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Frequency of COVID-19 Vaccination, Level of COVID-19 Fear among University Students: A Cross-sectional Study

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ABSTRACT

Objectives: This study aims to investigate the prevalence of coronavirus disease 19 (COVID-19) vaccination, the level of COVID-19 fear, and associated factors among university students.

Methods: This study is a cross-sectional study participated by university students from Maltepe University, Türkiye, between September 23 and November 26, 2021. An online questionnaire form was used in the study due to the pandemic. The questionnaire included sociodemographic and related COVID-19 characteristics and the fear of COVID-19 scale (FCV-19S).

Results: A total of 3216 university students, 2276 (70.8%) female, participated in this study. Three thousand ninety-two (96.1%) were vaccinated against COVID-19. The FCV-19S scores of those vaccinated against COVID-19 were 18.0±7.2, while the FVS scores of those who were not vaccinated were 15.7±8.3 (p=0.001). When the factors affecting vaccination with COVID-19 were evaluated by regression analysis, it was determined that the history of COVID-19 infection (OR=1.837, 95% CI=1.173–2.876, and p=0.008), FCV-19S (OR=1.041, 95% CI=1.014–1.070, and p=0.003), and recommending the COVID-19 vaccine to others (OR=24.585, 95% CI=15.658–38.602, and p<0.001) had an effect on vaccination.

Conclusion: This study revealed that the overall vaccination frequency among university students is >96%, with different hesitancy frequency among university departments. Medical and health science students have the lowest frequency of vaccine hesitancy and lowest fear levels, suggesting that they know the COVID-19 process, and its consequences, and have accurate information about vaccines.

Keywords: Coronavirus disease 19, pandemics, students, vaccination coverage, vaccination hesitancy

INTRODUCTION

Various vaccines have been developed, and recommended that they are the best remedy to end the pandemic since the declaration of the coronavirus disease 19 (COVID-19) pandemic by the World Health Organization.[1] However, it is necessary to provide herd immunity by vaccinating a certain number of people and exceeding a threshold rate to end the pandemic.[2,3] Therefore, vaccine rejection is among the top ten threats in the fight against the pandemic worldwide, and increasing anti-vaccination in society is a global problem.[4,5] However, univer-

Table 1. Sociodemographic and related-COVID-19 features of university students

	n (%)
Gender	
Male	940 (29.2)
Female	2276 (70.8)
University department	
Engineering	610 (19.0)
Medicine	572 (17.8)
Social sciences	472 (14.7)
Health sciences	379 (11.8)
Education	379 (11.8)
Architecture	262 (8.1)
Psychology	161 (5.0)
Law	152 (4.7)
Nursing	87 (2.7)
Linguistics	72 (2.2)
Dentistry	70 (2.2)
Accommodation	
Alone	251 (7.8)
Dormitory	683 (21.2)
Family	2084 (64.8)
Friends	198 (6.2)
Smoking	
No	2450 (76.2)
Yes	766 (23.8)
History of COVID-19	
No	2519 (78.3)
Yes	697 (21.7)
Vaccinated against COVID-19	
No	124 (3.9)
Yes	3092 (96.1)
Recommend the COVID-19 vaccine to others	
No	391 (12.2)
Yes	2815 (87.8)

sity students emerge as an essential group in combating the pandemic because vaccine rejection is higher in young groups compared to different age groups, and isolation, distance, and personal protective measures are less common in university and campus environments.[6,7] University students become more critical in terms of being infected with COVID-19 not only due to their active social lifestyles but also unknowingly spread it since they have only mild symptoms and therefore pay less attention to personal protective measures and isolation than other groups.[8,9] However, since the primary sources of information from which COVID-19 information is obtained also may create unnecessary fear of COVID-19, it seems that fear levels should also be investigated in this context and considered as related factors.[10,11]

In this study, it was aimed to evaluate the prevalence of COVID-19 vaccination, the level of fear of COVID-19, and related factors in university students.

METHODS

This is a cross-sectional study that was conducted at Maltepe University between September 23 and November 26, 2021. The study population consists of university students over 18 years of age.

