obtained, online survey was administrated via e-mail. However, response rate was very low at the first stage (%19). Then the researchers explained the aim of the study, assured the students about confidentiality of their response, and shared the link of online survey in their class after their lecture finished. Therefore, the sample consisted of only three departments of health sciences faculty, which were health management, nursing, and social work. Data were collected between 22 November 2020 and 6 January 2021. A total of 322 university students, who participated voluntarily, responded the online survey. The response rat was calculated as %41. Due to the remote education during COVID-19 pandemic, researchers could not reach out more students. In addition to this, due to the number of research about the effect of COVID-19 pandemic on university students in the current health sciences faculty, the students may have not been eager to respond online survey.

The adequacy of sample was calculated by power analysis with G*Power 3.1 (Cohen, 1992). After selecting the F test and ANOVA as statistical test, effect size was determined as 0.25 with a significance level of $\alpha = 0.05$, 95% and 4 number of groups (Faul et al., 2009). The total sample size was calculated as 280. Therefore, it can be inferred that the sample size of 322 is adequate for this study.

Data collection tool

Data collection tool included three parts. In the first part, there were questions about participants' gender, department, grade, and questions related to COVID-19, such as being COVID-19 positive, having a chronic disease, worrying about getting COVID-19 virus, etc.

The second part included questions about the knowledge level on COVID-19 pandemic. These questions were prepared drawn on previous studies and WHO website (e.g., Abdelhafiz et al., 2020; Baloran, 2020; Chesser et al., 2020; Khasawneh et al., 2020; La Torre et al., 2020; Olaimat et al., 2020b; Papagiannis et al., 2020; Sögüt et al., 2021). After, a multiple-choice test including questions about knowledge level on COVID-19 pandemic and their answers were prepared, this test was sent to an academician with Ph.D. in the internal medicine nursing and a family physician working at a COVID-19 outpatient clinic of a public hospital. These two experts evaluated all questions and answers. Then, they sent back their report a week later. In line with these experts' recommendations

and corrections, the final test was formed. This test has nine questions, which is given in Table 2.

In the third part, there were questions about attitudes towards COVID-19 pandemic. These questions were obtained from previous studies (e.g., Abdelhafiz et al., 2020; Khasawneh et al., 2020; La Torre et al., 2020; Papagiannis et al., 2020; Roy et al., 2020; Shi et al., 2020; Zhong et al., 2020). Based on previous studies, three sub-headline were determined under the attitudes towards COVID-19 pandemic. These were attitudes towards COVID-19 virus (4 items), attitudes towards COVID-19 vaccine (3 items), and attitudes towards protection from COVID-19 virus (7 items). It had a total of 15 items, given in Table 3. Participants rated their response on a 5-point Likert-type scale (1: definitely disagree to 5: definitely agree).

Data analysis

SPSS 22 software program was used to analyze the data. Number and percentage were reported for level about COVID-19 pandemic while mean and standard deviation were reported for attitudes towards COVID-19 pandemic. First, normal distribution of data was analyzed. According to Kline (2015), skewness and kurtosis are the two indicator of normal distribution and the skewness value should be within the range of ±3 while the kurtosis value should be within the range of ±10. In the current study, skewness values were found to be -0.03 to -1.23 while the kurtosis values were -0.19 to 2.90. Therefore, parametric tests – Independent sample T-test and One-way ANOVA were used to analyze whether the knowledge level and attitudes towards COVID-19 pandemic differed participants' educational features and other study variables significantly. Then, in order to determine the significant difference between subgroups of independent variables, post hoc analyze were performed. Homogeneity of variances was checked to determine which post hoc test would be performed. After the homogeneity of the test variances, Tukey HSD test and Scheffe test were used when the equal variances were assumed while Tamhane test and Dunnett's T3 test were used when equal variances were not assumed (Montelpare et al., 2020). In order to determine the internal consistency, Cronbach's alpha values are considered as following: 1 to 0.90 – Excellent, 0.89 to 0.80 – Good, 0.79 to 0.70 – Acceptable, 0.69 to 0.60 – Questionable, 0.59 to 0.50 – Poor, and under 0.50 – Unacceptable (George & Mallery, 2003).

