Original Research / Orijinal Araştırma

Evaluation of Vaccination Hesitancy in Medical Faculty Students
Tıp Fakültesi Öğrencilerinde Aşı Tereddütünün Değerlendirilmesi

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Abstract

Aim: This research aims to assess vaccine hesitancy among medical students.

Method: This descriptive study was conducted with 615 students in years 1, 2, 3, 4, 5, and 6 at a medical faculty in Istanbul. The first nine questions of the online survey developed by the researchers focused on socio-demographic characteristics, while the next 14 questions were prepared to address vaccine hesitancy. A significance level of $p < 0.05$ was considered in all analyses.

Results: The participants in the study were between the ages of 17 and 29; 58% were female. General vaccine hesitancy was observed in 7.6% of the students. The frequency of hesitancy regarding the COVID-19 (Coronavirus disease 2019) vaccine among the participants was 17.4%, and a higher rate of indecision regarding the COVID-19 vaccine was found (18.9%). The frequency of general vaccine hesitancy in preclinical students was higher than in clinical students ($p < 0.05$).

Conclusions: In this study, COVID-19 vaccine acceptance rates were higher compared to the general population, and general vaccine hesitancy was significantly lower in clinical term students compared to preclinical students. Vaccine information and advocacy training starting from the first year of medical education could help future physicians guide society.

Keywords: Vaccination, Hesitancy, COVID-19, COVID-19 Vaccination, Anti-vaccination

Özet

Amaç: Araştırmada tıp fakültesi öğrencilerinde aşı tereddütünün değerlendirilmesi amaçlanmaktadır.

Yöntem: Araştırma tanımlayıcı tipte olup, İstanbul'da bir tıp fakültesinde dönem 1, 2, 3, 4, 5 ve 6 olan 615 öğrencide yürütülmüştür. Araştırmacılar tarafından geliştirilen çevrimiçi anketin ilk dokuz sorusu sosyo-demografik özelliklere odaklanırken, sonraki 14 soru aşı tereddüdüne yönelik hazırlanmıştır. Tüm analizlerde anlamlılık düzeyi $p< 0,05$ olarak kabul edilmiştir.

Bulgular: Çalışmaya katılanların yaşları 17-29 arasında değişmektedir; %58'i kadındır. Öğrencilerin %7,6'sı genel olarak aşılarla ilgili tereddütlü bulunmuştur. Araştırmaya katılanların koronavirüs (Coronavirus disease 2019-COVID -19) aşısı ile ilgili tereddütlü olma sıklığı %17,4'tür ve COVID-19 aşı tereddütü konusunda kararsız kalanların oranı daha yüksek saptanmıştır (%18,9). Preklinik öğrencilerin genel aşılarla ilgili tereddütlü olma sıklığı klinik öğrencilere göre daha yüksek tespit edilmiştir ($p<0.05$).

Sonuç: Araştırmamızda genel popülasyona kıyasla COVID-19 aşılama kabul oranları daha yüksek bulunmuş ve genel aşı tereddütü klinik dönem öğrencilerinde preklinik döneme kıyasla anlamlı bir şekilde düşük bulunmuştur. Tıp fakültesi öğrencilerine ilk sınıftan itibaren başlanacak aşı bilgilendirme ve savunuculuk eğitimleri geleceğin hekimlerinin bu konuda topluma ışık tutmalarının yolunu açacaktır.