A total of 11,936 students studying at Maltepe University were taken as the study population. An online sample size calculator was used to determine the optimal sample size.[12] The minimum sample size of 980 participants was calculated as a 50% of prevalence with a 95% of confidence interval, and a 3% of error margin was used since proportions were not available for the preventive behavior of college students against the COVID-19 pandemic.

An online questionnaire form was used in the study due to the pandemic. The online form was created through a literature review and prepared through Google Forms, and distributed through university WhatsApp and university mail groups. Reminder e-mails and posts were made at an interval of 1 week. Among the 3231 participants, 15 were excluded because they were not from the university, and 3216 were included in the study. The online questionnaire form consisted of three main parts: The first part included the explanatory part that contained information about the study, followed by an informed consent section before data collection. The second part had demographic characteristics, including age, sex, smoking habit, accommodation status, type of university department studied, and any history of COVID-19. In the third part, the questions assessed the status of COVID-19 vaccination, reasons for being vaccinated or not, recommending the COVID-19 vaccine to others, and the fear of COVID-19 scale (FCV-19S), a seven-item self-report scale with one dimension that assesses COVID-19 related fear. The scale was developed in 2020 by Ahorsu et al.,[13] and the tool consists of seven items evaluated on a 5-point Likert scale, with 1="strongly disagree," 2="disagree," 3="neither disagree nor agree," 4="agree," and 5="strongly agree." The total score is the sum of the scores of the seven items, ranging from 7 to 35, with no cutoff score and a higher score indicating greater fear of COVID-19. The adaptation of this scale to Turkish was made by Satici et al.[14]

Table 2. Sociodemographic and related-COVID-19 features of university students according to COVID-19 vaccination status

	Vaccination of COVID-19		p
	No (n=124)	Yes (n=3092)	
Gender			0.449
Male	40 (32.3)	900 (29.1)	
Female	84 (67.7)	2192 (70.9)	
Department			0.003
Architecture	14 (11.3)	248 (8.0)	
Dentistry	3 (2.4)	67 (2.2)	
Education	17 (13.7)	362 (11.7)	
Engineering	30 (24.3)	580 (18.8)	
Health sciences	6 (4.8)	373 (12.0)	
Law	4 (3.2)	148 (4.8)	
Linguistics	5 (4.0)	67 (2.1)	
Medicine	10 (8.1)	562 (18.2)	
Nursing	4 (3.2)	83 (2.7)	
Psychology	13 (10.5)	148 (4.8)	
Social sciences	18 (14.5)	454 (14.7)	
Accommodation			0.058
Alone	8 (6.5)	243 (7.9)	
Dormitory	15 (12.0)	668 (21.6)	
Family	93 (75.0)	1991 (64.4)	
Friends	8 (6.5)	190 (6.1)	
Smoking			0.447
No	98 (79.0)	2352 (76.1)	
Yes	26 (21.0)	740 (23.9)	
History of COVID-19			<0.001
No	77 (62.1)	2442 (79.0)	
Yes	47 (37.9)	650 (21.0)	
Recommending the COVID-19 vaccine to others			<0.001
No	85 (74.6)	306 (9.9)	
Yes	29 (25.4)	2786 (90.1)	

Data are presented as n (%).
Chi-square test.

IBM SPSS Statistics version 21.0 was used in data analysis. Data were presented as frequency, percentages, mean, and standard deviation. The normal distribution of the data was evaluated with graphs and tests, including graphical representations like histograms and Q-Q plots. The Shapiro–Wilk test and Kolmogorov–Smirnov test were utilized to assess the normality of the data. The Chi-square test was employed to compare categorical data. In addition, the independent sample t-test and the ANOVA test were performed to compare the data. Multivariate logistic regression analysis was also conducted. A significance level of $p<0.05$ was adopted to determine statistical significance.

RESULTS

A total of 3216 university students with a mean age of 21.1±4.1 years participated in this research. The sociodemographic and related COVID-19 features of university students are summarized in Table 1.

In total, 3092 (96.1%) of university students were administered the COVID-19 vaccine. Sociodemographic and related COVID-19 features of university students according to COVID-19 vaccination status are summarized in Table 2.

