



COVID-19 VACCINE-RELATED ATTITUDES AND CONCERNS OF CHEMOTHERAPY PATIENTS

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Abstract – Objective: This study aimed to examine the attitudes and concerns of chemotherapy patients related to COVID-19 vaccination and determine factors associated with their vaccine behavior.

Patients and Methods: A cross-sectional, descriptive study was conducted with 300 patients who received chemotherapy in the oncology outpatient clinic of a University Hospital in Istanbul in October 2021. Based on our power calculation, a minimum sample size of 264 patients was needed. However, we recruited a sample of 300 to increase the power of the study. Data were collected online using a patient information form and the Attitudes Towards the COVID-19 Vaccine Scale. The data were analyzed using descriptive statistics and parametric tests.

Results: The participants had a mean age of 55.64 ± 13.80 years, 56.7% were women, 64% were married, 38.3% were high school graduates, and 35.7% were homemakers. Age, education level, and chronic disease were associated only with negative attitudes towards the COVID-19 vaccine; gender was associated with positive attitudes. Being vaccinated against COVID-19 was associated with 99% lower negative attitudes and 66.9 times higher positive attitudes towards the COVID-19 vaccine, while men had 76% lower positive attitudes than women.

Conclusions: Overall, patients receiving chemotherapy had a favorable attitude toward and high acceptance of the COVID-19 vaccine.

KEYWORDS: Cancer, Chemotherapy, COVID-19 vaccine, Attitudes and Concerns.

INTRODUCTION

Infectious diseases have existed throughout human history and were the most important cause of death until fairly recently¹. One of the main approaches to infectious disease prevention is vaccination². COVID-19 is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The World Health Organization first learned of this new virus on December 31, 2019, following a report of a cluster of viral pneumonia cases in Wuhan, China³. Afterward, SARS-CoV-2 rapidly spread worldwide,

and the resulting pandemic continues to threaten the lives of many people today^{3,4}. In Turkey, the first case was reported in March 2020, and as of January 2022, there had been over 9.5 million confirmed cases and more than 83,000 deaths⁵.

In an attempt to control the COVID-19 pandemic, many countries accelerated vaccine research and established vaccination programs^{1,2}. However, the rapid progress of COVID-19 vaccine research has led to issues with societal acceptance of the vaccines and negative attitudes towards vaccination^{2,6}. The COVID-19 pandemic



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had an adverse impact on the screening, diagnosis, follow-up, and treatment of all chronic diseases, especially for patients with cancer, resulting in a decline in patient survival^{1,7}. Numerous studies have examined this issue, and the effects of the COVID-19 pandemic on cancer patients have been widely discussed. Based on the results, experts predict that these effects will result in increased morbidity and mortality among cancer patients in the coming years⁷.

Different studies have suggested that COVID-19 mortality rates were higher in cancer patients compared to other disease groups because of immunosuppression^{8,9}. In addition, experts have reported reduced patient enrollment in oncological clinical trials and note that this will create a barrier to future scientific and medical advances¹⁰. There is limited experimental data on the effect of COVID-19 on the health of people with cancer¹¹. Patients receiving chemotherapy have impaired immunity and are thus especially vulnerable to infection and at higher risk of COVID-19 complications^{8,12}. In particular, because these patients are at high risk of developing neutropenia during chemotherapy, there is a higher expectation of fatal outcome of COVID-19 infection^{9,11,13}. Some studies have demonstrated that the odds of COVID-19 mortality are higher in cancer patients compared to other disease groups. For this reason, preventive measures should be increased to reduce the risk of COVID-19 infection, these patients should be given vaccination priority¹⁴, and necessary measures should be taken for infected patients^{8,9}. In general, immunization rates among patients with cancer are quite low and evidence regarding the safety and efficacy of the COVID-19 vaccine in cancer patients were reported to be insufficient^{1,9,10,13}. Therefore, as in all patient groups, patients with cancer also have many questions related to the rapid development of the vaccine^{6,15}.

As a result, it has been emphasized that broad measures to lower the risk of COVID-19 and vaccine priority are essential for patients with cancer. Despite these decisions regarding cancer patients, few studies have investigated attitudes and concerns related to COVID-19 vaccination among patients receiving chemotherapy¹. Therefore, this study was conducted to evaluate the attitudes and concerns of chemotherapy patients towards COVID-19 vaccination and determine factors associated with their vaccine behavior.

PATIENTS AND METHODS

The sample of this cross-sectional descriptive study consisted of 300 patients who received chemotherapy in the oncology outpatient clinic of a

University Hospital in Istanbul in October 2021. Based on our power calculation, a minimum sample size of 264 patients was needed. However, we recruited a sample of 300 to increase the power of the study. Due to the risk of COVID-19 transmission, we conducted an online survey using Google Forms in lieu of face-to-face interviews. Inclusion criteria were being 18 years of age or older, having no barrier to communication, and voluntarily consenting to participate in the study.