Ethical statement

Ethical approval was obtained from Istanbul Medeniyet University Social and Human Sciences Research and Publication Ethics Committee (Date: 04 November 2020 and Number: 2020/42). After obtaining the ethical approval, necessary permission for this study were acquired from the Faculty of Health Sciences.

Results

Features of sample

Table 1 indicates the general features of participants. The majority of sample consisted of females (n=280, 87%). While 42.86% of the participants were at healthcare management, 21.12% of them were at nursing, and 36.02% of them were at social work department. 33.85% of the participants were at first grade, while 13.98% of participants were at fourth grade.

Majority of participants reported that they did not get COVID-19 positive, however, their relatives got COVID-19 positive. Only 24 out of 322 (7.45%) participants had chronic diseases, while 214 (66.46%) participants had a family member with chronic disease or in the COVID-19 risk group. Majority of participants reported that they were worried about getting COVID-19 virus and family members getting the COVID-19 virus. Finally, 66.77% of participants reported that they followed the COVID-19 cases on a daily basis.

Knowledge level of participants about COVID-19 pandemic

Table 2 shows the frequency of true and false answers, as well as general mean of total test. According to these results, all the participants answered correctly to the questions of "what is the most common symptom of COVID-19?" and "who are more at risk for COVID-19?". Then, 96.9% of participants defined the pandemic correctly. However, the lowest score belonged to the question of endemic with 40.4% of the participants. General test score was calculated as 83 ± 12 on a total score of 100 points.

Attitudes of participants towards COVID-19 pandemic

Table 3 indicates the participants' attitudes towards COVID-19 pandemic.

First, participants rated high score on the items of attitudes towards COVID-19 virus. In this sub-headline, there are three negative items, which were coded reverse in data analysis (1=Definitely agree, 5= Definitely disagree). Participants reported that they did not agree with the item of "I think the COVID-19 outbreak is exaggerated", which of mean score was 4.30 (SD=0.86). Similarly, the item of "COVID-19 is no more serious than seasonal flu" had the average mean as 4.39 (SD=0.78). Under this sub-headline, the maximum mean score belonged to the item of "COVID-19 virus can cause death" with 4.44 (SD=1.00), while the minimum mean score belonged to the item of "Healthy people do not catch COVID-19 flu easily" with 4.02 (SD=0.94). General average score was found to be 4.28 (SD=0.59), while the Cronbach's alpha value was 0.567. Therefore, Cronbach's alpha value with 0.567 is within the poor and acceptable range.

When the attitudes towards vaccine was evaluated, participants rated moderate scores on the items of "The vaccine will stop this pandemic" with 2.88 (SD=0.91), "COVID-19 vaccine should only be given to those in high risk groups" with 3.50 (SD=1.06), and "I think everyone should get COVID-19 vaccine" with 3.18 (SD=1.21). The general average was 3.19 (SD=0.80) and the Cronbach's alpha value was within the questionable and acceptable range with 0.608.

When the participants' attitudes towards protection from COVID-19 virus were examined, it was determined that the two highest mean scores belonged to the item of "I think international roaming is safe" with 4.41 (SD=0.79) and "I think intercity or inner city transportation is safe" with 4.25 (SD=0.90). Participants reported that they did not agree these two items about transportation. However, the two lowest mean scores belonged to the item of "Pets cause the spread of COVID-19 virus" with 3.81 (SD=0.99) and "I think social distance prevents the spread of the virus" with 3.95 (SD=1.06). The general average was determined as 4.09 (SD=0.58), while Cronbach's alpha value was found to be 0.701 within the range of good.