Anahtar Kelimeler: Aşılama, Tereddüt, COVID-19, COVID-19 Aşılama, Aşı Karşıtlığı

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Introduction

Immunization and vaccination are global success achievements. Vaccines have been developed for more than twenty life-threatening diseases These diseases can be prevented with vaccines, and 3.5-5 million deaths are prevented each year by immunization.[1] High vaccination levels also play an important role in preventing infectious diseases and epidemics and establishing herd immunity.[2] A large number of people are not vaccinated every year due to factors such as inaccessibility to vaccines, disruption of vaccination programs, vaccine hesitancy, anti-vaccination, and vaccine rejection. In 2021, it was determined that the vaccination of many people, including 25 million children, was delayed due to the impact of the COVID-19 (Coronavirus disease 2019 epidemic.[1] The WHO's (World Health Organization) Strategic Advisory Group on Immunization (SAGE) has defined vaccine hesitancy as a delay in accepting or rejecting a vaccine despite the availability of vaccine services, which is affected by factors such as trust, confidence, and availability.[3, 4, 5] An analysis of the three-year WHO/UNICEF (United Nations Children's Fund)Joint Reporting Form data (2015–2017) found that vaccine hesitancy was common, with 90% of reporting countries detecting hesitancy.[6] Vaccination is one of the most cost-effective ways to prevent disease. Healthcare professionals remain the most trusted advisers and sources of influence on vaccine decisions and must be supported to provide reliable, credible information about vaccines.[7] It is essential to include the concepts of vaccine hesitancy and opposition in the curriculum of medical students, who are future physicians, and to develop skills in vaccine communication and managing these issues. Before developing programs aimed at enhancing these skills, studies assessing the current situation on this topic should be conducted. This study aims to examine vaccine hesitancy among medical students.

Materials and Methods

This descriptive study was conducted with medical students from years 1 to 6 in Istanbul between November 2021 and February 2022. The research was carried out with 615 (55.6%) medical students who agreed to participate in the study and answered the questionnaire, out of 1105 students in total: 77.8% of the students in year 1, 77.4% in year 2, 40.5% in year 3, 19.4% in year 4, 56.8% in year 5 and 55% in year 6 participated in the study. The first nine questions of the questionnaire created by the researchers included socio-demographic characteristics (e.g., age, gender, presence of chronic illness, etc.) and the next 14 questions were about vaccine hesitancy. Questions related to vaccine hesitancy were developed by reviewing widely used scales and the relevant literature.[8, 9] The researchers created questionnaires to be completed online and emailed to all university medical students. Participation was voluntary, and no specific sample was selected, aiming to reach the entire faculty. Completion of the questionnaire was considered as informed consent. At the beginning of the questionnaire, participants were informed that it would be used for scientific purposes, that it would remain completely anonymous, that they could withdraw at any time, and that participation was entirely voluntary. Ethics committee approval of the study was obtained from Göztepe Education and Research Hospital Clinical Research Ethics Committee (approval date: October 27,2021 and number: 2021/0540). This research is in accordance with the tenets of the Helsinki Declaration. COVID-19 vaccination status was based on individual declaration as at least one dose.

Statistical Analysis

Statistical analyses were performed using the SPSS 22.0 statistical package program (IBM SPSS Statistics for Windows, Version 22.0, IBM Corp., Armonk, NY, USA). The participants in the study were grouped for years 1,2,3 as preclinical period and years 4,5,6 as clinical period and analyses were performed. In the descriptive findings section, categorical variables were presented as numbers, percentages, and continuous variables as mean ± standard deviation and median (minimum and maximum values). As a statistical analysis, the Chi-square test was used to compare categorical variables. Binary logistic regression analysis of general vaccine hesitancy and hesitancy related to COVID-19 vaccine was performed. In the logistic regression analysis, those who answered "I agree or undecided" to the question "I am hesitant about vaccines in general" and "I am hesitant about the COVID-19 vaccine" were accepted as hesitant and analyses were made accordingly. The statistical significance level was taken as $p<0.05$ in all analyses.

Results

There were a total of 615 participants in the study. The ages of the participants were between 17-29 years and the mean was 21.08± 2.32; 58% of them were females, both preclinical and clinical medical students. Of those who participated in the study, 87.8% stated that they had infancy or childhood vaccinations, and 9.6% did not know about the situation. Those who had the COVID-19 vaccine comprised 98.4% of the participants (Table 1).

