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RESEARCH PAPER



Investigation of perceived fear of COVID-19 and vaccine hesitancy in nursing students

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ABSTRACT

This study aims to investigate the perceived fear of COVID-19 and vaccine hesitancy in nursing students. This study was conducted as a cross-sectional study with the participation of 1167 nursing students. Personal Information Form, Vaccine Hesitancy Scale and Fear of COVID-19 Scale were used for data collection. The reasons for the vaccine hesitancy of the students were listed as follows: 57.6% of them stated that it had side effects, 17.7% stated there was no conclusive evidence that the vaccine was effective, and 12.6% stated it was not reliable. A positive correlation was found between fear of COVID-19 and vaccine hesitancy.

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KEYWORDS

Fear of COVID-19; nursing students; vaccine hesitancy

Introduction

COVID-19 causes a severe acute respiratory syndrome. It emerged in Wuhan, China, at the end of 2019, caused a global pandemic and still has not been contained. It is a deadly and dangerous disease.^{1–3} Various treatment protocols are implemented in the Clinical and Intensive Care Unit (ICU) to weaken the disease-causing mechanism of COVID-19. In addition, expensive and significant scientific studies are being carried out to develop various treatment methods.⁴ However, a special and highly effective treatment method that will eradicate COVID-19 has not been developed yet.⁵

It is an easy, inexpensive and effective method to vaccinate individuals during the pandemic before being infected. World Health Organization (WHO) has reported that more than 200 COVID-19 vaccines are in development.¹ In order for the COVID-19 vaccine to meet optimal expectations, it must provide protection and not cause death or disability.⁶ It is noted that vaccines for infectious diseases saved the lives of 23 million people between 2011 and 2020.⁷

Vaccination is a practice that we may always need throughout our lives, from infancy to old age.^{8,9} Especially the nurses who take firm steps in the light of science should set an example with the right health behaviors. After all, vaccine administrators are nurses, and nursing students are also candidates for administering vaccines.

It is believed that there is a high level of knowledge and awareness regarding the lethal effects of COVID-19 thanks to the impact of the press and social media.¹⁰ People know that exposure to COVID-19 can result in death, and this can create fear even in individuals who are not yet infected with COVID-19. As a matter of fact, the number of deaths due to COVID-19 is high all over the world. This situation can create intense stress in people who think death as possibly due to COVID-19.¹¹

Fear is universal, and it is a psychological response to a perceived threat in humans in case of various problems and dangers.¹² Fear causes emotional, and physiological responses in individuals that can develop an anxiety disorder that may require medication or psychotherapy.¹³ Just as nursing students may be afraid to get COVID-19, they may be hesitant to get vaccinated. This is due to their insufficient level of knowledge about the COVID-19 vaccine.^{14,15} In 2019, the World Health Organization (WHO) recommended vaccines to prevent diseases. It identified ‘vaccine hesitancy’ as one of the ten biggest global health threats.¹⁶ This is due to the effect of postmodern perspective, social media sharing on the Internet about diseases and health-related sites that focus on the risks rather than the benefits of the treatments. The sharing and information mentioned do not have any scientific basis most of the time since individuals share their views, thoughts and sensations. Moreover, these shares can affect many people. Reading a lot of social media posts has caused an increase in the number of individuals who have some knowledge, and everyone has turned into an ‘expert’ in the postmodern society.¹⁷ This may trigger vaccine hesitancy in nursing students.

Nursing students are future vaccine practitioners, informers, and health workers in the professionalization process who are trained to perform various duties in vaccine units. While administering and recommending the vaccine, they should believe in the power of the vaccine.^{14,15,18} For this, it is of great importance to examine vaccine hesitancy from the perspective of nursing students and to determine the fear of COVID-19 as its primary predictor. This study aims to examine the perceived fear of COVID-19 and vaccine hesitancy in nursing students.

Materials and methods

This research was conducted as a cross-sectional study to examine the perceived fear of COVID-19 and vaccine hesitancy in nursing students.

Research design and participants

This research was carried out with the participation of nursing students studying at various universities in Turkey. This study was conducted with university students who volunteered to participate in the study within a month after ethical approval, nonprobability sampling methods and studying in the nursing department and accepting to fill out the online questionnaire. Nursing students were recruited through school WhatsApp groups in the study. In school WhatsApp groups, there are only students who take classes of a certain class. In this way, transparency was ensured. The questionnaires were shared with the students via online platforms, and they were allowed to answer the questions after obtaining informed consent. Before the survey questions started, they were asked a question about their willingness to participate in the study, and if yes, they were asked to confirm. The students who did not confirm could not answer the survey questions.