Table 2. Knowledge level of participants

Questions and answers	True		False	
	n	%	n	%
1. What is a pandemic? **(10p)** a. Refers to a disease that occurs infrequently or sporadically. b. Refers to the continuous presence and / or usual prevalence of a disease in a geographic population. c. It refers to persistent, high levels of disease well above that seen in other populations. **d. It usually refers to an infectious disease that affects a large number of people and has spread to the continent or the whole world.** e. Although the actual number or cause is uncertain, it refers to a disease that occurs in greater numbers. f. I do not know	312	96.9	10	3.1
2. What is an epidemic? **(10p)** a. It is the mode and speed of movement of a disease. b. It is the size of the susceptible population. c. Refers to the continuous presence and / or usual prevalence of a disease in a geographic population. **d. It is defined as an infectious disease occurring in a wide geographical area and affecting an extremely high proportion of the population.** e. I do not know.	131	40.7	191	59.3
3. What are the roughly 3 criteria for a viral epidemic to be defined as a pandemic in humans? **(10p)** **i) must be a new virus** **ii) must be easily and continuously transmitted from person to person** **iii) it should affect a large number of countries** iv) not be affected by air temperature v) the virus should not mutate	223	69.3	99	30.7
4. What is the most common transmission route of Covid-19? **(15p)** **a.Respiratory** b.The digestive tract c.Sexually d.Through the skin e. I do not know	293	91.0	29	9.0
5. What is the shortest and longest incubation period of Covid-19? **(10p)** a. 20-30 days b. 31-40 days **c. 2-14 days** d. 41-50 days e. I do not know	288	89.4	34	10.6
6. What is the most common symptom of Covid-19? **(15p)** a.**Fever, dry cough, tiredness** b.Thickened urine c. Burning in the esophagus d. Extensive skin rash e. I do not know	322	100.0	0	0
7. Is there any treatment used to treat Covid-19 virus? **(10p)** **a. There is currently no specific treatment available.** b. It is treated with non-steroidal anti-inflammatory drugs. c. I do not know	222	68.9	100	31.1
8. Social distance length specified in Turkey to protect them from Covidien-19 is at least how much? **(10p)** a. 3 meters **b. 1.5 meters** c. I do not know	305	94.7	17	5.3
9. Who are more at risk for Covid-19? **(10p)** **a. Elderly and those with chronic diseases** b. Healthy children, youth and women c. I do not know	322	100.0	0	0
Total Score of Knowledge Level (Mean ± Standard Deviation) (Minimum: 0 – Maximum: 100)			**83 ± 12 (33 – 100)**	

Note: Bold items are the correct answers.

General average of total items for attitudes towards COVID-19 pandemic was 3.85 (SD=0.48) and Cronbach's alpha value was 0.749, which indicates the good internal consistency.

Comparing the participants' knowledge level and attitudes towards COVID-19 pandemic according to their features

Table 4 presents the results that comparing the participants' knowledge level about COVID-19 pandemic and their attitudes towards COVID-19 pandemic according to their features.

Knowledge level: Participants' knowledge level about COVID-19 pandemic differed significantly according to the department, grade, having a family member with chronic disease or in the COVID-19 risk group, worried about getting COVID-19 virus, and worried about family members getting COVID-19 virus. When the knowledge level of students was examined, it was found that nursing students had the highest score with 86.27 (SD=10.18) and social work students had the lowest score with 81.23 (SD=13.70).

Table 3. Attitudes of participants towards Covid-19 pandemic

Attitudes towards Covid-19 Pandemic	M	SD
Attitudes towards Covid-19 virus (ATC)		
1. I think the Covid-19 outbreak is exaggerated.*	4.30	0.86
2. Covid-19 virus can cause death.	4.44	1.00
3. Covid-19 is no more serious than seasonal flu.*	4.39	0.78
4. Healthy people do not catch Covid-19 flu easily.*	4.02	0.94
General average	**4.28**	**0.59**
Cronbach's alpha: 0.667		
Attitudes towards vaccine (ATV)		
6. The vaccine will stop this pandemic.	2.88	0.91
7. Covid-19 vaccine should only be given to those in high risk groups.*	3.50	1.06
8. I think everyone should get Covid-19 vaccine.	3.18	1.21
General average	**3.19**	**0.80**
Cronbach's alpha: 0.608		
Attitudes towards protection (ATP)		
9. I think people with flu-like symptoms should be avoided.	4.08	1.04
10. I think frequent hand washing prevents the spread of Covid-19 virus.	4.07	1.01
11. Pets cause the spread of Covid-19 virus.*	3.81	0.99
12. I think intercity or inner city transportation is safe.*	4.25	0.90
13. I think international roaming is safe.*	4.41	0.79
14. I think social distance prevents the spread of the virus	3.95	1.06
15. I think regular masks will prevent contamination.	4.05	1.03
General average	**4.09**	**0.58**
Cronbach's alpha: 0.701		
General average of total items	**3.85**	**0.48**
Cronbach's alpha: 0.749		

