ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Frequency and Affecting Factors of COVID-19 Vaccine Hesitancy in Patients with Diabetes

Diyabetli Hastalarda COVID-19 Aşı Tereddütünün Sıklığı ve Etkileyen Faktörler

Mehmet Ali Eren[1], Huseyin Karaaslan[1], Sanem Gokcen Merve Kilinc[1], Veysel Altinyaprak[2], Gizem Ilgin Kaplan[1], Tevfik Sabuncu[1]

[1]Harran University, School of Medicine, Department of Endocrinology, Sanliurfa, Türkiye; [2]Harran University, School of Medicine, Department of Internal Medicine, Sanliurfa, Türkiye

ABSTRACT

Aim: *While vaccines are the most important strategy in combating the COVID-19 epidemic, their effectiveness can be greatly affected by vaccine hesitancy. Diabetes mellitus is known as an immune-compromised condition, and COVID-19 is associated with an increased risk of morbidity and mortality in patients with diabetes mellitus. For this reason, the COVID-19 vaccine is strongly recommended for diabetic patients. This study investigated the social, demographic, and clinical factors affecting vaccination frequency and vaccine hesitancy in diabetics.*

Material and Method: *A cross-sectional study used a questionnaire to determine the demographic, social, and individual characteristics of the participants who were vaccinated or unvaccinated. Patients with diabetes mellitus and having the physical and mental capacity to answer the pre-prepared questions by face-to-face survey method according to the order of admission were included. There were two groups of participants: those who received the COVID-19 vaccination (Group 1=180) and those who did not (Group 2=26).*

Results: *The frequency of vaccination was 87.4%. A comparison of the vaccinated and unvaccinated groups did not show any significant differences in terms of gender, age, type, and duration of diabetes, smoking, insulin use, marital and educational status, living place, history of COVID-19, family members with COVID-19, and relatives who died due to COVID-19. Influenza vaccination rates were also significantly lower in the unvaccinated group than in the vaccinated group (7.7% vs. 26.1%, p=0.047).*

Conclusions: *Although the COVID-19 vaccination rates of our diabetic patients were higher than the general provincial rate, they were the same as in Türkiye, regardless of demographic, social, and individual characteristics. As evidenced by the COVID-19 experience, additional information and support regarding vaccination-preventable diseases could raise the rate of other recommended vaccinations among diabetic patients.*

Keywords: *COVID-19 vaccine; diabetes mellitus; vaccine hesitancy*

ÖZET

Amaç: *Aşılama süreci, COVID-19 salgınıyla mücadelede en etkin stratejilerden biridir. Ancak, etkinliği aşı reddinden büyük ölçüde etkilenebilmektedir. Diyabetes mellitus, genel olarak immünsupresif bir durum olarak kabul edilmektedir ve bu hasta grubunda COVID-19'a bağlı morbidite ve mortalitede artış söz konusu olmaktadır. Bu nedenle diyabet hastalarına COVID-19 aşısı şiddetle tavsiye edilmektedir. Bu çalışmada diyabetiklerde aşılama sıklığı ve aşı reddini etkileyen sosyal, demografik ve klinik faktörlerin araştırılması amaçlanmıştır.*

Materyal ve Metot: *Bu kesitsel çalışmada aşı olan ve olmayan katılımcıların demografik, sosyal ve bireysel özelliklerini belirlemek için anket kullanıldı. Diyabeti olan ve soruları cevaplayabilecek fiziksel ve zihinsel kapasiteye sahip hastalar başvuru sırasına göre çalışmaya dâhil edildi. Önceden hazırlanmış sorular yüz yüze anket yöntemiyle katılımcılara soruldu. Katılımcılar COVID-19 aşısı olan (Grup 1=180) ve olmayan (Grup 2=26) olmak üzere iki gruba ayrıldı.*

Bulgular: *Aşılanma sıklığı %87,4 idi. Aşılı ve aşısız gruplar arasında yaş, diyabet yaşı, cinsiyet, diyabet tipi, insülin kullanımı, sigara kullanımı, medeni durum, yaşanılan yer, eğitim durumu, COVID-19 geçirme öyküsü, yakınlarından birinin COVID-19 geçirmesi ve yakınlarından birini COVID-19 nedeniyle kaybetmesi açısından fark yoktu. Herhangi bir zamanda influenza aşısı olma oranı aşılanmamış grupta aşılanmış gruba göre anlamlı olarak daha düşüktü (%7,7'ye karşı %26,1, p=0,047).*