Table 1. *The distribution of the socio-demographic characteristics and infancy or childhood and COVID-19 vaccination status of the medical students participating in the study*

Socio-demographic characteristics, Vaccination status		n	%	Socio-demographic characteristics, Vaccination status		n	%
Gender	Males	258	42.0	**Chronic disease**	Yes	61	9.9
	Females	357	58.0		No	554	90.1
Status of smoking	Never	458	74.5	**Infancy or childhood vaccination**	Yes	540	87.8
	Sometimes	84	13.7		No	16	2.6
	Regularly/ Frequent	50	8.1		Unknown	59	9.6
	Quitted	23	3.7	**COVID-19 vaccination**	Yes	605	98.4
					No	10	1.6

%: column percentage

While only 7.6% of the students were hesitant about vaccines in general, 13.8% of them answered indecisively to the suggestion that they were hesitant about vaccines in general. In the study, the percentage of medical faculty students who said they were hesitant about the COVID -19 vaccine was 17.4%, while those who were undecided constituted 18.9%. While the percentage of participants who are against vaccines in general is 0.7%, the percentage of those who are against the COVID-19 vaccine is 2%. While the percentage of those who answered "I am undecided" to the question "I am against vaccines in general" was 4.4%, the percentage of those who answered "I am undecided" to the question "I am against the COVID-19 vaccine" was found to be higher with 6,7% (Table 2).

Table 2. *Distribution of the answers given by the medical students participating in the study to the suggestions about vaccination*

Statements	Agreed		Disagreed		Indecisive	
	n	%	n	%	n	%
Vaccines are an effective way to protect health.	579	94.1	31	5.0	5	0.8
I trust government-recommended vaccines.	420	68.3	161	26.2	34	5.5
The side effects of vaccines worry me.	172	28.0	211	34.3	232	37.7
Vaccines can cause many diseases.	71	11.5	163	26.5	381	62.0
Vaccines have benefits as well as harm.	101	16.4	135	22.0	379	61.6
I am generally hesitant about vaccines.	47	7.6	85	13.8	483	78.5
I am against vaccines in general.	4	0.7	27	4.4	584	95.0
COVID-19 vaccine is important in reducing the spread of the disease.	506	82.3	64	10.4	45	7.3
COVID-19 vaccine should be mandatory for the public.	262	42.6	145	23.6	208	33.8
COVID-19 vaccine should be mandatory for healthcare workers.	313	50.9	136	22.1	166	27.0
COVID-19 vaccine should be mandatory for teachers.	309	50.2	134	21.8	172	28.0
COVID-19 vaccine is important to me.	498	81.0	78	12.7	39	6.3
I'm hesitant about the COVID-19 vaccine.	107	17.4	116	18.9	392	63.7
I am against the COVID-19 vaccine.	12	2.0	41	6.7	562	91.4

%: column percentage

While 98.1% of the males had the COVID-19 vaccine, 98.6% of the females had the COVID-19 vaccine. 99.6% of those who answered with disagreed the statement that “I am hesitant about vaccines in general” had the COVID-19 vaccine, and 10.6% of those who were hesitant about vaccines in general did not have the COVID-19 vaccine ($p<0.001$). While 75% of those who agreed with the statement that they are generally against vaccines had the COVID-19 vaccine, and 25% did not ($p<0.001$). Of those who were hesitant about the COVID-19 vaccine, 92.5% had the COVID-19 vaccine, but 98.3% of those who answered “I am indecisive” to the suggestion of being hesitant about the COVID-19 vaccine have had the COVID-19 vaccine, and all of the people who were not hesitant about the COVID-19 vaccine had the COVID-19 vaccine ($p<0.001$). While 75% of those who were against the COVID -19 vaccine were vaccinated, 99.1% of those who were not against were vaccinated ($p<0.001$). All respondents who believed that the COVID-19 vaccine is important ($p<0.001$) and that it should be mandatory for healthcare workers ($p=0.002$) were vaccinated with the COVID-19 vaccine (Table 3).