A significant difference was found between university departments regarding the frequency of COVID-19 vacci-

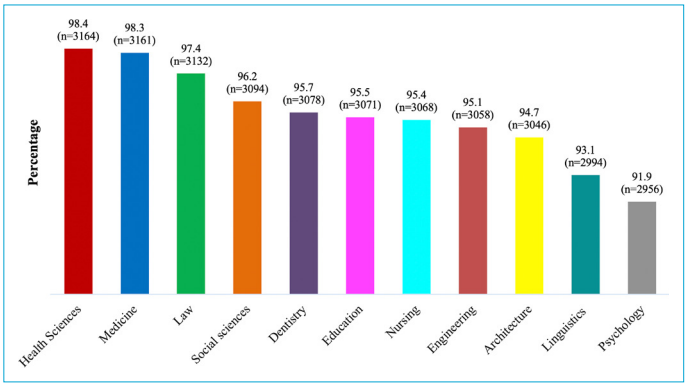

Figure 1. The frequency of COVID-19 vaccination among university departments.

nation (p=0.003). The frequency of COVID-19 vaccination among university departments is shown in Figure 1.

When the fear of COVID-19 was evaluated, the lowest fear score was found in the Department of Nursing, while the highest fear score was found in the Department of Education. FCV-19S scores according to sociodemographic and related COVID-19 features are summarized in Table 3.

When the reasons for university students to accept the COVID-19 vaccine were evaluated, 1397 (45.3%) were the absence of alternative means to safeguard themselves from COVID-19, 528 (17.1%) recognized the dangerous nature of the disease, 479 (15.5%) were desire for avoiding PCR tests, 347 (11.2%) protected vulnerable elderly family members, and 185 (6.0%) were comply with the recommendations of the Ministry of Health. Among the main reasons for the rejection of the COVID-19 vaccine, it was determined that 45 (37.5%) of them the lack of adequate scientific studies, 29 (24.2%) hesitations due to the side effects of the vaccine, 20 (16.7%) thinking that the vaccine will be ineffective due to the virus mutation, and 15 (12.5%) having a history of COVID-19 infection. Factors affecting vaccination with COVID-19 are summarized in Table 4 (−2 Log-likelihood: 697.354; Cox & Snell R^2=0.086; Nagelkerke R^2=0.324, accuracy=0.996).

Table 3. FCV-19S scores according to sociodemographic and related-COVID-19 features

	FCV-19S	p
Gender		<0.001*
Male	16.0±7.8	
Female	18.6±6.9	
University department		<0.001†
Architecture	18.5±7.9	
Dentistry	17.5±5.6	
Education	19.6±7.7	
Engineering	17.5±7.7	
Health sciences	18.2±7.0	
Law	19.5±8.0	
Linguistics	18.6±6.9	
Medicine	16.1±6.1	
Nursing	17.4±7.3	
Psychology	18.2±7.2	
Social sciences	18.0±7.3	
Accommodation		0.002†
Alone	16.3±7.3	
Dormitory	17.9±7.1	
Family	18.1±7.3	
Friends	17.5±7.5	
Smoking		0.963*
No	17.9±7.1	
Yes	17.9±8.0	
History of COVID-19		0.247*
No	17.8±7.0	
Yes	18.2±8.2	
Vaccinated against COVID-19		0.001*
No	15.7±8.3	
Yes	18.0±7.2	
Recommending the COVID-19 vaccine to others		0.072*
No	17.3±9.1	
Yes	18.0±7.0	

FCV-19S: Fear of COVID-19 scale.
Data are presented as mean±standard deviation.
*Independent samples t-test; †One way ANOVA test.

DISCUSSION

In this study, it was indicated that the COVID-19 vaccination frequency of university students, which is a crucial point in reaching the herd immunity targets required to end the pandemic, is more than 96%, with the COVID-19 vaccination frequencies differing between university departments. The frequency of COVID-19 vaccine uptake among university students was 96% in this study, which was higher than in other studies conducted during this time.[1,15,16] Furthermore, compared to the vaccination rejection frequencies, which are shown in one-fifth of the young groups in the previous studies, it is seen that the COVID-19 vaccination frequencies of university students in this study are also higher than the general population.[17,18] Meta-analysis data on the COVID-19 vaccines in 13 countries revealed that 20% of the overall population intends to refuse the COVID-19 vaccine, with estimates that vary widely by country.[19] However, a hesitant/flexible attitude was reported in 20–27% of the population examined in another meta-analysis.[20] Furthermore, a study in the young adult