Data Collection Tools

Data were collected using a personal information form and the Attitudes Towards the COVID-19 Vaccine scale.

Attitudes Towards the COVID-19 Vaccine Scale

The Attitudes Towards the COVID-19 Vaccine scale contains nine items in two subdimensions (positive and negative attitudes). The items are rated on a 5-point Likert-type scale (1=*strongly disagree*, 2=*disagree*, 3=*neutral*, 4=*agree*, and 5=*strongly agree*). Items in the negative attitude subscale (items 5, 6, 7, 8, and 9) are reverse scored. For each subscale, the total points are divided by the number of items to give a score between 1 and 5. Higher scores indicate more positive attitudes (for the positive attitude subscale) and less negative attitudes (for the negative attitude subscale) toward the COVID-19 vaccine¹⁶.

Ethical Considerations

Permission to use the Attitudes Towards the COVID-19 Vaccine scale was obtained by email from the researchers who conducted the Turkish validity and reliability study.

Statistical Analysis

IBM SPSS Statistics version 23.0 (SPSS Corp., IBM; Armonk, NY, USA) was used for statistical analysis of the data¹⁷. Kurtosis and skewness (+1, -1) values were examined to determine whether the data showed normal distribution. Normally distributed data were analyzed in independent groups using parametric tests such as *t*-test, one-way ANOVA, and post-hoc analysis. Pearson correlation analysis was performed to evaluate relationships between the data. To determine the

TABLE 1. Distribution of sociodemographic characteristics (N=300).

	<i>n</i>	%
Gender		
Female	170	56.7
Male	130	43.3
Marital status		
Married	192	64.0
Single	42	14.0
Widowed	66	22.0
Education level		
Illiterate	11	3.7
Literate, no education	22	7.3
Primary education	99	33.0
Secondary education	115	38.3
Associate's degree	15	5.0
Undergraduate or postgraduate education	38	12.7
Occupation		
Retired	95	31.7
Homemaker	107	35.7
Employed, private sector	25	8.3
Freelance/Self-employed	43	14.3
Student	4	1.3
Employed, government	26	8.7
Noncancer comorbidity		
No	149	49.7
Yes†	151	50.3
Diabetes	31	10.3
Hypertension	98	32.7
Heart disease	21	7.0
Thyroid disease	14	4.7
Asthma/Chronic obstructive pulmonary disease	10	3.3
Epilepsy	1	0.3
Prostate disease	4	1.3
Kidney disease	1	0.3
Celiac disease	1	0.3
Osteoporosis	12	4.0
Cancer diagnosis		
Breast cancer	87	29.0
Gynecological cancer (ovarian, cervical)	33	11.0
Colorectal cancer (colon, rectum)	53	17.6
Head and neck cancer (thyroid, esophagus, nasopharynx)	12	4.0
Lung cancer	42	14.0
Gastrointestinal cancer (stomach, pancreas, liver)	24	8.0
Male urological cancer (testis, prostate, bladder)	35	11.7
Other (melanoma, sarcoma, neuroendocrine tumor)	14	4.7

†Multiple answers were possible; row percentages were determined based on total sample number.

overall effect of variables associated with attitudes toward the COVID-19 vaccine in univariate analysis, logistic regression analysis was performed using forward selection with the first variable accepted as the determinant. Results were evaluated within a 95% confidence interval and significance level of $p < 0.05$.

RESULTS

The mean age of the study group was 55.64 ± 13.80 years, 56.7% were women, 64% were married, 38.3% were high school graduates, and 35.7% were homemakers (Table 1). The most common cancer type was breast cancer (29%), and 50.3%



of the participants had at least one noncancer comorbidity. The most common chronic disease was hypertension (32.7%) (Table 1).

Nearly all participants (99%) stated they believed they were at risk for COVID-19, 82.7% said they had no previous COVID-19 diagnosis, and 100% stated that they or their relatives were afraid of contracting COVID-19. Sixty-six percent of the participants reported receiving no vaccinations since receiving their cancer diagnosis. However, 77.7% said they were vaccinated against COVID-19. The 19.3% of participants who were not vaccinated against COVID-19 cited fear of vaccine side effects as the reason (Table 2).

The participants' mean scores in the positive attitudes and negative attitudes subscales were 4.39 ± 0.85 and 4.17 ± 0.82 , respectively (Table 3).

