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ORIGINAL ARTICLE

Are COVID-19 Vaccine Preference and COVID-19 Risk Differ in Individuals Living with HIV from The Normal Population?

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ABSTRACT

Objectives: Coronavirus disease 2019 (COVID-19) may have a severe course in high-risk patients and people living with Human immunodeficiency virus (HIV, PLWH)) are also in this risk group. The aim of the study was to compare the history of COVID-19, vaccination status, vaccine doses, and vaccine preferences of PLWH with the normal population.

Materials and Methods: This study was a retrospective cross-sectional survey study. The PLWH were study group and patients without chronic disease were selected as a control group.

Results: A total of 326 patients, 163 HIV positive and 163 without chronic disease, were included in the study. Of the patients, 142 (88.1%) were male, and the mean age was 46.69 ± 13.72 years. The number of patients who were not vaccinated was 36 (11.1%). When unvaccinated PLWH were evaluated, it was observed that women were less vaccinated than male patients (p=0.01). In PLWH, 145 (89.0%) of patients were vaccinated with single dose, 129 (79.1%) of patients with double dose, and 123 (75.5%) of patients with full dose; in the control group, 145 (89.0%) of patients with single dose, 131 (80.9%) of patients with double dose and 126 (77.3%) of patients with full dose were vaccinated. There was no difference between the groups in the preference of inactivated and mRNA vaccines (p=1.0). Before vaccination, 42 (12.9%) patients were infected. Twenty (12.3%) of these patients were in PLWH group, while 22 (13.5%) patients were in the control group. There were 28 (9.8%) patients who had COVID-19 during or after vaccination, and 10 (6.9%) of them were in PLWH group; 18 (12.4%) of them were in the control group.

Conclusion: In our study, no difference was found in the vaccination status, vaccine preference, vaccination doses and COVID-19 history between two groups.

Keywords: COVID-19, vaccination, HIV

INTRODUCTION

It is unclear whether people living with human immunodeficiency virus (PLWH, HIV) are at higher risk for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and for poorer clinical outcomes after infections [1]. There are many reasons to assume that PLWH are a high-risk group: Antibody responses are impaired in PLWH and there are risk factors associated with SARS-CoV-2 infection that can lead to poor clinical outcomes, including hypertension, diabetes, smoking, cardiovascular and lung disease [2-6]. As an alternative hypothesis, the results of more severe coronavirus disease 2019 (COVID-19) may be due to excessive immune activation, therefore it has been stated that PLWH may actually be at lower risk for poor clinical outcomes following SARS-

CoV-2 infection due to reduced immunological responses [7]. However, there is not yet sufficient data to support or refute any of these hypotheses [6].

With the active use of many vaccines worldwide, which can eliminate all the negative effects of the pandemic period and hope for the end of the pandemic, the return to normal life has begun. It has been observed that the disease is more controllable with vaccine applications [8]. In the first months of the vaccination campaign in Turkey, people classified as high risk group started to be vaccinated and PLWH was also included in this group [9]. Vaccination against COVID-19 is recommended by the World Health Organization (WHO) for PLWH even if there is a decreased immune response to vaccines [6,8].

In this study, it was aimed to compare the history of COVID-19, vaccination status, vaccine doses and preferences of PLWH with the normal population without chronic disease.

MATERIALS AND METHODS

Study design and patients

The study was a retrospective cross-sectional questionnaire study including patients who applied to outpatient clinic between June 1, 2021 and 30 November, 2021. PLWH who were followed up in Infectious Diseases and Clinical Microbiology clinic of Ankara City Hospital, were selected as study group; patients with similar age and gender, who did not have a chronic disease that suppressed the immune system and applied to the clinic within the specified date range for the study, were selected as the control group. The patients were first called by phone, and after consent form was obtained during the face-to-face interview at their subsequent visits from those who accepted the study; age, gender, COVID-19 history before or after vaccination, vaccine preference and number of doses were recorded. The last viewed count of CD4+ T cells before vaccination of the patients in the study group was obtained from the hospital automation system. According to the recommendations of the Republic of Turkey Ministry of Health, patients who received two doses of mRNA vaccine, three doses of inactivated vaccine, one or two doses of mRNA vaccine after the 2nd dose of inactivated vaccine, and patients who did not pass three months after the 2nd dose of inactivated vaccine were considered to be fully vaccinated [9].

Statistical analysis

Nominal variables were presented as number and percentage, whereas continuous variables were presented as mean ± standart deviation (SD) and median with interquartile range (IQR). The continuous variables' distribution was performed using the Kolmogorov-Smirnov test where appropriate. An Independent-sample t-test was applied to analyze normally distributed data, whereas Mann-Whitney was applied to analyze nonnormally distributed data. The Pearson Chi-square and Fisher's exact tests were applied to examine categorical data. A p-value of .05 or less was overall considered statistically significant for all analyses and comparisons. The IBM Statistical Package for the Social Sciences (SPSS) version 24 (Chicago, USA) was used to perform statistical analyses.