Note: 1: Definitely disagree, 5: Definitely agree
* items are reverse coded (5: Definitely disagree, 1: Definitely agree).
M: Mean, SD: Standard Deviation

Only the knowledge level of nursing students differed significantly from the social work students (p=0.015). When the knowledge level of students was examined according to the grade of students, it was determined that the highest score belonged to the third grade students with 86.03 (SD=9.21) and the lowest score belonged to the first grade students with 80.53 (SD=13.20). Only the knowledge level of first grade students differed significantly from the third grade students (p=0.009). When the factors related to COVID-19 pandemic were examined, it was found that the participants having a family member with chronic disease or in the COVID-19 risk group were reported higher scores with 84.84 (SD=10.65) than the others with 80.66 (SD=13.95) (p=0.01). In addition, participants worried about getting COVID-19 virus and worried about family members getting COVID-19 virus also reported higher scores than the others (p<0.05).

Attitudes towards COVID-19 virus (ATC): According to Table 4, the students' attitudes towards COVID-19 virus significantly differed according to their department (p=0.01). Only the mean score of healthcare management students with 4.40 (SD= 0.55) differed significantly from social work students with 4.19 (SD= 0.67) (p=0.012). Also, students having a family member with chronic disease or in the COVID-19 risk group, worried about getting COVID-19 virus, worried about family members getting COVID-19 virus, and following the COVID-19 cases on a daily basis had higher mean scores than others (p<0.05).

Attitudes towards vaccine (ATV): The mean score of attitudes towards vaccine (ATV) differed significantly according to the department and following the COVID-19 cases on a daily basis (p<0.01). When the mean score of ATV according to the students' department was evaluated, it was determined that healthcare management students reported the highest scores with 3.22 (SD=0.80), while the social work students reported the lowest scores with 3.02 (SD=0.79). Only the mean scores of healthcare management students were higher than the social work students significantly (p<0.05). In addition, the students following the COVID-19 cases on a daily basis had higher mean scores of ATW than others significantly (p<0.01).

Attitudes towards protection (ATP): As seen in Table 4, the mean scores of ATP differed significantly according to the worried about getting COVID-19 virus and worried about family members getting COVID-19 virus (p<0.01). Participants worried about getting COVID-19 virus reported higher scores with 4.15 (SD=0.57) than others with 3.88 (SD=0.60) (p<0.01). Also participants worried about family members getting COVID-19 virus had higher mean scores with 4.11 (SD=0.58) than others with 3.73 (SD=0.59) (p=0.01).

General average of attitudes towards COVID-19 pandemic: The general average score of attitudes towards COVID-19 pandemic differed significantly according to the department (p=0.01). It was found that only the mean score of healthcare management students with 3.95 (SD= 0.49) differed significantly from social work students with 3.74 (SD= 0.50) (p<0.01). In addition to this, students having a family member with chronic disease or in the COVID-19 risk group and following the COVID-19 cases on a daily basis had higher mean scores than others (p<0.01).

Discussion

Countries, health authorities and scientists are still struggling about how to manage and control COVID-19 infections that affect the whole world. In this process, determining the level of knowledge and awareness of individuals about COVID-19 infection, the transmission route, protective measures and vaccination will play an important role in reducing the transmission of the disease (Johnson & Hariharan, 2017). In the current study, the level of knowledge and attitudes towards COVID-19 pandemic of university students studying in the health sciences school were investigated. It was determined that the majority of the participants were worried about getting the COVID-19 virus both for themselves and their relatives. In addition to this, their knowledge level about the COVID-19 pandemic were high and their attitudes towards the COVID-19 pandemic were positive. Similar with the present study, in a study conducted with university students, it was found that university students exhibited positive attitudes (81.1%) and low-risk practices (84.3%) to prevent COVID-19 virus. It was also reported that approximately two-thirds of the students believed in the seriousness of COVID-19 infections (69.1%), and showed a positive attitude towards social distancing and hygiene measures (67.6%) with the anxiety of exposing the COVID-19 virus. Also, more than two-thirds (69.2%) of the students were concerned that they could be infected with COVID-19 virus (Olaimat et al., 2020a). The findings of the present study are supported by similar studies in the literature.