Age, marital status, education level, presence of chronic disease, cancer type, and COVID-19 vaccination status were found to be associated with negative attitudes towards the COVID-19 vaccine. There was a very weak inverse correlation between negative attitude score and age ($r = -0.11$; $p = 0.049$). Negative attitude scores were higher (indicating less negative attitudes) in single people compared

to participants who were married or widowed ($p = 0.02$), in those without a chronic disease compared to those with ($p = 0.06$), and in those who were vaccinated against COVID-19 compared to those who were not ($p = 0.001$). Negative attitude scores were lower (indicating more negative attitudes) in patients with colorectal cancer compared to those with breast, gynecological, and upper gastrointestinal cancers ($p = 0.04$) and in participants with undergraduate and postgraduate education compared to those who were illiterate, uneducated, or had primary school education ($p = 0.04$). Gender, occupation, history of COVID-19 infection, and being vaccinated after receiving the cancer diagnosis were not associated with negative attitudes towards the COVID-19 vaccine.

Gender, marital status, cancer diagnosis, and COVID-19 vaccination status were found to be associated with positive attitudes towards the COVID-19 vaccine. Positive attitude scores were higher in women compared to men ($p = 0.04$), in single participants compared to those who were married or widowed ($p = 0.02$), and in those who were vaccinated against COVID-19 compared to those who were not ($p = 0.001$). Positive attitude

TABLE 2. COVID-19-related characteristics and vaccination status (N=300).

	<i>n</i>	%
<i>Do you think you are at risk for COVID-19?</i>		
Yes	297	99.0
No	3	1.0
<i>Have you been diagnosed with COVID-19?</i>		
Yes	52	17.3
No	248	82.7
<i>Are you/your relative afraid of contracting COVID-19?</i>		
Yes	300	100.0
<i>Are you knowledgeable about COVID-19?</i>		
Yes	300	100.0
<i>Have you been vaccinated since receiving your cancer diagnosis?</i>		
Yes	102	34.0
No	198	66.0
<i>What vaccines have you received?[†]</i>		
Influenza vaccine	34	11.3
Pneumococcal vaccine	39	13.0
Hepatitis vaccine	23	7.7
Tetanus vaccine	29	9.7
COVID-19 vaccine	233	77.7
<i>Why are you not vaccinated against COVID-19?[†]</i>		
Side effects	58	19.3
I am afraid of it	32	10.7
The effects were evaluated in the short term	13	4.3
I have little knowledge about the vaccine	3	1.0
Vaccination is unnecessary	11	3.7

[†]Multiple answers were possible; row percentages were determined based on total sample number.

TABLE 3. Attitudes towards the COVID-19 vaccine (N=300).

	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
I want my family to get vaccinated.	4.51	0.88	1.00	5.00
I want to get vaccinated as soon as possible.	4.40	0.91	1.00	5.00
I think everyone should get vaccinated.	4.31	1.00	1.00	5.00
I trust the explanations made about the vaccine	4.33	0.93	1.00	5.00
Positive Attitudes Subscale	4.39	0.85	1.00	5.00
The vaccine may cause spread of the disease.	4.20	1.05	1.00	5.00
The vaccine is not protective.	4.26	0.98	1.00	5.00
The vaccine is dangerous.	4.31	0.95	1.00	5.00
The vaccine's effectiveness has not been tested.	3.99	0.85	1.00	5.00
I can get through the pandemic without a vaccine.	4.10	0.99	1.00	5.00
Negative Attitudes Subscale	4.17	0.82	1.00	5.00

scores were lower in participants with colorectal cancers compared to those breast, gynecological, and upper gastrointestinal cancers ($p=0.007$). Age, education level, occupation, comorbidity, previous COVID-19 diagnosis, and being vaccinated after receiving the cancer diagnosis were not associated with positive attitudes towards the COVID-19 vaccine.

DISCUSSION

In addition to personal protective measures, vaccination is a key method of preventing the rapid spread of SARS-CoV-2. However, the accelerated development of COVID-19 vaccines has resulted in many questions among cancer patients, as in other groups^{1,6,15}. The present study was conducted to determine the attitudes and concerns of cancer patients towards the COVID-19 vaccine and associated factors.

Patients diagnosed with breast, colorectal, and lung cancers comprised the majority of our study group. As in the rest of the world, breast cancer is the most commonly diagnosed cancer among women in Turkey^{3,11,18}. Most patients in our study had at least one chronic disease, most frequently hypertension and diabetes. As the patients in our study were middle aged, conditions such as diabetes, hypertension, and congestive heart failure are expected in this group^{1,19}. In addition, hypertension is more prevalent in patients with cancer compared to the general population²⁰. The literature indicates that rates of COVID-19 morbidity and mortality are higher in people with hypertension, chronic lung disease, and diabetes²¹. Therefore, the coexistence of these diseases with cancer further increases the risk of COVID-19 for these patients^{21,22}.

It has been reported previously that most cancer patients are afraid of contracting COVID-19^{11,12,23}. The main motivations for being vaccinated are a sense of responsibility, as well as fear of con-

tracting a serious disease and fear of transmitting the disease to relatives^{22,23}. All patients included in our study stated that they feared COVID-19 infection both in themselves and their family.