Ethics approval

The study was approved by Clinical Research Ethics Committee of Ankara City Hospital (E1- 21-2220).

RESULTS

A total of 326 patients, 163 HIV positive and 163 without chronic disease, were included in our study. Both groups were equal in terms of age and gender distribution, with 142 (88.1%) men and 21 (12.9%) women in each group. The mean age of the patients was 46.69 ± 13.72. The median CD4+ T cell count is 540 (IQR:430) cells/mm^3 in PLWH, and CD4+ T cell count of 11 (6.7%) patients was lower than 200 cells/mm^3.

The number of unvaccinated individuals in the entire study population was 36 (11.1%), and this number was equally distributed in both groups (n=18, 11.0%). No gender difference was found among unvaccinated patients (p=0.06). However, when unvaccinated PLWH were evaluated, it was observed that women (28.6%) had significantly less vaccination compared to male patients (8.5%) (p=0.01), and this difference was not seen in unvaccinated patients in the control group (p=1.0).

It was seen that the mRNA vaccine was preferred by 79.0% (n=113) of patients in both groups. Among patients with CD4+ T cell count below 200 cells/mm3 (n=11, 6.7%), 9 (81.8%) of them preffered mRNA vaccine; two (18.2%) of the remaining patients were vaccinated with inactived SARS-CoV-2 vaccine. All patients with low CD4+ T cell count were fully vaccinated. Demographic characteristics, vaccination rates and vaccine preferences of the patients were shown in Table 1.

The number of patients with SARS-CoV-2 infection history was 69 (21.2%), and this number was 30 (18.4%) patients in PLWH; there were 39 (23.9%) patients in the control group. After full-dose vaccination, SARS-CoV-2 infection was detected in 7 (5.9%) patients in PLWH;11 (8.7%) patients in the control group. None of the patients in the study or control groups, who received a single dose of mRNA vaccine after 2 doses of inactivated vaccine or two doses of mRNA vaccine after 2 doses of inactivated vaccine, did not develop SARS-CoV-2 infection. Two (1.2%) patients with low CD4+ T cell count had a history of SARS-CoV-2 infection, one of them prior vaccination and the other one after 2 doses of inactivated vaccine. The SARS-CoV-2 infection history of patients was shown in Table 2 according to vaccination.

It was determined that one (0.6%) patient in the study group and two (1.2%) patients in the control group died, respectively. One patient in the control group and one patient in the study group died due to COVID-19. The other patient in the control group died due to sepsis associated with urinary infection. There was no history of vaccination against SARS-CoV-2 infection in deceased patients.

DISCUSSION

Since the beginning of the pandemic, many studies have been conducted to evaluate the transmission routes of SARS-CoV-2 infection, the

Table 1. Comparison of demographic characteristics, vaccination rates and vaccine preferences of patients in the groups

Characteristics	PLWH (n=163) (n, %)	Controls (n=163) (n, %)	*p*-value
Age, mean (years, standart deviation)	46.69 ± 13.72	46.69 ± 13.72	1.0[a]
Male gender	142 (87.1)	142 (87.1)	1.0[b]
Vaccination status (unvaccinated)	18 (11.0)	18 (11.0)	1.0[b]
Vaccination history (single dose)	145 (89.0)	145 (89.0)	1.0[b]
Vaccination history (double doses)	129 (79.1)	131 (80.9)	0.89[b]
Full-dose vaccination	123 (75.5)	126 (77.3)	0.79[b]
Vaccine preference (mRNA vaccine)	113 (79.0)	113 (79.0)	1.0[b]

N: number; %: percentages; PLWH: People living with Human immunodefficiency virus.

[a]Independent sample t and [b]Chi-square tests were used.

Table 2. Distribution of SARS-CoV-2 infection before, during and after vaccine types and doses

Characteristics	PLWH		Controls		*p*-value
	N	n (%)	N	n (%)	
History of SARS-CoV-2 infection	163	30 (18.4)	163	39 (23.9)	0.28*
Prior vaccination	145	20 (12.3)	145	22 (13.5)	1.0*
During vaccination	145	10 (6.9)	145	17 (11.7)	0.16*
After full-dose vacciantion	123	7 (5.9)	126	11 (8.7)	0.46*
History of SARS-CoV-2 infection after vaccine types and doses					
First dose of inactivated vaccine	50	-	65	1 (1.5)	-[#]
Second dose of inactivated vaccine	48	4 (8.3)	65	10 (15.4)	0.76[q]
Third dose of inactivated vaccine	16	2 (12.5)	16	2 (12.5)	1.0[q]
First dose of mRNA vaccine	95	1 (1.1)	80	3 (3.7)	0.33[q]
Second dose of mRNA vaccine	86	3 (3.5)	71	2 (2.8)	0.60[q]

N: number; %: percentages; PLWH: People living with Human immunodefficiency virus; SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2.