Inclusion criteria

- (i) Being a student in the Department of Nursing at a university in Turkey.
- (ii) Being 18 years or older.
- (iii) Not having any communication barriers.
- (iv) Agreeing to participate in the study.

Exclusion criteria

- (i) Not being a nursing student.
- (ii) Being under the age of 18.
- (iii) Being non-Turkish speakers having a communication barrier.
- (iv) Not being willing to participate in the study.

Data collection tools

In the study, "Personal Information Form," "Fear of COVID-19 Scale" and "Vaccine Hesitancy Scale" were used as a data collection tool.

Personal information form

It is a questionnaire prepared by the researchers, which includes sociodemographic characteristics, personal information and COVID-19 questions. This form was used to measure the perception toward the COVID-19 vaccine as well as knowledge toward vaccine effectiveness and vaccination.

Fear of COVID-19 scale (FCV-19S)

It was developed by Ahorsu et al. to measure individuals' fear levels caused by COVID-19.¹⁹ The items of the scale were created based on a comprehensive review of existing scales on fear, expert evaluations, and participant interviews. The Turkish adaptation of the scale was performed by Satici et al, and Cronbach's alpha coefficient for internal consistency was found to be 0.84.²⁰

This is a unidimensional 7-item and 5-point Likert-type scale (1-Strongly disagree; 5-Strongly agree). There is no reversed item on the scale. Internal consistency of the scale was found to be 0.82 and test-retest reliability was 0.72. High scores on the scale indicate that fear of COVID-19 is high. In this study, Cronbach's alpha was found to be 0.87.

Vaccine Hesitancy Scale (VHS)

The Vaccine Hesitancy Scale is a Likert-type self-assessment scale developed by Shapiro and his team to measure the level of vaccine hesitancy in individuals.²¹ The VHS consists of 12 items and 3 subscales. The validity and reliability of the scale were performed by Kılıçarslan and his team²² and the Cronbach's Alpha coefficient was determined as 0.79. Each item on the scale is scored as follows: 1 point for "exactly disagree," 2 points for "disagree," 3 points for "partially agree," 4 points for "agree," and 5 points for "exactly agree." Subscales are "Benefits and Protective Value of Vaccines," "Vaccine Repugnance," and "Solutions for Non-vaccination." In the calculation of total points, all items are collected and divided by the total number of items. As the score increases, vaccine hesitancy increases as well. Benefits and Protective Value of Vaccines, which is one of the subscales, is reverse-scored. In this study, Cronbach's alpha value was determined as 0.86. The VHS was not adapted for the COVID-19 vaccine. The original version in the literature was used.

Statistical analysis

The statistical analysis of the data was performed using the IBM SPSS (Statistical Packed For The Social Sciences) 25.0 statistics program. Descriptive statistical methods (number, percentage, min-max values, mean and standard deviation) were used in the evaluation of the data in the personal information form. It was found that the data did not show a normal distribution in the examination performed with the Kolmogorov-Smirnov test before the analysis. In the data analysis, Mann-Whitney U test and Kruskal-Wallis test, non-parametric tests were performed. Spearman's rank correlation was performed to determine the correlation between scales and identifying features. Bonferroni test was used to determine the difference in multiple comparisons. In addition, the effect of fear of COVID-19 on vaccine hesitancy was analyzed with the Structural Equation Model (SEM). The results were evaluated at a 95% confidence interval with a significance level of $p < .05$.

Ethical considerations

Prior to the study, the ethical approvals were anonymously obtained from Ethics Committee (Decision No: E-30603717-050.06.04-5389). Participants were informed about the research in accordance with the Declaration of Helsinki, and their approval for the Voluntary Information Form was obtained. Volunteer participants were included in the study.

Results

The distribution of the nursing students participating in the study according to their characteristics is shown in Table 1.

When the distribution of the students participating in the study according to their demographic characteristics was examined, it was found that 79.7% of the students were women, the vast majority of them (30.8%) were 2nd-year students, the proportion of those whose income was equal to their expenses was 50.1%, 90.1% of them have extended family, and the longest living place is cities (50.1%). In addition, the average age of students was 20.99 ± 2.16 and the average number of siblings was 3.68 ± 2.69 (Table 1).

