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Causes of COVID-19 Vaccine Hesitations and Investigation of Effective Factors in Changing Vaccine Decision Positively

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ABSTRACT

Aim: In recent years, the increasing anti-vaccination with the effect of social media has a negative effect on the mass vaccination campaign, which is the most important step of the pandemic struggle. In our study, it was aimed to determine the rate of those who declared that they would not have COVID-19 vaccine, to determine the reasons for not being vaccinated, to reveal the factors affecting this in individuals who changed their decision positively, and thus to contribute to the efforts to reduce vaccine opposition in the future.

Material and Methods: The study was conducted in two stages with a digital questionnaire method on healthcare workers who were included in the first vaccination program. The first stage was carried out 3 days before vaccination and the second stage 1 month after vaccination.

Results: 223 healthcare workers were included in the study. The rate of those who said 'I will be vaccinated' in the first survey was 57%. In the second survey, 34 participants who declared that they would not be vaccinated were vaccinated by changing their decision. The most influential factors in the decision not to vaccinate were "I do not think there is sufficient evidence about the vaccine" and "I fear the side effects of the vaccine". The most effective factors for those who positively changed their decision were determined as the influence of the environment and the perception that it was safe. The fear of COVID-19 and the belief that the vaccine will work were found effective in the positive decision to be vaccinated.

Conclusion: As a result, it has been concluded that informing activities about the reliability, effectiveness and low side effect rates of vaccines are important in eliminating vaccine hesitancy and increasing vaccination rates.

Keywords: COVID-19; vaccine hesitancy; vaccination; anti-vaccine.

COVID-19 Aşı Tereddütü Nedenleri ve Aşı Kararını Olumlu Yönde Değiştirmede Etkili Faktörlerin İncelenmesi

ÖZ

Amaç: Son yıllarda, sosyal medyanın da etkisiyle artan aşı karşıtlığı, pandemi mücadelesinin en önemli basamağı olan kitlesel aşılama kampanyasına olumsuz etki etmektedir. Aşı kararsızlığını gidermek ve aşılama oranlarını artırmak için yapılması gereken toplumsal farkındalık çalışmalarında kullanılmak üzere bu alanda verilere ihtiyaç vardır. Çalışmamızda COVID-19 aşısı yaptırmayacağını bildirenlerin oranını belirlemek, aşı olmama sebeplerini tespit etmek, olumlu yönde kararlarını değiştiren bireylerde buna etkili faktörleri ortaya koymak ve böylece ilerleyen süreçte, aşı karşıtlığının azaltılması çalışmalarına katkıda bulunmak amaçlanmıştır.

Gereç ve Yöntemler: Çalışma, ilk aşılanma programına alınan sağlık çalışanlarında, dijital anket yöntemi ile iki aşamada yapılmıştır. İlk aşama aşılamadan 3 gün önce, ikinci aşama aşılamadan 1 ay sonra gerçekleştirilmiştir.

Bulgular: Çalışmaya 223 sağlık çalışanı dâhil edildi. İlk ankette ‘aşı olacağım’ diyenlerin oranı %57 idi. İkinci ankette ise aşı olmayacağını bildiren 34 katılımcı kararını değiştirerek aşı olmuştu. Aşı yaptırmama kararına en etkili faktörler olarak, ‘aşı hakkında yeterli kanıtların olduğunu düşünmüyorum’ ve ‘aşının yan etkisinden korkuyorum’ seçenekleri belirtilmişti. Kararını olumlu yönde değiştirenlere en etkili faktörler ise çevrenin etkisi ve güvenli olduğunun görülmesi olarak belirlendi. COVID-19 hastalığı geçirme durumu, COVID-19 hastaları bakılan birimlerde çalışma durumu ile aşı olma kararı arasında ilişki yoktu. COVID-19’dan korkma durumu ve aşının işe yarayacağına olan inanç ile aşı olma kararı arasında anlamlı ilişki bulundu.