Table 3. *Distribution of the medical students regarding COVID-19 vaccine*

Statements		**COVID-19 Vaccination**		**p**
		Yes	**No**	
		n(%)	**n(%)**	
I am generally hesitant about vaccines.	Agreed	42 (89.4)	5 (10.6)	**<0.001**
	Disagreed	481 (99.6)	2 (0.4)	
	Indecisive	82 (96.5)	3 (3.5)	
I am against vaccines in general.	Agreed	3 (75.0)	1 (25.0)	**<0.001**
	Disagreed	578 (99.0)	6 (1.0)	
	Indecisive	24 (88.9)	3 (11.1)	
COVID-19 vaccine is important in reducing the spread the disease.	Agreed	504 (99.6)	2 (0.4)	**<0.001**
	Disagreed	39 (86.7)	6 (13.3)	
	Undecided	62 (96.9)	2 (3.1)	
COVID-19 vaccine should be mandatory for the public	Agreed	261 (99.6)	1 (0.4)	**0.008**
	Disagreed	200 (96.2)	8 (3.8)	
	Indecisive	144 (99.3)	1 (0.7)	
COVID-19 vaccine should be mandatory for healthcare workers.	Agreed	313 (100)	0 (0.0)	**0.002**
	Disagreed	159 (95.8)	7 (4.2)	
	Indecisive	133 (97.8)	3 (2.2)	
COVID-19 vaccine should be mandatory for teachers.	Agreed	308 (99.7)	1 (0.3)	**0.008**
	Disagreed	165 (95.9)	7 (4.1)	
	Indecisive	132 (98.5)	2 (1.5)	
COVID-19 vaccine is important to me.	Agreed	498 (100.0)	0 (0.0)	**<0.001**
	Disagreed	33 (84.6)	6 (15.4)	
	Indecisive	74 (94.9)	4 (5.1)	
I'm hesitant about the COVID-19 vaccine.	Agreed	99 (92.5)	8 (7.5)	**<0.001**
	Disagreed	392 (100.0)	0 (0.0)	
	Indecisive	114 (98.3)	2 (1.7)	
I am against the COVID-19 vaccine.	Agreed	9 (75.0)	3 (25.0)	**<0.001**
	Disagreed	557 (99.1)	5 (0.9)	
	Indecisive	39 (95.1)	2 (4.9)	

%: row percentage Pearson's chi-squared test

There was no statistically significant relationship between general vaccine hesitancy by gender. While 10.5% of the students in the preclinical period were generally hesitant about vaccines, 3.3% of the students in the clinical period were generally hesitant about vaccines ($p<0.001$). No statistically significant difference was found between the hesitancy regarding the COVID-19 vaccine according to gender ($p=0.150$) and preclinical/clinical periods ($p=0.331$) (Table 4).

Table 4. *Distribution of hesitant suggestions about vaccines in general and COVID-19 vaccine by gender and term*

Gender and Term		The state of being hesitant about general vaccinations			p	The state of being hesitant about the COVID-19 vaccine			p
		Agreed	Disagreed	Indecisive		Agreed	Disagreed	Indecisive	
		n(%)	n(%)	n(%)		n(%)	n(%)	n(%)	
Gender	Males	21 (8.1)	200 (77.5)	37 (14.3)	0.865	50 (19.4)	168 (65.1)	40 (15.5)	0.150
	Females	26 (7.3)	283 (79.3)	48 (13.4)		57 (16.0)	224 (62.7)	76 (21.3)	
Term	Preclinical (Terms 1,2,3)	39 (10.5)	266 (71.9)	65 (17.6)	**<0.001**	71 (19.2)	229 (61.9)	70 (18.9)	0.331
	Clinical (Terms 4,5,6)	8 (3.3)	217 (88.6)	20 (8.2)		36 (14.7)	163 (66.5)	46 (18.8)	
Total		47 (7.6)	483 (78.5)	85 (13.8)		107 (17.4)	392 (63.7)	116 (18.9)	

%: row percentage Pearson's chi-squared test

General vaccine hesitancy was found 2.6 times higher in preclinical students than in clinical students (p<0.001, 95% CI (1.683-4.306)), but no relationship was found between COVID-19 vaccine hesitancy and being a preclinical or clinical student. No significant correlation was found between general vaccine hesitancy and COVID-19 vaccine hesitancy and gender, presence of chronic disease, and regular medication use (Table 5).