When the distribution of the nursing students participating in the study was examined according to their demographic characteristics, it was found that 92.8% of them did not experience a negative situation regarding the vaccine, 67.4% were not afraid of vaccination, 78.8% thought that the vaccine was protective, 80.4% did not catch COVID-19 and 67.1% of them have the positive opinion toward vaccination. In addition, 83% of nursing students did not smoke, 75% of them did not have an operation or surgery, and 64.7% were not hospitalized during their lifetime. In addition, the average daily cigarette smoking of nursing students was calculated as 10.05 ± 10.58 (Table 2).

Looking at the reasons why nursing students participating in the study have a negative opinion toward vaccination, the first three reasons were listed as follows; 57.6% of them stated that it had side effects, 17.7% of them did not have conclusive evidence that the vaccine was effective, and 12.6% stated that it was not reliable (Table 3).

Table 1. Distribution of nursing students according to their characteristics (n = 1187).

Characteristics	X ± SS	n	%
Gender	Female	946	79.7
	Male	241	20.3
Age	20.99 ± 2.16		
Course year	1st-year	271	22.8
	2nd-year	366	30.8
	3rd-year	227	19.1
	4th-year	323	27.2
Income status	Income > Expense	164	13.8
	Income = Expense	595	50.1
	Income < Expense	428	36.1
Family type	Nuclear Family	854	90.9
	Extended family	333	28.1
Number of siblings	3.68 ± 2.69		
Settlement type	City	620	52.2
	District	346	29.1
	Village	221	18.6
Total		1187	100

Table 2. Nursing students' health history and their views on the COVID-19 vaccine (n = 1187).

Variables	Mean±SD	n	%
Negative experience with any vaccine	Yes	85	7.2
	No	1102	92.8
Fear of getting vaccinated	Yes	387	32.6
	No	800	67.4
Attitude toward vaccine effectiveness	Yes	935	78.8
	No	252	21.2
Get infected with COVID-19	Yes	233	19.6
	No	954	80.4
Positive attitude Toward COVID-19 Vaccine	Yes	797	67.1
	No	390	32.9
Past surgical experience	Yes	297	25.0
	No	890	75.0
History of previous hospital stay	1–3 days	262	22.1
	4–6 days	74	6.2
	7 days and above	83	7.0
	Any	768	64.7
Smoking status	Yes	202	17
	No	985	83
Number of cigarettes consumed daily	10.05 ± 10.58		
Total		1187	100

Table 3. Reasons for nursing students' COVID-19 vaccine hesitancy (n = 1187).

Reasons for COVID-19 vaccine hesitancy	n	%
Thinking that it might have side effects	225	57.6
Not reliable	49	12.6
Lack of evidence that the vaccine is effective	69	17.7
Thinking that antibodies have been formed because of getting infected in the last 3 months	7	1.8
Finding the mask, social distance and hygiene measures adequate and lack of knowledge	5	1.3
Not believing that the vaccine will produce enough antibodies	10	2.6
Others	25	6.4
Total	390	100

According to Spearman rank correlation, a weak positive ($r = 0.101$, $p = .001$) correlation was found between the fear of COVID-19 and vaccine hesitancy (Table 4). In addition, there was no significant correlation between the Benefits and Protective Value of Vaccines and the fear of COVID-19 ($r = -0.051$, $p = .078$). On the other hand, a low correlation was found between the fear of COVID 19 and Vaccine Repugnance ($r = 0.194$, $p = .000$) and between the fear of COVID-19 and Solutions for Non-Vaccination ($p = .000$, $r = 0.075$).

There was no statistically significant difference between family type, place of residence and COVID 19 vaccination hesitancy among the students participating in the study ($p > .05$). A statistically significant difference was found between gender, class, income status, negative experience toward vaccination, fear of vaccination, positive opinion toward vaccine effectiveness, positive opinion toward vaccination, smoking, past surgical experience and vaccine hesitancy ($p < .05$) (Table 5). According to the Bonferroni test, the difference in the course year of nursing students results from the 1st-year and 3rd-year students, the 1st-year and the 2nd-year students, and the 1st-year and the 4th-year students. Based on the Bonferroni test, the difference in income originated from the group in which income is equal to expenses and income is less than expenses.

Table 4. Comparison of VHS and FCV-19 score averages (n = 1187).