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Sonuç: Sonuç olarak aşı kararsızlığını gidermede, aşıların güvenilirliği, etkililiği, yan etki oranlarının yok denecek kadar az olduğu konusunda bilgilendirme faaliyetlerinin yapılmasının aşılanma oranlarını artırmada önemli olduğu kanaatine varılmıştır.

Anahtar Kelimeler: COVID-19; aşı karşıtlığı; aşı kampanyaları.

INTRODUCTION

COVID-19, an infectious disease continues to spread as a global epidemic. There is no definitive treatment with proven efficacy to prevent all these deaths and life-threatening symptoms (up to our study). For this reason, the primary method of struggle to end the pandemic by preventing rapid transmission is using of COVID-19 vaccines with proven protection and acceptance by the World Health Organization (WHO) and international scientific boards (1).

The vaccines are known as the most important achievement of the past century in terms of public health. Vaccination is a highly safe, effective, and inexpensive method to prevent life-threatening infectious diseases at all ages. It is essential for the vaccines to be applied above a specific rate in society to ensure communal immunity. In addition, in favor of herd immunity, people who cannot be vaccinated due to immunodeficiency or other health problems can also be protected (2).

The rapid production and approval of COVID-19 vaccines and the fact that they will be implemented for the first time have created doubts in some groups of society. The unrealistic and unscientific claims, mainly circulated in the visual and social media, have led to the appearance of a group that does not want to be vaccinated (3,4). However, in pandemics, community immunity is essential for controlling the disease. To eradicate the COVID-19 pandemic, it does not seem possible to find a solution other than mass vaccination programs. For this reason, it is a public health duty to convince all segments of people and to minimize the vaccine opposition. For this purpose, firstly, the reasons for anti-vaccination should be revealed, and then the factors that could cause those who declared that the vaccine would not be vaccinated to change their minds should be determined. The results obtained can be used in awareness studies and social education to increase vaccination rates. Thus, it can increase success in pandemic warfare.

This study was carried out in healthcare professionals in order to determine the reasons for vaccine hesitations about the COVID-19 vaccine in our country and also to observe the factors that positively change the vaccine decisions of individuals who do not tend to be vaccinated. The information to be obtained will lead the studies aiming to eliminate the arguments of the anti-vaccine campaign and the indecision not to be vaccinated in society in the upcoming days.

MATERIAL AND METHODS

The study protocol was approved by the local ethics committee of the Sakarya University School of Medicine. (Approval Number: 050.01.04-6074-52) The study was conducted on healthcare workers, the first vaccinated population in our country, using an anonymous web-based multiple choice and likert survey method. The study was planned in two stages. The first stage was made in the period when it was announced that healthcare workers would be vaccinated first, although there was no vaccination in our country yet. During this period, it was discussed in all visual and social media whether the vaccine would be mandatory, whether it was effective and whether it would have side effects. In addition, there was a lack of information about the results of phase 3 studies of vaccine companies and the superiority of the two approved vaccines to each other. Health workers had the right to choose whether or not to be vaccinated. In the meantime, the first part of the questionnaire was terminated three days before the vaccination campaign started. The second stage of the study was conducted after the first dose of vaccine to healthcare workers ended, approximately one month after the first questionnaire. The first survey, it was aimed to investigate if the decision to be vaccinated or not and the factors affecting the decision-making process. The second survey was set up to figure out whether the decisions of those who declared not to be vaccinated have been changed positively and the reasons why these people have changed their decisions.

Our study was planned as a cross-sectional observational study. No intervention was made. The duration of the study was limited to 2 months. The first questionnaire was sent 1 week before the start of the vaccination program and was terminated 3 days before the start of the vaccination program. The second questionnaire was sent to the participants 1 month after the vaccination program started and the study was terminated 1 week later. Social media platforms, including healthcare professionals, were used as the sampling method. The sampling size was limited by time. All healthcare professionals who completed the questionnaire were included in the study. There were no exclusion criteria. The questionnaires were filled in anonymously. A code containing numbers or letters was used to match the person who filled out the first and second questionnaires. The survey questions were prepared by the researchers and the survey took its final form by making a pilot application on 10 experts who are competent in this field. 223 health workers answered the first questionnaire and 114 of them answered the second questionnaire.