Sonuç: *Diyabetik hastalarımızın COVID-19 aşılanma oranları il genelinden yüksek ve Türkiye geneli ile aynıydı ve bu durum demografik, sosyal ve bazı bireysel özelliklerden bağımsızdı. Diyabetik popülasyonda aşı ile önlenebilir hastalıkların ciddi sonuçları hakkında çeşitli ortamlarda daha fazla destek ve bilgi sağlanması, COVID-19'da olduğu gibi, önerilen diğer aşıların da uygulanma oranlarını artırabilir.*

Anahtar kelimeler: *COVID-19 aşısı; diyabetes mellitus; aşı reddi*

İletişim/Contact: *Hüseyin Karaaslan, Harran University, School of Medicine, Department of Endocrinology, Sanliurfa, Türkiye* •
Tel: *+90 535 409 80 30* • ***E-mail:*** *huseyinkaraaslan@hotmail.com* • ***Geliş/Received:*** *13.01.2023* • ***Kabul/Accepted:*** *02.10.2023*

ORCID: *Mehmet Ali Eren, 0000-0002-3588-2256* • *Hüseyin Karaaslan, 0000-0002-1271-6298* •
Sanem Gökçen Merve Kılınç, 0000-0002-5004-4111 • *Veysel Altınyaprak, 0000-0003-2698-7133* •
Gizem Ilgın Kaplan, 0000-0002-2839-0923 • *Tevfik Sabuncu, 0000-0001-6504-5355*

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Introduction

The pandemic spread of the novel coronavirus Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which causes Coronavirus Disease 2019 (COVID-19), has seriously threatened public health worldwide. Great efforts have been made globally to develop and distribute effective vaccines during the pandemic. Manufactured COVID-19 vaccines can effectively prevent serious COVID-19. By October 2022, 68.2% of the world's population had received at least one dose of COVID-19 vaccine[1]. Currently, vaccines are the most important strategy in combating this spread. Although their effectiveness depends on the frequency of vaccination in the population, it can be greatly affected by vaccine hesitancy[2,3].

Mass vaccination programs target herd immunity. This aims to vaccinate a large portion of the population to slow disease transmission. It also protects vulnerable individuals who cannot be vaccinated[4]. There is an increased incidence of vaccine hesitancy, defined as delayed acceptance of a vaccine despite its availability. Vaccine hesitancy has, therefore, led to it being listed by the World Health Organization (WHO) as one of the top 10 global health threats[5,6]. Vaccine hesitancy is a complex problem that disrupts herd immunity and arises depending on the time, place, and type of vaccine[7].

Immune system weakness is present in patients with diabetes mellitus (DM) as the result of dysfunction of neutrophils and macrophages (innate immune response) and dysfunction of T cells (acquired immune response)[8]. It is well known that DM in COVID-19 patients is associated with a significant increase in mortality and severity of COVID-19 compared to non-diabetic patients[9]. For this reason, the priority of the COVID-19 vaccine is given to the population with DM, and the COVID-19 vaccine is strongly recommended for this group[10].

In this study, we aimed to investigate the social, demographic, and clinical factors affecting vaccination frequency and vaccination hesitancy in our patients with DM.

Material and Methods

Study Design

Patients who were followed up in our endocrinology polyclinic diagnosed with DM and had the physical and mental capacity to answer the questionnaire were included in the study according to the admission order. Hereby, a questionnaire including pre-prepared questions was applied to 206 patients. The patient's age, gender, duration, types of DM, and insulin use were recorded simultaneously.

Consent was obtained from the patients who agreed to participate in the study, and their knowledge levels were measured using the face-to-face survey method. Ethics committee approval for the study was obtained from Harran University Clinical Research Ethics Committee on 23.05.2022 with a decision numbered HRU/22.10.05 in accordance with the ethical principles for human investigations, as outlined by the Helsinki Declaration.

Patients who answered the questionnaire were divided into two groups according to COVID-19 vaccination: vaccinated patients as Group 1 (n=180) and unvaccinated as Group 2 (n=26).