Total and subscales	Number	Items	Min-Max.	Mean±SD	Correlation
Fear of COVID-19 Scale (FCV-19S) Total Score	7	(Items 1–7)	7–35	17.10 ± 6.49	r = 0.101
Vaccine Hesitancy Scale (VHS)	12	(Items 1–12)	12–16	30.10 ± 9.90	p = .001**
Benefits and Protective Value of Vaccines	4	(Items 1–4)	4–20	8.93 ± 3.82	r = -0.051
Vaccine Repugnance	5	(Items 5–9)	5–25	14.33 ± 4.55	p = .078
Solutions for Non-Vaccination	3	(Items 10–12)	3–15	6.83 ± 2.58	r = 0.194
					p = .000**
					r = 0.075
					p = .010*

*p < 0.05.

Table 5. Comparison of nursing students' characteristics, past health experiences, views on COVID-19 vaccine and VHS scores.

Variables		N	Mean±SD	Statistics	p	Bonferroni
Gender	Female	946	29.82 ± 8.86	U = 103208.500	0.023*	
	Male	241	31.17 ± 9.00			
Course year	1st-year	271	32.01 ± 8.11	KW = 21.706	0.000*	1 > 3, 2 > 1, 4 > 1
	2nd-year	366	29.30 ± 8.85			
	3rd-year	227	29.13 ± 9.52			
	4th-year	323	30.08 ± 8.95			
Income status	Income > Expense	164	30.28 ± 8.66	KW = 10.315	0.006*	2 > 1
	Income = Expense	595	29.36 ± 8.95			
	Income < Expense	428	31.06 ± 8.85			
Family type	Nuclear Family	854	29.89 ± 8.84	U = 134614.00	0.153	
	Extended family	333	30.62 ± 9.07			
Settlement type	City	620	30.19 ± 9.32	KW = 5.271	0.072	
	District	346	29.34 ± 8.46			
	Village	221	31.03 ± 8.32			
Negative experience with any vaccine	Yes	85	34.45 ± 10.42	U = 34865.00	0.000*	
	No	1102	29.76 ± 8.69			
Fear of getting vaccinated	Yes	387	35.71 ± 8.41	U = 70622.50	0.000*	
	No	800	27.38 ± 7.80			
Attitude toward vaccine effectiveness	Yes	935	27.78 ± 7.39	U = 40422.00	0.000*	
	No	252	38.68 ± 8.82			
Get infected with COVID-19	Yes	233	31.17 ± 9.95	U = 104905.00	0.183	
	No	954	29.83 ± 8.62			
Positive attitude toward COVID-19 Vaccine	Yes	797	26.79 ± 7.12	U = 55852.50	0.000*	
	No	390	38.86 ± 8.35			
Smoking status	Yes	202	31.80 ± 8.70	U = 86.201	0.003*	
	No	985	29.75 ± 8.91			
Past surgical experience	Yes	297	31.29 ± 9.60	U = 4.505	0.034*	
	No	890	29.70 ± 8.63			
History of previous hospital stay	1–3 days	262	29.85 ± 8.68	KW = 1.216	0.749	
	4–6 days	74	30.97 ± 8.84			
	7 days and above	83	30.96 ± 11.53			
	Any	768	30.00 ± 8.67			

*p < 0.05, U = Mann-Whitney U, KW = Kruskal-Wallis.

Table 6. Results on the effect of fear of COVID 19 on vaccine hesitancy.

Impact	Estimate	Standard Error	t	p	Result
Fear of COVID-19 → Vaccine Hesitancy	0.207	0.037	5.355	0.019*	Acceptable

Adjustment Values: CMIN/DF; 4.409, RMSEA; 0.054, GFI; 0.924, AGFI; 0.896, SRMR; 0.077

*p < 0.05.

The results regarding the effect of fear of COVID-19 on vaccine hesitancy are given in Table 6. When the table is examined, it is seen that the fear of COVID-19 has a statistically significant and positive effect on vaccine hesitancy ($\beta = 0.207$, $p < .05$). 1 unit of increase in the fear of COVID-19 causes an increase of 0.207 on vaccine hesitancy (Table 6.).

In Figure 1, the correlation between VHS and FCV-19S is analyzed according to the Structural Equation Model. Fear of COVID-19 was found to be associated with all dimensions of vaccine hesitancy.

Discussion

Individuals may always need vaccination throughout their lives, from infancy to old age. Vaccination is an effective health practice developed to protect human life. In this context, the nurses who take firm steps in the light of science should set an example with the right health behaviors. After all, those who professionally administer vaccines are nurses. In this study, we examined the effect of nursing students' fear of COVID-19 on vaccine hesitancy.