Statistical Analysis

All statistical analyses were performed using the SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Qualitative data were presented as frequencies and percentages. All data were categorical variables. For this reason, the chi-square test was used to compare multiple and binary groups. In multi-group comparisons, merging was performed for cells with fewer than expected numbers.

RESULTS

The study included 223 healthcare workers. The rate of having COVID-19 was 47.05% (n=153/72), in those working in departments where COVID-19 patients were treated, and 28.57% (n=70/20) in those not working in departments where COVID-19 patients were treated. The demographic characteristics of the participants are given in Table 1.

Table 1. Sociodemographic characteristics of the participants

	Mean ±SD (Min/max)		
Age	32.15±8 (21/58)		
		n	**%**
Sex	Female	128	57.39
	Male	95	42.61
Marital Status	Married	139	62.33
	Single	84	37.67
Occupation	Nurse	140	62.78
	Physician	43	19.28
	Technician	21	9.41
	Hospital Cleaning Workers	14	6.28
	Medical Secretary	5	2.24
The wards where participants work	The department where COVID-19 patients are treated	153	68.61
	The department where COVID-19 patients are not treated	70	31.39
The history of having COVID-19	Yes	92	41.25
	No	131	58.74
Has anyone in your household with COVID-19?	No	167	74.89
	Yes	56	25.11
Chronic illness	No	195	87.44
	Yes	28	12.55

There was no significant difference in vaccination status between those working in units with COVID-19 patients and those working in units where COVID-19 patients were not cared for (Table 2).

Table 2. Willingness to be vaccinated according to the unit of study

	The number of people declaring to get vaccinated (n)	**%**	**p**
All participants (223)	127	56.95	
The people working in wards where COVID-19 patients are treated (153)	85	55.55	0.534
The people working in wards where COVID-19 patients are not treated (70)	42	60.0	

There was no significant difference in the rate of declaring that they would be vaccinated between those who had previously had COVID-19 disease and those who did not. The status of having COVID-19 and the desire to be vaccinated according to the unit of study are given in Table 3.

Table 3. Previous COVID-19 status and desire to be vaccinated by the unit of work

The working unit and history of having an illness (n)	**The number of people declaring to be vaccinated (n)**	**%**	**p**
Those who had COVID-19 infection (92)	55	59.78	0.495
Those who had not COVID-19 infection (131)	72	54.96	
Those who work in the COVID-19 treatment unit and also gone through the disease (72)	41	56.94	0.744
Those who work in the COVID-19 treatment unit and also not gone through the disease (81)	44	54.32	
Those who do not work in the COVID-19 treatment unit and also gone through the disease (20)	14	70.0	0.418
Those who do not work in the COVID-19 treatment unit and also not gone through the disease (50)	28	56.0	

Fifty-three 55.79%) of 95 men and 74 (57.81%) of 128 women declared that they would be vaccinated. There was no significant difference between declaring to get vaccinated in terms of gender. (p=0.763).
When the results are evaluated according to occupational groups, the rate of those who reported that they would have the highest vaccine was in the physician group and then followed by the technician group, and there was a significant difference between the groups (Table 4).

Table 4. Willingness to be vaccinated according to occupational groups

Occupation (n)	**The number of people declaring to be vaccinated (n)**	**%**	**p**
Doctor (43)	33	76.74	0.006[a] 0.003[b] 0.645[c] 0.076[d]
Technician (21)	15	71.42	
Nurse (140)	71	50.71	
Hospital Cleaning Workers and Medical secretary (19)	8	42.10	

a= All groups; b= Doctor vs. Nurse; c= Doctor vs. Technician; d= Technician vs. Nurse

While 64.70% said that they would be vaccinated in the physician group who did not have COVID-19 (n=22/4), those who said that I would be vaccinated in the physician group who had COVID-19 were 84.61% higher (n=11/6). Likewise, 50.62% of those in the nurse/midwife group who did not have COVID-19 said that I would be vaccinated (n=41/40), while 50.84% who had COVID-19 declared they would be vaccinated. (n=30/29). The ratio was not calculated due to the small number of the other groups.
According to the fear of COVID-19 disease, there was a significant difference between the participants who reported that they would be vaccinated. Those who said I was terrified of COVID-19 disease were found to have a high vaccine request. Results are given in Table 5.