In a cohort study including 1044 cancer patients, investigation of the causes of death among the 319 patients who died revealed that 295 of the patients had died due to COVID-19. Therefore, it has been emphasized that cancer patients should have vaccination priority^{9,21,22,24}. Most of the patients who participated in our study reported they had not yet contracted COVID-19 at the time of the study.

A large proportion of the participants in this study said they had not received any vaccines since being diagnosed with cancer. Many people in the United States have shown skepticism about receiving the COVID-19 vaccine. This is primarily attributed to the lack of a consistent message from health institutions and the resulting distrust that people developed²⁵. There is a gap in the literature in terms of large-scale prospective studies of neutralizing antibody or T-cell responses in COVID-19 for cancer patients. Similarly, data on the immunological responses induced by SARS-CoV-2 vaccines and their effectiveness are reported to be insufficient for this group^{11,13,24}. However, most participants in our study group were vaccinated against COVID-19. Many studies on vaccine resistance have yielded different results. In a study 536 cancer patients intended to be vaccinated as soon as it was available, 297 said they were not ready yet but could change their minds, and 166 participants absolutely refused the COVID-19 vaccine²². Fear of side effects has been identified as the main cause of vaccine hesitation^{15,22,26}. The main reason for the studies for vaccine rejection was that patients believed it was not compatible with their disease or treatment^{1,11,22}. In our study, the majority of unvaccinated patients cited fear of vaccine side effects as their reason.



In a systematic study conducted among health care professionals observed that negative attitudes were associated with factors such as vaccine side effects, the newness of the vaccine, not having enough time to make a decision, family history of COVID-19, lack of adequate clinical research, not getting flu vaccines regularly, participants not knowing the type of vaccine allowed in their country, and vaccine safety and efficacy⁶.

In our study, negative attitudes were less strong in single people compared to those who were married or widowed and were stronger in participants with undergraduate or postgraduate education compared to those with no or lower education. We observed no relationship between negative attitudes and gender or occupation.

There is a global dearth of information on vaccination among patients with chronic disease. It is known that most people are afraid of being vaccinated due to a lack of information about COVID-19 vaccines²⁷. This suggests that patients who resist vaccination could be persuaded through education or information¹⁵. Therefore, oncologists and nurses have an important responsibility in this regard²².

Brodziak et al¹ reported that patients who had a positive attitude towards vaccination were mostly female, more educated, lived in major metropolitan areas, and were professionally active. A study by Bai et al² showed that students living in cities and attending courses related to the health sciences were more positive about accepting a future COVID-19 vaccine. In the same study, the likelihood of vaccine acceptance was found to be higher among university students who were worried about contracting COVID-19, had heard about COVID-19 vaccines before, believed that vaccines are safe and could protect people from COVID-19, and encouraged friends and family to get vaccinated². Barriere et al²² observed in their study that male patients and those over 69 years of age had a more positive attitude toward vaccination. They also determined that having received the flu vaccine (n=514) was a predictor of COVID-19 vaccine acceptance.

In our study, we determined that gender, marital status, cancer diagnosis, and COVID-19 vaccination status were factors associated with positive attitudes towards the COVID-19 vaccine. Positive attitudes were higher in women, single people, and those who were vaccinated against COVID-19. Positive attitudes were not associated with age, education level, occupation, comorbidity, COVID-19 history, or being vaccinated after receiving their cancer diagnosis.

Study Limitations

Limitations of our study were that the participants in the sample came from a single institution and were all in the acute care period. These factors and the relatively small number of patients limit the generalization of our results.

CONCLUSIONS

In conclusion, the participants in our study exhibited an overall positive attitude towards the COVID-19 vaccine. However, there were concerns about potential adverse effects of the vaccine. Considering that COVID-19 and cancer are currently among the biggest threats to human health, more emphasis should be placed on patient education about vaccination. To improve vaccination rates, oncology team members should be informed about adult vaccination programs and jointly organized patient education programs should be prepared and presented by multiple stakeholders.

ETHICAL APPROVAL:

The study was approved by the Istanbul University-Cerrahpaşa Noninvasive Clinical Research Ethics Committee (no: 193679) and institutional approval was obtained (no: 20237).

INFORMED CONSENT:

All participants were informed of the purpose of the study and that their data would remain confidential, and all provided informed consent to participate in the study.

AVAILABILITY OF DATA AND MATERIAL:

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

CONFLICT OF INTERESTS:

The authors declare that they have no conflict of interest to disclose.

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AUTHORS' CONTRIBUTIONS:

All authors made substantial contributions to the study's conception and design, data acquisition, and collective analysis and interpretation. All authors were involved in collecting materials and drafting and critically revising the manuscript. All authors have approved the final version, take responsibility for its content, and have agreed to be accountable for the accuracy and integrity of the work.

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