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Acceptance of COVID-19 Vaccination and Its Associated Factors Among Cancer Patients Attending the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina: A Cross-Sectional Study

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Background: The pandemic of Coronavirus infectious disease 2019 (COVID-19) poses a major public health challenge, and an effective vaccine is the potential mechanism to resolve this specific situation. The present study aimed to evaluate acceptance of COVID-19 vaccination among patients attending the Oncology Clinic of University Clinical Hospital Mostar.


Material/Methods: This cross-sectional observational study enrolled 364 patients with cancer from the Oncology Clinic of University Clinical Hospital Mostar during February 2021. Data were collected using a questionnaire that captured general information about the participants and their attitudes toward COVID-19 vaccination.

Results: Of the participants, 41.8% answered "Yes" when asked if they would take the vaccine once it becomes available, 37.6% answered "Not sure", and 20.6% answered "No". For patients in favor of vaccination, the main reasons reported were fear of getting sick (77.6%), the desire to contribute to herd immunity (57.8%), and trusting the recommendations of health professionals (57.2%). The main reasons for the patients' vaccination refusal/indecision were doubts about the results from clinical trials of COVID-19 vaccines (49.1%), concerns about adverse effects (24.5%), and confusion about the various vaccine options (19.8%). The majority of participants (82.4%) stated that recommendation by their oncologist could influence their decision about vaccination. Of the participants who indicated unwillingness (refusal or indecision) to be vaccinated against COVID-19, 65.3% stated that recommendation by their oncologist could influence their decision about vaccination.

Conclusions: The findings from the present study showed most patients had refused or were indecisive regarding immunization with COVID-19 vaccine. Increasing physician awareness of this situation may result in higher rates of vaccination.

Keywords: COVID-19 • Neoplasms • Patients • Vaccination

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Background

The pandemic caused by Coronavirus infectious disease 2019 (COVID-19) continues to affect all aspects of our lives [1].

From the beginning of the pandemic in Bosnia and Herzegovina (BiH) in March 2020 to April 19, 2021, according to the Institute for Public Health Federation of BiH, there were 17 125 confirmed cases of COVID-19 in Mostar [2]. The City of Mostar is the administrative center of Herzegovina-Neretva Canton of the Federation of BiH, with a total population of 105 797 according to the results of the most recent 2013 population census in BiH [3]. There is no cancer registry in BiH and we do not have epidemiological data about the number of cancer patients infected by severe acute respiratory syndrome-related Coronavirus-2 (SARS-CoV-2). According to estimates from the International Agency for Research on Cancer (IARC), 14 673 new cancer cases and 9 209 related deaths occurred in 2020 in BiH [4].

The Oncology Clinic of University Clinical Hospital Mostar is the only specialized oncology institution in the southwestern part of BiH that covers the needs for all forms of oncology treatment and care for more than half a million people.

Vaccination is getting more attention as a strategy to combat the COVID-19 pandemic [5] and it seems to be the best solution for a long-term response to this pandemic. However, a vaccine must be accepted and used by the vast majority of the population to be successful [6].

Patients with cancer have been shown to have higher infection rates of SARS-CoV-2 than the general population, and cancer patients with COVID-19 had worse conditions and clinical outcomes [7,8]. The results from another study showed that patients with COVID-19 and cancer had similar outcomes compared to matched patients without diagnosis of cancer [9].

The American Society of Clinical Oncology (ASCO) and the Infectious Diseases Society of America (IDSA) hosted a webinar titled "COVID-19 Vaccine & Patients with Cancer" on December 17, 2020 to address the effectiveness of COVID-19 vaccination and provide expert opinion on its use in cancer patients. Although it should be mentioned that patients receiving treatments have been excluded from enrollment in vaccine trials to date, there is little to no information on the vaccines' safety and effectiveness in cancer patients, and the panel of experts concluded that the vaccines have been shown to be safe and effective for the general population, and there was no indication that they would not be safe for most cancer patients [10].