Table 5. Willingness to be vaccinated according to fear of COVID-19 disease

Are you afraid of getting COVID-19 disease?	**The number of people declaring to be vaccinated (n)**	**%**	**p**
I'm not afraid at all (21)	11	52.38	0.020
I'm partially afraid (181)	98	54.14	
I am so afraid (21)	18	85.71	

Will the COVID-19 vaccine be effective for the participants? When asked, 86 (38.56%) answered yes, 92 (41.25%) were undecided, and 45 (20.18%) answered no. 75.58% of those who answered yes (n=86/68), 51.09% of those who answered I am indecisive (n=92/47), and 33.33% of those who answered no declared that they would be vaccinated (n=45/15). The difference between them was found to be significant (p<0.001).
According to the answers given to the questions, “Do you think you will catch COVID-19 in the next few months” and “how do you think the severity of your disease will be if you get caught”; the rate of declaring that they will be vaccinated, is shown in Table 6.
The rate of vaccination was detected as 64.5% in the group who did not have COVID-19 and thought that if it did, it would have severe.

Table 6. Expectation of getting COVID-19

Do you think that you will get COVID-19 disease in the next few months?	**The number of people declaring to be vaccinated (n)**	**%**	**p**
No, I do not. (21)	15	71.43	0.370
I think I will go through mild illness (51)	28	54.90	
I think I will go through moderate/ severe illness (151)	84	55.63	

Among those who declared that they would not be vaccinated, the most frequent options were "I do not think there is enough evidence about the vaccine" and "I am afraid of the side effects of the vaccine". The results are shown in Table 7. Among those who declared that they would not be vaccinated; as a reason, the most frequently given answers were "I do not think there is enough evidence about the vaccine" and "I am afraid of the side effects of the vaccine". The results are shown in Table 7.

Table 7. Reasons for not being vaccinated

The reason not to be vaccinated	**n**	**%**
I think there is no enough evidence about the vaccine	67	30.04
I am afraid of the side effects of the vaccine	41	18.38
I have seen negative information about the vaccine	32	14.35
I have a negative opinion about the vaccine companies	25	11.21
I think my antibody is positive against COVID-19	18	8.07
I think the vaccine is not necessary	7	3.14
I am pregnant, or I think to be pregnant	4	1.79

* More than one option marked

The sources of information on vaccines were also evaluated in the study. Results are given in table 8.

Table 8. The sources of information on vaccines

Sources of information	**n**	**%**
Health professionals	189	84.75
Internet / social media	140	64.12
Television	95	42.60
Written sources	63	28.25
Friends / family	50	22.42
Anti-vaccine groups	8	3.58
Religious sources	4	1.79

* More than one option marked.

The second part of the study was performed with the same sample group, one month after the healthcare workers started to be vaccinated. To be compared with the previous survey results; 'Have you been vaccinated' and 'Did your mind change according to the previous survey?' questions were posed. In the first part of the study, 96 participants answered, "I will not be vaccinated". In the second part, 57 of these 96 people answered the questionnaire. Thirty-four of them stated that they would not be vaccinated but then changed their mind and got vaccinated. Results are given in Table 9.

Table 9. Decision-changing situations

	n	**%**
Those declaring not to be vaccinated	96	43.04
Those answering the second survey	57	59.31
Those declaring not to be vaccinated but get vaccinated.	34	59.64
Those declaring not to be vaccinated and also not get vaccinated.	23	40.32
Those declaring to be vaccinated but not get vaccinated.	2	3.54

When the reasons for changing the decision of those who have been vaccinated by changing the decision are examined; It was determined that 50% (n=17) changed their minds due to the influence of the environment, and 17.6% (n=6) because they saw the vaccine as safe. In addition, 11 participants marked the option "I have been vaccinated because I want the pandemic to end". Ten participants did not give reasons.