According to the obtained results, when the distribution of the students participating in the study based on their demographic characteristics is examined, it was found that 79.7% of

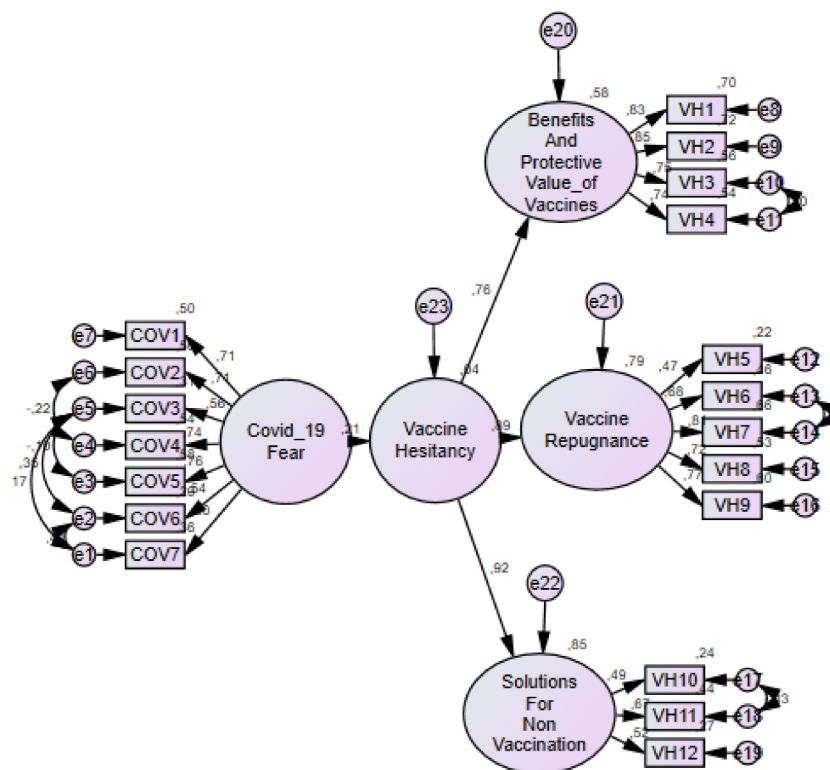


Figure 1. COVID-19 effect of fear of COVID-19 on vaccine hesitancy.

the students were women, 30.8% of them were 2nd-year students. It was found that 32.9% of the students do not have a positive opinion toward vaccination when offered, and 21.2% of them do not believe that the vaccine is protective. 57.6% stated that it might have side effects, 12.6% did not find it reliable, and 17.7% of them stated that there is a lack of evidence. In literature reviews, studies found that COVID-19 vaccine refusal in healthcare workers ranged from 27.7% to 63%.^{23–25}

In studies conducted in different societies, the rate of vaccine hesitancy in Ireland and England (UK) was 26% and 25%, respectively, while vaccine resistance or vaccine refusal rates were 9% and 6%, respectively.²⁶ The estimated vaccine hesitancy or resistance rate of people living in European countries is thought to be 26%.²⁷ It is estimated that the COVID-19 vaccine resistance or refusal rate of individuals living in the United States of America (USA) is 33%.²⁸ In a study conducted in Malta, it was found that the rate of those who hesitated to get the COVID-19 vaccine was 25%.²⁹ When studies conducted in East and Southeast Asia are examined, vaccine refusal rates are 10% in Indonesia, Malaysia and China^{30–32} and 20% in South Korea.^{33,34} As stated above, studies in the literature show that vaccine hesitancy rates are around 26%, and vaccine rejection rates vary between 6% and 33%. In our study, the rate of students who refused to get vaccinated was found to be 38.8% (390 to 1187). 57.6% (225 to 390) of the students who refused to get vaccinated stated that they refused the vaccination because it could have side effects. These results do not coincide with future job descriptions of nursing students.

In a study conducted with the participation of more than 1000 adults in the USA, it was found that 9% of the participants have MMR (measles, mumps, rubella) vaccine hesitancy since they found it unsafe.³⁵ In similar studies, it has been found that men are more likely to get the COVID-19 vaccine than women, and individuals over the age of 65 are more likely to get the COVID-19 vaccine than younger ones.^{29,36}