Table 5. *Logistic regression analysis to evaluate the relationship between some socio-demographic characteristics of medical students and COVID-19 vaccine hesitancy*

Socio-demographic characteristics	The state of being hesitant about general vaccinations		The state of being hesitant about the COVID-19 vaccine.	
	OR (95% CI)	**p**	**OR (95% CI)**	**p**
Gender Male Female (Reference)	1.087 (0.725-1.629)	0.687	0.871 (0.619-1.227)	0.430
Term Preclinical Clinical (Reference)	2.692 (1.683-4.306)	**<0.001**	1.156 (0.811-1.647)	0.424
Chronic disease Yes (Reference) No	1.418 (0.622-3.229)	0.406	0.631 (0.339-1.173)	0.145
Regularly used medication Yes (Reference) No	0.991 (0.488-2.014)	0.980	1.590 (0.876-2.887)	0.127

Binary logistic regression

Discussion

The overall rate of vaccine hesitancy among the students participating in the study was 7.6%, whereas hesitancy regarding the COVID-19 vaccine specifically was 17.4%. In a study conducted by Alıcılar et al., with grade 3 medical students in Ankara, 9.5% of the students had hesitancy or opposition to the vaccine, while this frequency was found to be 14.3% for COVID-19 vaccines.[10] This difference may be attributed to the novelty of the COVID-19 vaccine and the dissemination of misinformation on social media. In a study conducted with medical school students in India, COVID-19 vaccine hesitancy was found to be lower by 10.6%.[11] In a study conducted with students in five medical faculties in Egypt, the rate of those who refused the COVID-19 vaccine was 19.4%, the rate of those who were hesitant was 45.7%, and the rate of those who were against the vaccine in general was 4.9%.[12] In a study conducted on university students in Pakistan, vaccine hesitancy was found to be 1.3% lower in medical students compared to 2.5% in university students studying in non-medical departments.[13] In the online survey study conducted in Türkiye and England on COVID-19 vaccine hesitancy, it was found that 31% of the participants in Türkiye and 14% of the participants in the United Kingdom had hesitations about the COVID-19 vaccination.[14] In a systematic review of worldwide COVID-19 vaccine hesitancy, survey studies examining COVID-19 vaccine acceptance from 33 countries were evaluated and the highest acceptance rates in the general population were found in Ecuador (97%), Malaysia (94.3%), Indonesia (93.3%) and China (91.3%); with the lowest acceptance rates as Kuwait (23.6%), Jordan (28.4%), Italy (53.7%), Russia (54.9%), Poland (56.3%), and the USA (56.9%).[15]

In a population-based study conducted by İkiışık et al., 18.2% of the participants refused the vaccine after being questioned about accepting a vaccine that has not been administered yet.[16] Studies showed that there was a certain rate of vaccine hesitancy in medical students, and this rate is higher in the COVID-19 vaccine. In our study, COVID-19 vaccination status was found to be higher than the general population (98.4%). The fact that the population we studied consisted of medical students may have created this difference; however, it should be noted that the attitudes and knowledge levels of healthcare professionals regarding vaccines are among the main determinants of vaccine acceptance by the general population.[17] In our study, a significant relationship was found between the responses given to the statement that the COVID-19 vaccine is important to me and the status of being vaccinated. In the study conducted by Jain et al. on medical students in India, COVID-19 vaccine acceptance was found to be significantly higher among those who stated that the vaccine is important for organizing their private lives and attending clinical work and classes.[11] In the modeling study used for the example of Istanbul by Maral et al., the calculation of R0 for non-drug measures was studied, and the R0 value was calculated for Istanbul with curfew practices for the whole society. Accordingly, this implementation will prevent the epidemic; however, the curfew is not a sustainable practice.[18] In fact, it is understood from this that other implementations such as vaccination or medication use are needed to prevent the epidemic.