Despite the lack of evidence for vaccination in cancer patients, there is sufficient evidence to support anti-infective vaccination

in general (excluding live-attenuated vaccines and replication-competent vector vaccines) even in cancer patients receiving immunosuppressive therapy [11-13]. The World Health Organization (WHO) considers the elderly and healthcare professionals as main priorities for vaccination against COVID-19 (phases 1b and 1a, respectively), followed by cancer patients (phase 2) [14,15], and in the United States of America (USA), professionals are considered priorities (1a), followed by cancer patients and the elderly (\geq age 65 years) (1b) [16].

Vaccination against COVID-19 has now started in several countries around the world [17], and vaccination in BiH is planned to start soon, but at this moment there is no available data on exactly when [18]. It is known that vaccines in general help to reduce morbidity and mortality, and patients receiving cancer treatment, as a vulnerable population, should be considered for age- and indication-appropriate vaccinations as a certain vaccine-preventable diseases are more common in cancer patients and are linked to worse health outcomes. Many risk factors, including immunological suppression, old age, comorbidities, and malnutrition, contribute to this. Despite these facts, anti-vaccination beliefs and activities have always persisted in response to vaccines and vaccination as a technique of infectious disease prevention. Negative views regarding vaccination, as well as fears of adverse effects, are among the reasons for vaccination refusal [19-21]. Given the large proportion of cancer patients, vaccination is important to gain collective immunity and also to provide protection to patients because cancer treatment delays for any reason, including COVID-19, may lead to worse outcomes of oncology treatment.

According to our literature review, few studies have been conducted to assess the cancer population's attitudes toward COVID-19 vaccination [22,23] and there is lack of evidence in this area. To the best of our knowledge, no previous published research has evaluated the intent of patients with cancer from BiH to be vaccinated against COVID-19 when a vaccine becomes available.

The aim of this study was to understand the attitudes among cancer patients toward vaccination with a potential COVID-19 vaccine. This was a survey of willingness of oncology patients to receive the COVID-19 vaccine.

Material and Methods

Study Design

We conducted a cross-sectional, observational survey. Ethics approval was obtained from the Hospital Ethics Committee at University Clinical Hospital Mostar (number 857/21). This study was performed following institutional guidelines and

all procedures followed were in accordance with the Helsinki Declaration of 1975 in its most recent version. Participation in the study was voluntary. All participants gave their written informed consent.

Setting

The present study included oncology patients at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina. Data were collected during February 2021. All cancer patients visiting the Oncology Clinic in that period were invited to participate in this study. After completing a scheduled appointment, patients were asked to respond to a questionnaire by a physician. Patients were clearly informed about the background and objectives of the study. Questions related to medical history (cancer type, therapeutic status, therapeutic strategy, presence of comorbidities and allergies) and how to use the questionnaire were explained to patients who agreed to participate in the study. After obtaining their written informed consent, physicians asked patients to complete the self-administered questionnaire in a separate and quiet room. Participants returned their filled-out questionnaires to locked drop-boxes.

Participants

Cancer patients 18 years of age and older at any stage of cancer treatment, including before, during, and after treatment and patients on surveillance, were eligible to participate. Patients were volunteers who agreed to fill out the survey. Refusals were not documented.

All patients visiting the Oncology Clinic in the period of recruitment were invited to participate in this study and asked to complete a questionnaire. The Oncology Clinic of University Clinical Hospital Mostar is consulted by approximately 10 000 patients annually. During the study recruitment period, in February 2021, during which preventive measures were in force that limited the number of patient visits, a total of 600 patients were available for testing, 364 of whom agreed to participate in the study.

Variables

Variables analyzed for all patients included sociodemographic data (age, gender, residence area, educational level, employment status, marital status), medical history variables (presence of allergies, cancer type, therapy status, therapeutic strategy, presence of comorbidities), and variables related to questions about the participants' experience with COVID-19, including attitudes toward potential COVID-19 vaccination (including questions about participants' willingness to be vaccinated against COVID-19 and their reasons), and information about previous vaccination against seasonal flu.