*Pearson Chi-square and [q]Fisher's exact tests were used. [#]Statistical analysis was not made due to the small number of patients.

risk of transmission, the course of the disease, laboratory results, treatment methods and trends in vulnearable groups. PLWH were also included in the vulnerable group, and the coexistence of COVID-19 and HIV and its results have been investigated [10]. Studies evaluating the prevalence of COVID-19 in PLWH are few and they are showing conflicting results. In the literature, besides the studies reporting that SARS CoV-2 infection is more common in PLWH than in the normal population [11], there are also studies showing that there is no difference [12]. In our study, no difference was found in terms of the incidence of COVID-19 and the history of having COVID-19 before and after vaccination between the normal population and PLWH.

While there are studies showing that SARS-CoV-2 infection can be more severe in PLWH [13-16], there are also studies showing that it does not progress differently from the normal population [17-20]. Studies conducted in the first months of the pandemic period mostly consist of case reports or series, and especially the risk factors that cause the worsening of COVID-19, clinical presentations and disease results were examined [19,21,22]. In the later stages of the pandemic, with the increase in the diversity of the affected population, specific studies on PLWH have begun. In these studies, the effects of compliance with anti-retroviral therapy (ART), HIV viral load, CD4+ T cell count and the presence of comorbidities on the course of the disease were investigated, and these results seem to be inconsistent with each other [15,17,20]. The incompatible results in the studies revealed the necessity of considering the presence of confounding factors and reviewing patient-specific risk factors when evaluating the COVID-19 diagnosis, hospitalization and mortality data in PLWH.

With the initiation of vaccination against COVID-19, PLWH has been among the priority groups our country [9]. mRNA and inactivated vaccines were applied according to the preference of the patients, and vaccination programme is still ongoing. [8,23]. Vaccination against COVID-19 is recommended, although the World Health Organization and Centers for Disease Control and Prevention have stated that there is a limited possibility of efficacy in PLWH. In studies examining the efficacy and safety of two different vaccines administered in our country, it was found that the mRNA vaccine was effective, safe and had mild side effects; [24-26]; on the other hand, some inactivated vaccine studies did not include PLWH [27-29]. In the included studies, it has been shown to be effective and safe, but with less antibody responses [30-32].

In our study, there was no difference in preference between the two vaccines against COVID-19; and there was also no difference in the frequency of SARS-CoV-2 infection after immunization with mRNA or inactivated vaccines between two groups.

In a study examining vaccination anxiety and attitude among PLWH, age, gender, religious belief, marital status, occupation, income and education level were not found to have an effect on this attitude [33]. In another study conducted in black PLWH, it was stated that 97% of the patients had a feeling of insecurity about COVID-19, and more than 50% of this insecurity was related to the COVID-19 vaccine and treatments [34]. In a study from China showed that individuals who had a higher education, engaged in occupations with a higher risk of COVID-19 infection, received influenza or pneumonia vaccine in the past three years, believed in the effectiveness of vaccines and received media information regarding COVID-19 vaccine were more likely to be vaccinated. But concerning about adverse reactions, negative impact on the progression of HIV or ART, comorbidities, being unmarried and older age were negatively associated with vaccination [35]. In our study, the number of unvaccinated patients was 18 (11.0%) in each group and no difference was found. Women living with HIV were vaccinated less than men. This could be explained by the low number of female patients included in the study.

It was known that at the beginning of the pandemic period, patients' applications to health centers were delayed due to closure [2,6]. In this period, the drug reports about the chronic diseases of the patients in our country were extended by the Ministry of Health without the need to go to the hospital. This application, which was done with the benefit of the patient in mind, might have caused negative results such as not being able to answer questions about the vaccines and not being able to resolve their hesitations, since PLWH can take their medications

without coming to the hospitals. Considering that PLWH are applying to the hospitals more frequently for examinations, important duties fall on the health care providers who follow these individuals for the continuation of the normalization process. Explaining the importance, necessity and effectiveness of vaccination at each visit and creating social awareness for the continuity of normalization will only be possible with the effort of health caare professionals.

In conclusion, despite the many negative effects of the COVID-19 pandemic, it has contributed to remind health-care professionals of the importance of close follow-up of the high-risk patient population and taking the necessary urgent measures to protect them from the disease.

PLWH is included in this high-risk group. Vaccination of these patients is of great importance for the continuity of their well-being and for the provision of community immunity. In our study, vaccination status, vaccine preference, vaccination doses, history of SARS-CoV-2 infection before and after vaccination between PLWH and the normal population were evaluated and no difference was found.

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Author contribution

Study conception and design: ÇMA and AB; data collection: ÇMA and AB; analysis and interpretation of results: ÇMA and AB; draft manuscript preparation: ÇMA and AB. All authors reviewed the results and approved the final version of the manuscript.

Ethical approval

The study was approved by the Clinical Research Ethics Committee of Ankara City Hospital (Protocol no. E1-21-2220).

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Conflict of interest

The authors declare that there is no conflict of interest.

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