Table 4. Factors affecting vaccination with COVID-19

	B	SE	Wald	df	p	Exp (B)	95% CI
Age	-0.021	0.024	0.734	1	0.392	0.979	0.934-1.027
Gender							
Male (Ref)							
Female	0.128	0.239	0.288	1	0.591	1.137	0.712-1.816
Department							
Architecture (Ref)							
Dentistry	-0.904	0.750	1.455	1	0.228	0.405	0.093-1.760
Education	-0.048	0.437	0.012	1	0.912	0.953	0.405-2.242
Engineering	0.071	0.381	0.035	1	0.852	1.074	0.509-2.264
Health sciences	0.947	0.535	3.135	1	0.077	2.577	0.904-7.349
Law	0.313	0.626	0.250	1	0.617	1.368	0.401-4.668
Linguistics	-0.568	0.731	0.603	1	0.437	0.567	0.135-2.375
Medicine	0.625	0.471	1.757	1	0.185	1.867	0.742-4.702
Nursing	0.275	0.654	0.177	1	0.674	1.317	0.365-4.749
Psychology	-0.647	0.474	1.859	1	0.173	0.524	0.207-1.327
Social sciences	0.176	0.421	0.175	1	0.676	1.193	0.522-2.723
Accommodation							
Alone (Ref)							
Dormitory	0.381	0.502	0.575	1	0.448	1.463	0.547-3.917
Family	-0.231	0.434	0.282	1	0.595	0.794	0.339-1.860
Friends	-0.187	0.576	0.105	1	0.746	0.830	0.269-2.564
Smoke							
No (Ref)							
Yes	0.164	0.258	0.404	1	0.525	1.178	0.710-1.954
History of COVID-19							
Yes (Ref)							
No	0.608	0.229	7.072	1	0.008	1.837	1.173-2.876
FCV-19S	0.040	0.014	8.679	1	0.003	1.041	1.014-1.070
Recommending the COVID-19 vaccine to others							
No (Ref)							
Yes	3.202	0.230	193.507	1	<0.001	24.585	15.658-38.602
Constant	0.507	0.811	0.392	1	0.031	1.661	

SE: Standard error; CI: Confidence interval.
FCV-19S: Fear of COVID-19 scale.
Multivariate binary logistic regression.

population in Italy showed that COVID-19 vaccine rejection is higher in the 30–40 age group compared to the 18–29 age group. In this study, the high acceptance frequencies of the COVID-19 vaccine from university students support these data with the differences between university departments.[15] The fact that medical and health science students have high COVID-19 vaccination frequencies and low fear levels suggests that these groups can access and consider more accurate information about COVID-19 than other groups of students. Furthermore, medical students statistically are at the lowest level of fear in the FCV-19S values, which also supports this result.

The main factors that determine the reasons for getting COVID-19 vaccination are parallel to other studies, which had no other effective prevention method and COVID-19 being a dangerous disease.[21-23] However, in this research, the necessity of COVID-19 vaccination due to the request

of the PCR test before traveling in university students who are social and frequently travel for education or vacation makes us think that travel restrictions are significant in the fight against the pandemic, especially in this young age and in high-contagious groups. The third reason to get the COVID-19 vaccine in this study was not to have repetitive PCR tests. Although the primary purpose of requiring tests in workplaces, activities, and travels is infection control, it indirectly contributes to public health by increasing COVID-19 vaccination frequencies. The fact that students were vaccinated due to the necessity of traveling in this study suggests that the opposition to COVID-19 vaccination among young university students is not as strong as is thought.