Data Sources/Measurements

To create the survey, we performed a literature review to identify current COVID-19 vaccination data and guidelines and recent studies of vaccination against other diseases among cancer patients [22-27]. Surveys were peer-reviewed by the authors of the article and pretested with a sample group of 20 patients to assess the clearness of the questionnaire (to improve choice of words and readability of expression of the study variables). On the basis of their suggestions, the questionnaire was revised to the final form.

The final version of the questionnaire took between 5 and 10 minutes to complete. The questionnaire was distributed in Croatian, one of 3 official languages in BiH. A copy of the administered questionnaire in Croatian and translated into English can be found in **Supplementary Material**.

The questionnaire comprised baseline participants' information (age, gender, area of living, educational level, employment status, marital status, presence of allergies, cancer type, therapeutic status, therapeutic strategy, comorbidities); information about the participants' experience with COVID-19; attitudes toward potential COVID-19 vaccination, including questions about participants' willingness to be vaccinated against COVID-19 and their reasons (multiple-choice questions); and information about previous vaccination against seasonal flu.

Participants were asked to indicate if they had COVID-19 by answering "yes" or "no".

Participants were asked whether they would accept receiving COVID-19 vaccines once the vaccine becomes approved and available in BiH, with 3 response options: "yes", "no", or "not sure". Patients who answered "yes" or "no"/"not sure" were asked to indicate their reasons (multiple-choice questions). For analysis, responses to the attitudes section were combined. For example, the responses "no" and "not sure" were combined into a single category.

Participants were also asked to respond to whether they had enough information about the vaccine and its safety with responses "yes" or "no". On the question "How much would recommendation of your oncologist influence your decision to get vaccinated against COVID-19?", respondents were asked to respond "There is no influence on my decision" or "It is the key factor for my decision" or "It would be one of the factors for my decision." Additionally, participants were asked to report whether they had previously received a seasonal flu vaccine and whether their general practitioner (GP) recommend it to them.

Bias

Participants were assured of the anonymity and confidentiality of their responses, which helped to minimize the possible bias caused by self-reported data. To minimize potential desirability bias, patients completed questionnaire in a separate and quiet room, without the presence of medical staff.

Study Size

The study was designed as a cross-sectional survey, so we sought to include all available patients at our institution. Since we did not evaluate the effects of any particular intervention, we did not conduct a sample size calculation. All patients visiting the Oncology Clinic during recruitment in February 2021 were invited to participate in this study, and total of 364 patients agreed to take part in the study. At that time, epidemiological measures were still in place and the number of patient visits was limited (many normally face-to-face follow-up appointments were changed to appointments by email, phone, or fax). It was not yet known when the official vaccination in our region would begin.

Quantitative Variables

The variable age was divided into 4 categories: <40 years old, 40-54 years old, 55-64 years old, and >64 years old.

Statistical Methods

IBM SPSS Statistics v. 23.0 was used for statistical analysis. We defined descriptive measures, including absolute value and percentages. Multivariate analysis (logistic regression) was used to study the association between study population characteristics and survey outcomes. The chi-square test of independence was used to evaluate relationship between being infected with COVID-19 and willingness to vaccinate against COVID-19. $P < 0.05$ was an indicator of significance.

Direct logistic regression was performed to evaluate the effect of multiple factors on the probability that participants would answer positively to the question about their willingness to get a COVID-19 vaccine. The model consists of 8 independent variables (comorbidities – no vs yes; sex – female vs male; information about COVID-19 vaccines – insufficient vs sufficient; influenza vaccination – no vs yes; recommendation of GP to vaccinate – no vs yes; allergies – no vs yes; age; residence area – rural area vs urban area).