In our study, a significant relationship was found between the cases of receiving a supportive COVID-19 vaccine and the responses given to the statement that the COVID-19 vaccine is important in reducing the spread of the disease. There is also a significant relationship between the responses given to the statement that the COVID-19 vaccine should be mandatory for the public, teachers, and health workers and the status of being vaccinated against COVID-19. Similarly, in the study conducted in Egypt, most of the participants thought that the way to overcome the COVID-19 epidemic is through community vaccination (67.9%), and also that vaccination should be mandatory, especially for healthcare workers (92.1%).[12] Vaccination of individuals who serve as role models for society, such as healthcare workers and teachers, may contribute to the understanding of the importance of vaccination and help reduce vaccine hesitancy. In a study conducted by Alıcılar et al., with grade 3 medical students in Ankara, 62.8% of the medical students thought that vaccination would be the solution for the pandemic.[10] In the study conducted by Lucia et al. on medical school students, almost all participants agreed on the importance of developing a COVID-19 vaccine to reduce the spread in the community (>98%).[9] In the study conducted by İkiışık et al., 51.6% of the participants were found to think that the vaccine is important in preventing COVID-19 disease.[16] In the study conducted in India, the acceptance of the COVID-19 vaccine was found to be significantly higher in the participants who answered that the COVID-19 vaccine can reduce the spread of the disease in the community.[11]

In our study, vaccination hesitancy (3.3%) in clinical period (terms 4,5,6) students was found to be significantly lower than in preclinical period (grade 1,2,3) students (10,5%). In addition, vaccination hesitancy of preclinical students was found to be 2.6 times higher than clinical students in our study. While the majority of those who agreed to receive the COVID-19 vaccine by Hamdan et al. were seniors (26.5%) and graduate (25.5%), the majority of those who were undecided were second-year students with 33.5% and the majority of those who were opposed with 41%.[19] In a study conducted in Egypt, the highest rate of vaccine acceptance (47%) was reported among graduate participants, while the highest hesitancy and rejection were found among students with a significant difference in younger education years.[12] Similar to these studies, vaccination hesitancy was found to be

higher in lower-grade students in this study. It is possible that the increased clinical and theoretical knowledge of clinical period students, along with their involvement in patient treatment and examination processes, may have contributed to reducing their vaccine hesitancy.

Conclusions

In our study, the frequency of being hesitant and against the COVID-19 vaccine was found to be higher than the general vaccines. It has been determined that more than a quarter of the students were worried about the side effects of the vaccines, but two-thirds trusted the vaccines recommended by the government. The frequency of being hesitant about general vaccines in preclinical students was found to be higher than in clinical students. The increase in acceptance of general vaccines as the education year progresses shows the importance of education. However, it is still not sufficient. It should be noted that these results reflect the attitudes and behaviors of medical students. It is expected that a physician who has just graduated from the faculty of medicine should not have vaccine hesitation and have the ability to accurately inform the individuals in the society with vaccine hesitation with vaccine communication techniques and convince them about the safety of vaccines. In this study, the need to create specific educational materials about vaccines in the medical curriculum and to develop vaccine communication physician skills is revealed.

Disclosure

Ethical Considerations

Ethics committee approval of the study was obtained from Göztepe Education and Research Hospital, Clinical Research Ethics Committee (issue date: October 27,2021 and decision number: 2021/0540).

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Conflict of Interest

The authors report no conflict of interest.

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