Table 4. Comparing the participants' knowledge level and attitudes towards COVID-19 pandemic according to their features

	n	Knowledge level M±SD	Attitudes towards Covid-19 virus (ATC) M±SD	Attitudes towards vaccine (ATV) M±SD	Attitudes towards protection (ATP) M±SD	General Average of Attitudes M±SD
Department						
Health management	138	83.9±10.99	4.40±0.55	3.32±0.80	4.14±0.59	3.95±0.49
Nursing	68	86.27±10.18	4.23±0.51	3.22±0.76	4.1±0.45	3.85±0.38
Social work	116	81.23±13.70	4.19±0.67	3.02±0.79	4.02±0.65	3.74±0.50
	F	*4.05*	*4.51*	*4.61*	*1.35*	*6.20*
	p	***0.02***	***0.01***	***0.01***	*0.26*	***0.002***
Grade						
First grade	109	80.53±13.20	4.24±0.68	3.13±0.8	4.09±0.63	3.82±0.52
Second grade	102	84.20±11.95	4.28±0.52	3.12±0.81	4.09±0.57	3.83±0.42
Third grade	66	86.03±9.21	4.3±0.53	3.38±0.76	4.03±0.58	3.9±0.52
Fourth grade	45	84.94±11.64	4.39±0.6	3.21±0.8	4.17±0.5	3.93±0.45
	F	*3.62*	*0.72*	*1.85*	*0.56*	*0.86*
	p	***0.01***	*0.54*	*0.14*	*0.64*	*0.462*
Having a family member with chronic disease or in the Covid-19 risk group						
Yes	214	84.84±10.65	4.33±0.56	3.21±0.8	4.11±0.58	3.89±0.46
No	108	80.66±13.95	4.19±0.64	3.14±0.79	4.05±0.6	3.79±0.52
	t	*2.74*	*1.96*	*0.84*	*0.90*	*1.63*
	p	***0.01***	***0.04***	*0.40*	*0.37*	*0.10*
Worried about getting Covid-19 virus						
Yes	253	84.23±11.49	4.34±0.57	3.21±0.75	4.15±0.57	3.9±0.47
No	69	80.52±13.39	4.07±0.62	3.12±0.97	3.88±0.60	3.69±0.49
	t	*2.30*	*3.48*	*0.73*	*3.35*	*3.25*
	p	***0.02***	***0.00***	*0.46*	***0.00***	***0.00***
Worried about family members getting Covid-19 virus						
Yes	305	83.75±11.88	4.31±0.57	3.18±0.78	4.11±0.58	3.87±0.47
No	17	77.78±13.03	3.84±0.8	3.35±1.08	3.73±0.59	3.64±0.6
	t	*2.01*	*3.24*	*-0.65*	*2.62*	*1.88*
	p	***0.04***	***0.00***	*0.52*	***0.01***	*0.06*
Following the Covid-19 cases on a daily basis						
Yes	215	83.57±12.19	4.37±0.55	3.29±0.8	4.11±0.61	3.92±0.48
No	107	83.18±11.66	4.12±0.65	2.99±0.76	4.05±0.54	3.72±0.46
	t	*0.27*	*3.50*	*3.24*	*0.97*	*3.62*
	p	*0.78*	***0.00***	***0.00***	*0.33*	***0.00***

Therefore, it can be said that university students have sufficient knowledge and positive attitudes towards the COVID-19 pandemic. For example, some studies have reported that university students have positive attitudes towards COVID-19 pandemic such as wearing masks, social distancing (Erick & Baloran, 2020), washing hands, and disinfecting surfaces and objects (Bokadia & Ganapathy, 2020; Ferreira Alves et al., 2020; Maheshwari et al., 2020). In another study conducted with undergraduate students in Jordan, it was determined that 82% of the participants had an acceptable attitude towards the pandemic (Alzoubi et al., 2020). In addition, Yakar et al. (2020) reported that the participants had sufficient knowledge and positive attitude towards COVID-19 in their study conducted with medical students. In line with these studies, in a study conducted with Iranian medical school students by Taghrir et al. (2020), the average correct answer to questions about COVID-19 was reported as 86.9%, which is very similar with the findings of current study.