When the side effects of the vaccine were evaluated, it was determined that 46 people (51.7%) had no side effects, 41 people (46.1%) had mild side effects, and two people (2.2%) had moderate side effects. None of the participants had severe side effects.

DISCUSSION

The main result of our study was the observation of the influence psychology of majority psychology. 60% of those who declared that they would not be vaccinated changed their minds after the vaccination program started and got vaccinated. Among the reasons for not being vaccinated in our study, the thought that there is not enough evidence about the vaccine and the feeling of fear of its side effects came to the fore. These reasons can be explained by the fact that vaccines are still very new, and their effects/side effects are not known sufficiently. Our study included the first vaccinated population in our country. Side effects are reported as very few and mild. Sharing the safety data obtained from this group with the public will positively affect the vaccination decision of the following groups. As a matter of fact, although the influence could not be evaluated in our study, side effects were reported very few and mildly. This situation manifested itself in the group who initially stated that they would not be vaccinated but changed their mind later on. The fact that participants declaring not to be vaccinated changed their decisions and accepted to get vaccinated after their close relatives living in the same house had been vaccinated can be explained by the disappearance of the fear of side effects. As a matter of fact, 34 participants in our study later changed their minds and got vaccinated. This situation shows the positive effect of the majority of psychology. On the contrary, the organized social media interactions of those who declare that they will not be vaccinated may negatively affect those who are indecisive. Health authorities must disprove the claims clearly and directly shared by the people announcing not to be vaccinated. Other reasons for those who reported not getting vaccinated were made up of negative feelings about vaccines and a lack of trust in vaccine companies. These reasons can actually be eliminated by social information and confidence-building studies. Those who said, "I think the vaccine is unnecessary", which is more difficult to convince, were only 7 participants and only 3% of the whole group. These results mean that vaccination indecision will be reduced substantially with organized information activities in the fields of written, visual and social media.

In our study, in order to shed light on the studies to be done in this direction, the sources of information that affect the vaccine decision were also evaluated. It has been revealed that awareness-raising activities carried out by health

professionals from the Internet, social media, and television sources can be influential in the favorable vaccine decision. In our study, obtaining information from the anti-vaccine groups was found to be very low, with 3.6%. However, we think that this data should not be reflected in society as our study population includes healthcare professionals. We anticipate that this ratio will be higher in society, and we believe that it is important to work in this area. In our study, the most significant parameter with the desire to be vaccinated was found to be the fear of COVID-19 disease. The highest rate of desire to be vaccinated was found in those who said, "I am terrified of COVID-19 disease". When this situation is examined inversely, the perception in the society that COVID-19 disease is not different from seasonal flu, and that it heals spontaneously or with mild symptoms without medication, may negatively affect the vaccination decision. This area also requires an important work in reducing vaccine opposition in the fight against pandemics. Another significant parameter in the study was related to the answers given to the question "Do you think the COVID-19 vaccine will work?". The desire for vaccination was significantly higher among those who thought it would work. Those who said it wouldn't work had a low desire to get vaccinated. This situation can be used in awareness studies that will increase vaccination rates. It may be beneficial if the vaccine reducing effect on sickness and severe disease rates should be brought up frequently.

In our study, the effect of education level on declaring positive vaccination was clearly demonstrated. While the desire for vaccination was the highest in the physician group with higher education, this rate was found to be the lowest in cleaning personnel. However, we think that the reflection of this data on society will be different. We believe that the physician group in the study population made this difference. We believe that there is a need for social epidemiological studies to measure sociodemographic data of anti-vaccine groups in this area. In our study, there is no significant difference between people who work in COVID-19 treatment units and the people who do not in terms of declaring to be vaccinated or not. The reason for this can be explained by the high contagiousness rate of COVID-19 and the increased risk for almost every part of the hospital and for all employees. Similarly, there was no significant difference between those who had COVID-19 disease and those who did not in terms of the declaration to get vaccinated. Because the cases who had the disease for the second time were known and there was no feeling of confidence that it would not be sick again. No difference was found with gender.