Immunization can be considered one of the most effective ways to protect against life-threatening infectious diseases. Thanks to the use of vaccines, it is possible to stop epidemics of many dangerous diseases all over the world. In previous epidemics, vaccines have been very effective in reducing the incidence of the disease (for example: polio, diphtheria, tetanus, smallpox, and measles).³⁷ Vaccination is a revolution in healthcare. Nurses professionally administer vaccines,³⁸ but they may refuse or hesitate vaccination in their private life. If nursing students do not believe in the power of the vaccine and fully understand the negative effects of COVID-19, they can refuse the vaccination mentally, and at the same time, they can conduct anti-vaccination activities, information and interviews with members of the community. Nurses administering vaccines should be professionals with strong knowledge, competencies and skills in vaccinating, promoting health and promoting healthy actions, and also they should be able to make independent decisions in the prophylaxis of communicable diseases.³⁹

In our study, it was found that there was a positive weak correlation ($r = 0.101, p = .001$) between nursing students' fear of COVID-19 and vaccine hesitancy. In a study evaluating the views of 1941 people, including healthcare professionals, on the COVID-19 vaccine, it was found that healthcare workers who

have not followed up any COVID-19 patients have a higher rate of vaccine hesitancy.⁴⁰ In addition to the physiological burden caused by the drugs used in the treatment of COVID-19, the virus itself is thought to cause pulmonary, renal, hepatic, psychiatric, neurological and cardiovascular problems. Problems caused by SARS-CoV-1 and COVID-19 can be listed as follows; headache, impaired consciousness, muscular coordination (ataxia), acute cerebrovascular disease, confusion, and convulsive seizures.^{41–43} These problems are likely to occur within 2 to 3 weeks after catching the coronavirus.⁴⁴

Vaccination seems much more advantageous considering both COVID-19 infection and medical treatment, invasive procedures, stress caused by hospitalization, loss of function, sadness and the sequelae it causes. High rates of vaccine refusal and hesitancy are found in the data of our study and studies in the literature. It is possible to say that this is due to the low level of knowledge and awareness about the disease. The fact that our research was conducted online through non face-to-face communication was accepted as a limitation of the study.

The World Health Organization (WHO) has defined health literacy as the cognitive-social skills and motivation levels of individuals to access, understand and use information in order to protect and improve their health.⁴⁵ Health literacy is a critical determinant of health. Health literacy requires people's knowledge and competencies to acquire, process and understand health information and services to make appropriate health decisions. No one is completely health literate, and everyone at some point needs help understanding, making decisions, or staying in-between important health information, even in economically developed countries with strong education systems.⁴⁶ Health literacy of nursing students was not examined in our study. However, in a study comparing the health literacy of nursing students and social science students, it was found that nursing students had better results.⁴⁷ In the other study comparing medical students and nursing students, the health literacy of nursing students was found to be quite low.⁴⁸

Health literacy plays a major role in understanding the importance of vaccines for society and the public. In our study, the opinion of nursing students who had vaccination rejection and hesitancy may have resulted from the lack of health literacy. It is recommended to examine this aspect in future studies.

Limitations

When the data of our study was collected, universities were providing online education and the fact that students did not fully understand the importance of the vaccine before starting clinical applications can be considered a principle of limitation. Due to the curfews during the pandemic, students were emotionally worn out as they spent too long at home. This may trigger negative feelings toward the vaccine and can be considered a limitation. In addition, low vaccination literacy in nursing students, the effects of social media, general anxiety and stress due to COVID-19 may have affected the thoughts of students, and all these parameters may be a principle of limitation. In this study, the use of correlational model and online collection of data were among the other limitations.

Conclusion

Vaccine hesitancy and refusal pose a serious threat to public health all over the world because the high population not vaccinated will cause the pandemic to recur and will cause it to last longer. The pandemic, each passing day, exhausts people financially, socially and psychologically and causes significant losses. In our study, the rate of vaccination rejection of nursing students was found to be high with 38.8% (390 to 1187). This high rate is a very intimidating result for future vaccine practitioners. Therefore, nursing students need comprehensive trainings on vaccination and immunization.

In this context, it has great importance to provide training to healthcare professionals, nursing students, and other students related to health about the importance and necessity of vaccination. The participation of exemplary people in the educations and drawing attention to the importance and necessity of vaccines in the media and print media will constitute an effective solution. In this way, the knowledge and opinion of nursing students about vaccination can be improved.

Nursing students' belief in vaccination should be increased while their education process continues so that good vaccination practices can be implemented. Nursing students should be allowed to express themselves. Educators should listen to their concerns and problems, and gently discuss with students, and they should be encouraged to develop health literacy.

Disclosure statement

No potential conflict of interest was reported by the author(s).




Contributions of authors

Study conception and design: AY, SA and SB
Data analysis and interpretation: AY
Data collection: AY, SA and SB

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