Results

Baseline Characteristics of the Participants

The study sample included 364 patients from the Oncology Clinic of University Clinical Hospital Mostar, the majority of whom were women (61.5%). Of the participants, 3.0%, 23.4%, 34.6%, and 39.0% were aged <40, 40 to 54, 55 to 64, and >64 years, respectively. The mean age was 61.6 ± 11.2 years. Most of the participants were married (81.9%) and had a secondary level of education (56.6%). Most of the participants (76.4%) were not employed. The majority of patients (56%) lived in urban areas. Most of the participants were patients with a diagnosis of breast cancer (35.2%) or gastrointestinal cancer (28.8%). A total of 309 (84.9%) oncology patients did not have allergies. Of the participants, 80.2% were actively receiving anticancer therapy; 31.3% were treated with adjuvant or neoadjuvant therapy, 44.0% with therapy in metastatic setting, 4.9% with primary cancer treatment, and 19.8% of participants were in follow-up or had not been treated in the last 3 months. More than half (58.8%) had other chronic diseases. Baseline characteristics of the participants are shown in **Table 1**.

Information About the Participants' Experience with COVID-19 and Attitudes Toward Potential COVID-19 Vaccination

Of the participants, 18.9% were already infected with SARS-CoV-2. The chi-square test of independence did not reveal a significant relationship between being infected with SARS-CoV-2 and willingness to be vaccinated against COVID-19 ($P = 0.676$).

Of the participants, 41.8% answered "Yes" when asked if they would take the vaccine once it becomes available, 37.6% answered "Not sure", and 20.6% answered "No".

For patients in favor of vaccination, the main reason they reported was fear of getting sick (77.6%). Other reasons reported by patients in favor of vaccination are shown in **Figure 1A**. The main reason for the patients' vaccination refusal/indecision was doubt about the results of clinical trials of COVID-19 vaccines (49.1%). Other reasons for the patients' vaccination refusal/indecision are shown in **Figure 1B**. None of the patients who refused or were in doubt about vaccination stated it was because of religious belief. Most participants (82.4%) stated that recommendation by their oncologist could influence their decision about vaccination.

Knowledge and Perceptions About COVID-19 Vaccine Based on Willingness to Vaccinate

Figure 2 shows that the most patients who indicated willingness to be vaccinated against COVID-19 (65.10%) stated they

Table 1. Baseline characteristics of participants. Survey of patients with cancer at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina, 2021.

| Variables | Frequency (n) | Percent (%) |
|--------------------------|---------------|-------------|
| Gender | | |
| Female | 224 | 61.5 |
| Male | 140 | 38.5 |
| Age groups | | |
| <40 years old | 11 | 3.0 |
| 40-54 years old | 85 | 23.4 |
| 55-64 years old | 126 | 34.6 |
| >64 years old | 142 | 39.0 |
| Educational level | | |
| Primary school | 65 | 17.9 |
| High school | 206 | 56.6 |
| College | 93 | 25.5 |
| Employment status | | |
| Yes | 86 | 23.6 |
| No | 278 | 76.4 |
| Allergies | | |
| Yes | 55 | 15.1 |
| Drugs allergies | 25 | |
| Other allergies | 30 | |
| No | 309 | 84.9 |
| Cancer type | | |
| Breast cancer | 128 | 35.2 |

| Variables | Frequency (n) | Percent (%) |
|-----------------------------|---------------|-------------|
| Gynecological cancer | 38 | 10.4 |
| Urogenital cancer | 53 | 14.6 |
| Respiratory tract cancer | 22 | 6.0 |
| Gastrointestinal cancer | 105 | 28.8 |
| Other malignancies | 18 | 4.9 |
| Comorbidities | | |
| Yes | 214 | 58.8 |
| No | 150 | 41.2 |
| Marital status | | |
| Married | 298 | 81.9 |
| Unmarried | 66 | 18.1 |
| Area of living | | |
| Urban | 204 | 56.0 |
| Rural | 160 | 44.0 |
| Therapy status | | |
| Active therapy | 292 | 80.2 |
| Surveillance | 72 | 19.8 |
| Therapeutic strategy | | |
| Adjuvant/neoadjuvant | 114 | 31.3 |
| Metastatic disease | 160 | 44.0 |
| Primary therapy | 18 | 4.9 |
| No therapy | 72 | 19.8 |

had sufficient information about vaccines, 23.00% thought that vaccines were safe for oncological patients, 85.60% stated that recommendation of their oncologist could influence their decision about vaccination, 21.70% of them had been vaccinated against seasonal flu, and 27% stated that their GP recommended vaccination. Of the patients who indicated unwillingness (refusal or indecision) to be vaccinated against COVID-19, 34.70% stated they had sufficient information about vaccines, 25.30% thought vaccines were safe for oncological patients, 65.30% stated that recommendation of their oncologist could influence their decision about vaccination, only 4% of them had been vaccinated against seasonal flu, and 12% stated that their GP recommended vaccination.