In recent years, some individuals and institutions have put forward vaccine opposition against the vaccines, which are effective, inexpensive, and applicable to combat epidemics, and have claimed side effects that are not based on scientific facts (5). WHO formed the "Vaccine Hesitations Working Group" due to the anti-vaccine movements that became widespread in 2014 and presented a model of vaccine hesitations. According to this model, determinants of vaccine hesitancy are grouped under three main headings. These titles; contextual effects (socioeconomic groups, policies, laws, etc.), individual-group effects (belief in health practices, past vaccination experiences, risks, etc.), and vaccination and vaccination effects (vaccination schedule, access to vaccine resources, application method, etc.) (6).

Vaccine hesitancy, also known as anti-vaccination or anti-vax, is a reluctance or refusal to be vaccinated or to have one's children vaccinated against contagious diseases. According to the report of WHO, vaccination hesitation is defined as a delay in accepting the vaccine for one or more vaccines or rejection despite reaching the vaccine. Vaccination refusal is defined as not having all vaccinations of the person's own will (7). We think that our study is important in terms of revealing data that can positively change the decision of individuals with vaccine hesitancy. As a matter of fact, we have demonstrated that after the initiation of vaccination without any intervention, 60% of individuals changed their decisions positively with the effect of the psychology of the majority.

According to the data of the IPSOS research company, which conducts public opinion research on the COVID-19 vaccine, the number of those considering to be vaccinated in our country is 44%, and the number of those who are indecisive is 32 % (8). The low number of people considering getting vaccinated in our country necessitates the investigation of the causes of this issue and the implementation of interventions for these reasons. We believe our work will fill an important gap in this area. In a similar study conducted with 3541 patients in China, the rate of those who said "I definitely get vaccinated" was 28.7%, and the rate of those who said "I probably get vaccinated" was 54.8%. Similar to our study, in this study, the perceived benefit of the vaccine was reported as factors affecting the vaccine decision positively, and concerns about side effects and efficacy as factors that negatively affected the decision to be vaccinated (9).

In a study of 168 medical students in the USA, 98% of the students agreed that they would be exposed to COVID-19, but only 53% agreed to have a vaccine. Among the factors contributing to vaccine hesitancy, concerns about serious vaccine side effects and lack of confidence in expert knowledge were cited. In addition, the students commented on the politicization of the vaccine, the need for transparency, and concerns about the speed of vaccine development that could potentially affect vaccine safety (10).

Interestingly, in a study conducted in Israel, it was reported that working in the health sector did not significantly affect the vaccine acceptance or rejection decision. Thus, it can be accepted that studies such as our work in healthcare professionals can also give an idea about social trends in the general population. Similar to our research, vaccine acceptance was found to be 78% by doctors and 61% by nurses. In the same study, vaccine acceptance in the general population was reported as 75%. In this study, unlike our study, vaccine acceptance was higher in those working in departments where COVID-19 patients were treated. This difference can be explained by the fact that the number of physicians is higher than the number of nurses. In our study, the number of nurses was higher. In the study, the greatest concern for both physicians and the general population was identified as fears related to the safety of the vaccine due to its rapid production (11).

In a study conducted in Philadelphia, 63.7% of employees said they were planning to get a COVID-19 vaccine,

26.3% were not sure, and 10.0% did not plan to be vaccinated (12).

In fact, the reasons set out above are similar in all adult vaccines, independent of COVID-19 vaccines. For example, in a study examining the attitudes of healthcare workers towards seasonal influenza vaccine in Canada, concerns about the effectiveness and reliability of the vaccine were found to be effective in the decision not to be vaccinated. On the other hand, it has been shown that colleagues are influential in the decision to vaccinate (13).

In conclusion, our study showed that obtaining information about the safety, efficacy and low side-effect rates of vaccines can increase vaccination rates and eliminating vaccine hesitancy. We have determined that it is important to work to refute the negative statements about the vaccine in visual and social media with counter theses in addition to conducting awareness studies against the perception that simplifies the COVID-19 disease. For this purpose, we believe that frequent coverage of content prepared by healthcare professionals on vaccine information resources such as internet/social media and televisions will significantly reduce vaccine instability.

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