It has been observed that there are lower COVID-19 vaccination frequencies in students living alone, and this frequency increases in the case of living in a dormitory or with family. The FCV-19S fear values also endorse these data in this study. Furthermore, the levels of fear in people living alone are significantly lower than in those living together, and the fear of infecting people living together is an important reason for being vaccinated for COVID-19 in this study, which also supports these data. In other studies, the relationship between obtaining information from the correct sources and having accurate information about the disease in vaccination frequencies and fear levels also supports the high vaccination frequencies and low fear levels of university students from medical schools and health departments.[24,25] Furthermore, the willingness to be vaccinated in medical students was 2.7 times higher than that of dental students in a multicenter study conducted by Kelekar et al.,[7] which supports the findings of this study. Similarly, medical students were found to have the lowest COVID-19 vaccination rejection compared to other groups of students in a study conducted among health students.[26]

In this study, it was found that there are differences in COVID-19 vaccination and fear levels in terms of the studied university departments and demographic characteristics of university students. The highest COVID-19 vaccination frequencies and lower levels of fear among medical and health students suggest that this group acquires, considers, and cares for more accurate information about COVID-19 than others. This result for students in the health field is highly positive, given that it has a key role in being a role model for preventive behaviors during the pandemic and helping vaccinate others. These results are essential, considering that medical students are responsible for their health as well as the health of individuals in society. In addition, the fear of COVID-19 has decreased with enhanced sources of access to information and the level of information. A study conducted with a small group of dentistry students in Türkiye showed that the level of fear decreased in students with a high level of knowledge.[27]

The main reasons for not being vaccinated for COVID-19 in this study are the lack of adequate scientific studies, the side effects, and the belief that the COVID-19 vaccine is ineffective due to new virus mutations, which was found in line with other previous studies.[28-30] Considering that young university students actively use social media, these concerns may also be due to incomplete or incorrect information and conspiracy theories that spread over social media. This deduction is also supported by studies showing that false information sources are an important factor affecting COVID-19 vaccine rejection.[31] In another study with university students, as of November 2020, 85.2% of those who were not willing to receive a COVID-19 vaccine stated that they were afraid or worried about unknown side effects, 68.5% believed that the COVID-19 vaccines were not adequately tested, and 29.6% thought that the COVID-19 vaccine would infect them with COVID-19 or another disease, and 25.9% did not believe that the vaccine would work.[6]

Consequently, safety, side effects, the perception that other groups need the COVID-19 vaccine more, and mistrust of vaccines were stated as the primary reasons for the hesitations to the vaccine in studies conducted with university students in the United States, the UK, and Taiwan.[28-30,32,33] These reasons are also similar to the concerns in this research. However, it should be noted that the reason for not being vaccinated due to "having COVID-19" was stated at a low frequency in this study, unlike the other studies, suggesting that there may be a lack of knowledge among students about this subject. However, COVID-19 infection may not create sufficient immunity, or it can be reinfected at the end of the immunity period.[18]

This study has some limitations. Since the study was conducted online, the sampling method that would provide generalization could not be used. Furthermore, the study is cross-sectional and thus does not include a cause-effect relationship. Another limitation is that the study could not be conducted face-to-face, and the evaluations are limited to the answers given by the participants. The large sample number and the demonstration of a high COVID-19 vaccine uptake frequency and related factors, including the departments studied at the university, are the strengths of this study.

CONCLUSION

This study revealed that the overall COVID-19 vaccine uptake frequency among university students is <96%, with different hesitancy frequency among university departments. It may contribute to the creation of new strategies against the pandemic with new data on the prevalence of COVID-19 vaccination among university students, the level of fear of COVID-19, and related factors, including COVID-19. It was determined that the history of COVID-19 infection, FCV-19S level, and recommending the COVID-19 vaccine to others have an effect on COVID-19 vaccination. Due to the importance of vaccination during pandemic periods, there is a need for larger and larger studies to increase the frequency of vaccination.

Disclosures

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Authorship Contributions: Concept – – A.K.K., M.K.Ş., H.P., I.T., F.Z.K.; Design – A.K.K., H.P., I.T.; Supervision – A.K.K., I.T.; Materials – F.Z.K., S.S., E.K., M.K.S., H.P.; Data collection &/or processing – A.K.K., F.K.Z., E.K., S.S., M.K.S.; Analysis and/or interpretation – A.K.K., M.K.S., I.T., H.P.; Literature search – A.K.K., E.K., S.S., H.P.; Writing – A.K.K., M.K.S., I.T.; Critical review – H.P., I.T., A.K.K.

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