Logistic Regression

Logistic regression modeling showed statistically significant results for all predictors (χ^2 8, N=364, $P<0.001$), which shows that our model distinguished participants who wanted to be vaccinated from those who did not. The model in total explains between 22.4% (Cox & Snell R Square) and 30.1% (Nagelkerke R Square) of variance of willingness to get a COVID-19 vaccine status and accurately classifies 72.3% of cases. As shown in **Table 2**, 3 of the independent variables gave a unique statistically significant contribution to the model (gender, information about COVID-19 vaccines, and recommendation of GP to vaccinate). The strongest predictor of willingness to be vaccinated is sufficient information about COVID-19 vaccines, with odds ratio (OR) of 3.97 (95% CI 2.43-6.49). Participants who answered that they had sufficient information about COVID-19

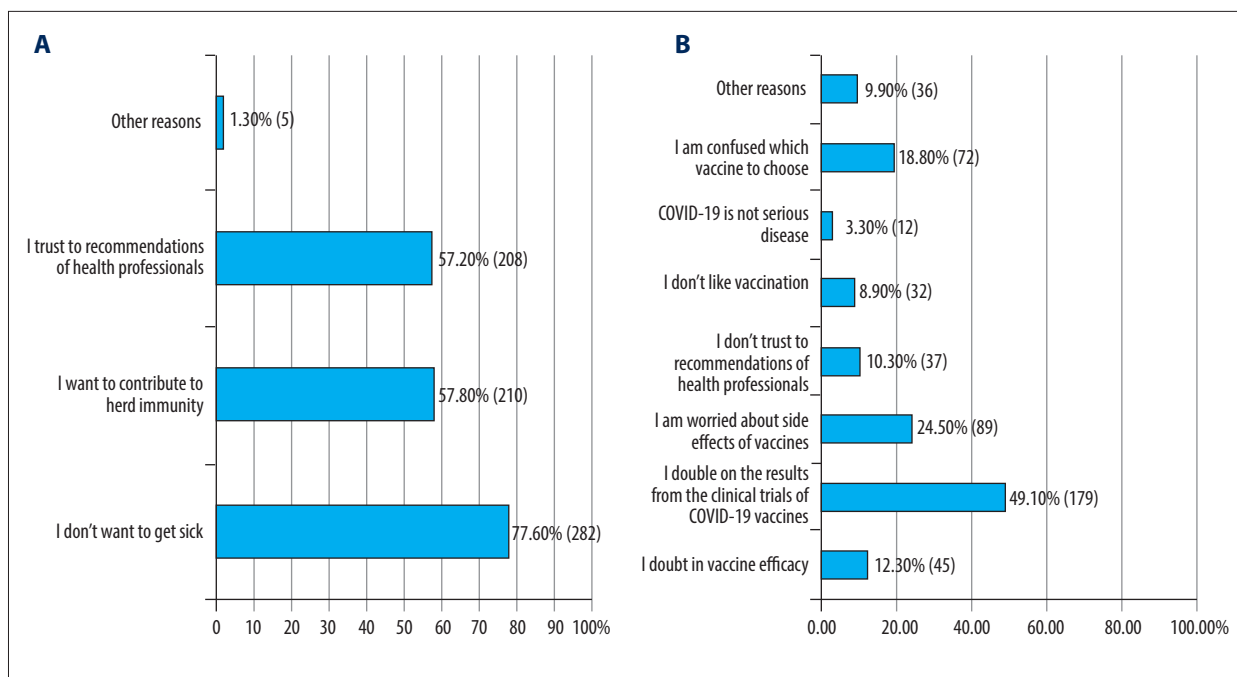


Figure 1. (A) Reasons for willingness to get vaccinated against COVID-19 among patients with cancer at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina, 2021. **(B)** Reasons for unwillingness to get vaccinated against COVID-19 among patients with cancer at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina, 2021 (Microsoft Excel 2013).