On the contrary, the findings of some studies in the literature are not in line with the current study. For example, in a study conducted with students, one third of participants (33.2%) reported that they used inappropriate hand washing techniques (Torales et al., 2020). According to the World Health Organization (WHO), the hand washing procedure should be 40-60 seconds (WHOa, 2020). In another study, only a small portion of the students chose at least 40 seconds (4.4%) for hand washing. In addition, it was determined that a significant percentage of students (60.2%) did not wear a face mask when going out, which does not support the present study finding (Olaimat et al., 2020a). It suggests that this difference may arise from social awareness and sensitivity. However, wearing a face mask is reported to reduce the spread of COVID-19 infection by reducing the droplet spread of

infected people and is recommended (European CDC, 2020; Feng et al., 2020).

In the current study, it was determined that the knowledge level of nursing students who had clinical practice, especially those who directly touch the patient and third grade students received higher scores than others. Yakar et al. (2020) found that the level of knowledge of the students who had clinical practice increased compared to those who did not have. This finding is in line with the findings of current study. In another study, it was also found that medical and graduate students were more sensitive to social distance and hygiene measures taken against COVID-19 compared to other groups and showed a significant difference ($p \leq 0.05$) (Olaimat et al., 2020a). It has also been noted that medical students have lower fear of being infected with COVID-19 (65.0%), which is due to the fact that they have more opportunities to access accurate information (Olaimat et al., 2020b). On the contrary, Alzoubi et al. (2020) found that there was no significant difference between the knowledge and attitudes of medical and non-medical students about the pandemic.

Another finding of the current study is that participants worried about getting Covid-19 virus and worried about family members getting Covid-19 virus are more aware of Covid-19 virus protection measures. Similarly, Hamza et al., (2021) stated that the anxiety level of individuals shapes human attitudes, especially in pandemic situations (Guan et al., 2020). For example, in a study, it was found that there was a positive and significant relationship between preventive behavior and risk perception. When the perception of risk increased, preventive behaviors have been reported to increased (Ferreira et al., 2020). In line with the findings of the current study, in the study of Yang et al. (2020), it was found that the increase in risk perception causes the student to adapt more to preventive practices. This finding suggests that individuals who are worried about getting the disease will protect themselves from the virus. This finding also can be related to the positive effect of the anxiety felt by the students who are afraid of catching COVID-19 by themselves or their families, on their knowledge and attitudes towards the pandemic.

Conclusion

As a result of this study, it has been determined that students' attitudes towards COVID-19 and protective measures are high and positive, and their attitudes towards vaccination are moderate. In addition, it has been determined that the attitudes of students who are worried about getting COVID-19 virus and who follow the daily number of cases have higher scores than others. In line with the findings of the study, it is recommended:

- To reduce university students' anxiety levels by increasing their knowledge about the transmission route, the protection measures about the COVID-19 pandemic,
- To improve their attitudes towards COVID-19 virus, vaccination, and protection by increasing awareness of university students.
- To increase the awareness of university students, especially those who do not receive health-related education by improving their knowledge level and positive attitudes towards COVID-19 pandemic.

Limitations of the study

This study has some limitations. First of all, online survey method was used to collect the data. Online surveys can be a useful tool for collecting data, but they also have certain limitations. Online surveys tend to have a self-selected sample, which means that only people who are interested or motivated enough to respond to the survey will do so. This can lead to sampling bias and limit the generalizability of the findings. Second, with online surveys, researchers have limited control over the respondents' behavior, such as ensuring that they respond honestly, provide complete answers, or do not skip questions. Third, online surveys are dependent on technology, and technical issues such as server errors, slow internet connections, and browser compatibility issues can result in data loss and low response rates.

Conflict of Interest

There is no conflict of interest.

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Ethics Committee Approval

Ethical approval for this study was obtained to Ethical Committee of Istanbul Medeniyet University (Date: 04 November 2020 and Number: 2020/42).

Informed Consent

Participation in this survey was anonymous, consensual and voluntary with informed consent provided by all respondents.

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Author Contributions

S.Ş.: Literature Search, Design, Supervision, Critical Review, Concept, Writing Manuscript, Materials, Data Collection and Processing, Analysis and/or Interpretation.

R.T.: Literature Search, Design, Supervision, Critical Review, Concept, Writing Manuscript, Materials, Data Collection and Processing.

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