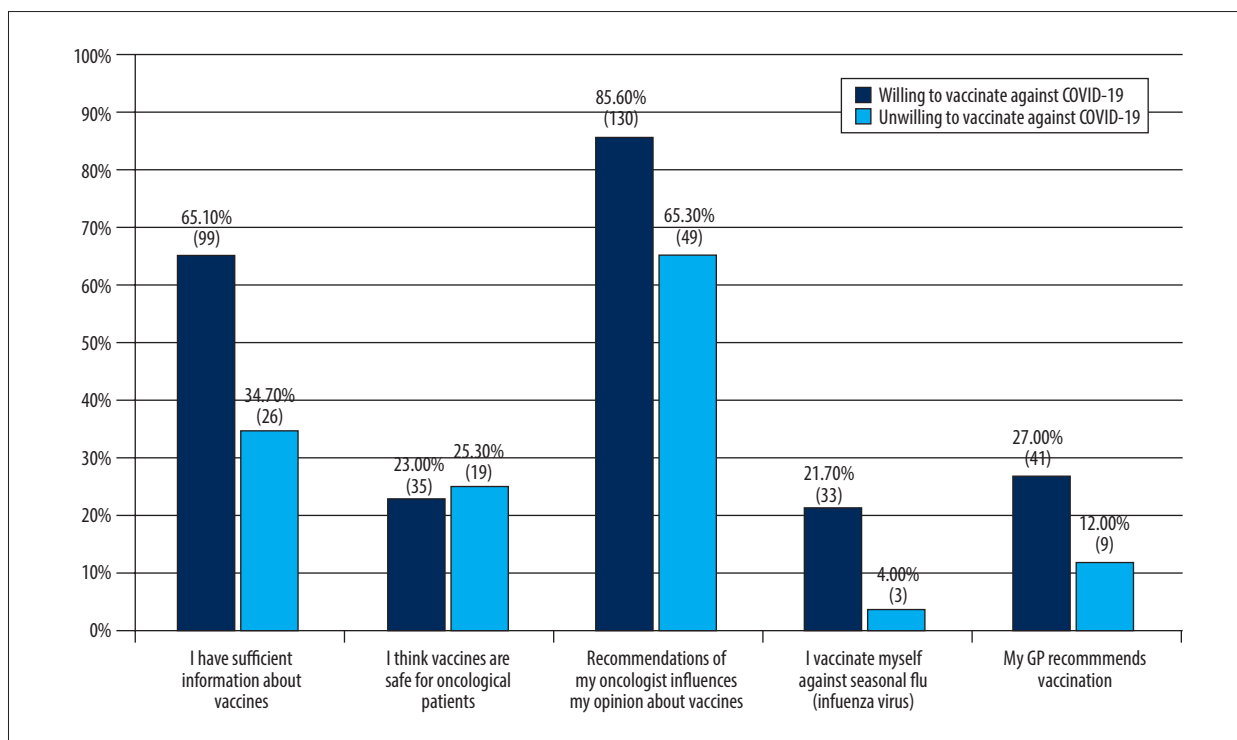


Figure 2. Knowledge and perceptions about COVID-19 vaccine based on willingness to be vaccinated among patients with cancer at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina, 2021 (Microsoft Excel 2013).

Table 2. Probability prediction of answer that participant is willing to get the COVID-19 vaccine. Survey among patients with cancer at the Oncology Clinic of University Clinical Hospital Mostar, Bosnia and Herzegovina, 2021.

| Independent predictors (reference variable) | p-value | OR | 95% C.I. for EXP (B) | |
|--|---------|-------|----------------------|-------|
| | | | Lower | Upper |
| Comorbidities (no) | 0.529 | 0.845 | 0.500 | 1.428 |
| Gender (Female) | <0.001 | 3.105 | 1.876 | 5.139 |
| Information about COVID-19 vaccines (insufficient) | <0.001 | 3.974 | 2.432 | 6.494 |
| Influenza vaccination (no) | 0.099 | 1.947 | 0.881 | 4.301 |
| Recommendation of general practitioner for vaccination (no) | 0.021 | 2.335 | 1.138 | 4.791 |
| Allergies (no) | 0.420 | 0.747 | 0.368 | 1.517 |
| Age | 0.605 | 1.006 | 0.983 | 1.030 |
| Living area (rural area) | 0.225 | 1.360 | 0.828 | 2.235 |

vaccines were almost 4 times more likely to answer that they want to be vaccinated. Since being a female was marked as a reference category, the OR of 3.1 (95% CI 1.88-5.14) for gender covariate means that men are almost 3 times more likely to answer that they want to be vaccinated.

History of Influenza Vaccination

The majority had not received an influenza vaccine in previous years (86.3%). A total of 300 participants (82.4%) stated that their GP did not recommend vaccination against influenza.

Discussion

This study presents results addressing the attitudes and beliefs of cancer patients toward COVID-19 vaccination. It is unclear how active treatment affects a patient's ability to mount protective immunity against COVID-19 after vaccination, and studies stratifying patients by type of treatment and the type of vaccine are a top priority for the international oncology community [22,23].

Given the importance of this topic, and for physicians and other health professionals to promote vaccination, it is necessary to better understand patients' attitudes regarding vaccines.

Our study shows that the majority of cancer patients expressed unwillingness (refusal/indecision) to be vaccinated against COVID-19, which does not agree with other surveys, in which the majority of participants showed willingness to be vaccinated against COVID-19 [22,23,28].

Given the obtained results, which differ from those of other studies, it was also important to investigate patients' opinions about their willingness to be vaccinated against COVID-19 and earlier vaccination behaviors, in order to identify and understand the reasons for vaccination hesitance, which could help us address this problem.

One reason that could explain above results is the smaller number of patients previously vaccinated against influenza virus in our study (13.7%), in contrast to the cancer patients in the French study (52.2%) because previous influenza vaccination is considered a predictor for vaccination acceptance [22].

The lower percentage of patients vaccinated against influenza, as shown by the results of our study and in accordance with results from previous studies [25-27], can be explained by the lack of recommendations from attending physicians (the majority of participants in our study stated that their GP did not recommend vaccination against influenza). Results from previous studies, including those among cancer patients and also in the general population, have confirmed the role of primary physicians in increasing influenza vaccination awareness and acceptance [25-27,29].

The results from the present study showed that the most patients stated that recommendation of their oncologist could influence their decision about vaccination. It is important to emphasize that among the participants who indicated unwillingness (refusal or indecision) to be vaccinated against COVID-19, most stated that recommendation of their oncologist could influence their decision about vaccination. Similar findings have also been confirmed in other surveys, including those related to influenza vaccination [22,25-27], emphasizing

the importance of primary physicians and mostly clinical oncologists in promoting vaccine acceptance among cancer patients.

Accordingly, increasing oncologists' awareness of this problem, as well as counseling and educating patients about it, could result in a higher rate of vaccine acceptance, especially in countries where there is a lack of public vaccination campaigns. This is important because results from the present study also showed that the strongest predictor of willingness to vaccinate was sufficient information about COVID-19 vaccines, which can be provided during medical consultations.

However, it should be emphasized that the provision of oncology services during the pandemic has contributed to mental health challenges among health care workers, and preventive measures should be taken to address these problems, which negatively impact the delivery of appropriate care for patients with cancer [30,31].

Another reason that may influence patients' decision about vaccination against COVID-19 is their therapeutic status. Accordingly, a study of Romanian adults with cancer only included patients under treatment, as they might be afraid of possible cancer treatment delays because of possible COVID-19 infection. The present study also included patients who were in follow-up [28].

Our study also revealed the main reasons for the refusal/indecision of the patients to vaccination, which included doubts about the results of clinical trials of COVID-19 vaccines, concerns about adverse effects, and confusion about different vaccine options.

Previous studies of COVID-19 vaccine acceptance, including those among cancer patients and also the general population, revealed similar attitudes [6,22,32,33].

The present study has several limitations. Because of the cross-sectional design, longitudinal follow-up is lacking. The vaccine was not available at the time this study was conducted, and participants' vaccination intentions may differ when

the vaccines become available. Also, our study did not include patients who responded to the survey by email, phone, or fax. This could also affect the results of our study, as these patients are probably more likely to be in greater fear of COVID-19 and more of these patients may be in favor of vaccination. The public COVID-19 vaccination campaigns have been launched around the world. Lack of such public campaigns in BiH may be one of the reasons why a slightly smaller percentage of patients would accept vaccination against COVID-19.

This was a single-institution study and the results we obtained do not give a complete picture of vaccination acceptance among oncology patients with cancer in BiH.

Conclusions

In summary, our study showed the COVID-19 vaccination refusal/indecision of a majority of patients in active cancer therapy or on surveillance, mainly because of doubts in clinical trials of COVID-19 vaccines, concerns about adverse effects, and confusion about different vaccine options.

It is also important to emphasize that most patients stated that recommendation of their oncologist could influence their decision about vaccination.

Healthcare professionals must raise awareness about the importance of vaccination in preventing infection and gaining herd immunity.

Department and Institution Where Work Was Done

Oncology Clinic, University Clinical Hospital Mostar, Mostar, Bosnia and Herzegovina.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors, who confirm that the images are original with no duplication and have not been previously published in whole or in part.

Supplementary Material

Questionnaire about acceptance of potential COVID-19 vaccination among cancer patients at Oncology Clinic of University Clinical hospital Mostar, Bosnia and Herzegovina, 2021. English version (translated)

Date: ___/___/____; Age (years): _____; Gender: Male Female

Education level: Elementary education / High school / College

Occupation: Unemployed / Employed

Town: _____; County: _____

Area of residence: Rural area / Urban area; Marital status: Married / Not married

Oncological diagnosis: _____

Therapy status: _____; Therapeutic strategy: _____

Do you have any allergies? Yes / No/ If answer is yes, indicate the type of allergy: Drugs allergies / Other

1. Are you diagnosed with other chronic conditions, except for cancer? Yes No

If yes, please indicate it (multiple answer choice):

Cardiac Pulmonary Autoimmune Diabetes mellitus Arterial hypertension

Renal (kidney failure) Hepatic (hepatitis) Other diseases: _____

2. Have you been infected with COVID-19? Yes No

3. Would you accept a vaccine against the COVID-19 virus once the vaccine becomes approved and available in our country?

Yes No Not sure

4. If yes, please select a reason (multiple answer choice).

- I do not want to get sick from COVID-19
- I want to contribute to the herd immunity
- I trust to recommendations of health professionals
- Other

5. If no, please select a reason (multiple answer choice).

- I doubt in vaccine efficacy in this case
- I doubt on the results from the clinical trials of COVID-19 vaccines
- Because of side effects
- I do not believe to recommendations of health professionals
- I generally don't like to vaccinate
- I don't believe that COVID-19 is a serious disease
- I am confused because of the different vaccination options
- Because of religious beliefs
- Other

6. Do you think you have enough information about COVID-19 vaccine and its safety? Yes No

7. Does your diagnosis of cancer and course of treatment influence your decision about vaccination?

Yes No Not sure

8. How much would recommendation of your oncologist influence your decision to get vaccinated against the COVID-19?

- There is no influence on my decision
 It is the key factor for decision
 It is one of the factors for decision

9. Have you been vaccinated with the influenza vaccine (since you know about diagnosis of your malignancy)?

Yes No

10. Did your GP recommend you vaccination against Influenza virus? Yes No

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