Statistical Analysis

Categorical data were presented as % (n), and other data as mean ± standard deviation (SD). Categorical data between groups were compared with the Chi-square test, and those that were constantly variable were compared with the Student T, or Mann Whitney U tests according to the data distribution. Statistical analyses were performed with IBM Statistical Package for Social Sciences (SPSS) program version 20.0 (IBM Inc., Chicago, Illinois, USA). $p<0.05$ was considered significant.

Results

The frequency of vaccination was 87.4% (n=180). According to the number of COVID-19 vaccines, the frequency was 6.3% (n=13) for one vaccine, 53.0% (n=109) for two vaccines, 22.3% (n=46) for three vaccines, 4.9% (n=10) for four vaccines and 0.9% (n=2) for five vaccines. There was no difference between the vaccinated and unvaccinated groups regarding age, diabetes duration, gender, type of diabetes, insulin use, smoking, marital status, living place, and educational status. Moreover, these two groups of patients had a history of having COVID-19 with almost similar frequency. Additionally, there was no significant difference between vaccinated and unvaccinated patients in having a relative with COVID-19 and losing one of their relatives as a result of the disease. All of the data are shown in Table 1. As compared to the vaccinated group (26%.1), the unvaccinated group (7.7%) had a significantly lower frequency of influenza vaccination

Table 1. *Comparison of social, demographic, and clinical data between vaccinated and unvaccinated patients*

Parameter	Group 1 (vaccinated) (n=180)	Group 2 (unvaccinated) (n=26)	p
Age (year)	54.9±12.8	50.0±16.0	0.177
Duration of diabetes (year)	8.3±7.3	9.2±8.4	0.704
Gender (n(%))			
Female	106 (58.9)	19 (73.1)	0.201
Male	74 (41.1)	7 (26.9)	
Type of diabetes (n(%))			
Type 1	83 (46.1)	14 (53.8)	0.426
Type 2	97 (53.9)	12 (46.2)	
Use of insulin? (n(%))			
Yes	37 (48.4)	7 (50)	0.531
No	143 (51.6)	7 (50)	
Smoking (n(%))			
Yes	37(20.6)	5 (19.2)	0.999
No	143 (79.4)	21 (80.8)	
Marital status (n(%))			
Married	172 (95.6)	24 (92.3)	0.631
Single	7(3.9)	2 (7.7)	
Widow	1 (.6)	0 (0)	
Living place			
Provincial center	116 (64.4)	15 (57.7)	0.440
District	36 (20.0)	8 (30.8)	
Village	28 (15.6)	3 (11.5)	
Educational status			
Illiterate	83 (55.9)	11 (42.3)	
Primary school	53 (25.8)	13 (50.0)	0.114
Middle-high school	26 (12.9)	1 (3.8)	
University	18 (5.4)	1 (3.8)	
Catching COVID-19			
Yes	118 (65.6)	14 (53.8)	0.501
No	62 (34.4)	12 (46.2)	
Have a relative with COVID-19			
Yes	95 (52.8)	14 (53.8)	0.999
No	85 (47.2)	12 (46.2)	
Died of a relative due to COVID-19			
Yes	10 (5.6)	0 (0)	0.618
No	170 (94.4)	26(100)	
Influenza vaccination in any time			
Yes	47 (26.1)	2 (7.7)	0.047
No	133 (73.9)	24 (92.3)	
Influenza vaccination in last year			
Yes	18 (10.0)	0 (0)	0.137
No	162 (90.0)	26 (100)	
Pneumococcal vaccine			
Yes	21 (11.7)	1 (3.8)	0.322
No	159 (88.3)	25 (96.2)	

(p=0.047). Although none of the patients in the unvaccinated group and 10.0% (n=18) patients in the vaccinated group had influenza vaccine in the last year, this difference was not statistically significant. Similarly, there was no significant difference in the frequency of pneumococcal vaccine between the two groups.

Discussion

In the current study, we examined the frequency of vaccination of outpatients with DM and found it to be 87.4%. During the study period, the Turkish Ministry of Health reported that 93.0% of the population over 18 years had received their first vaccination dose, and 85.3% had received their second vaccination[11]. On the other hand, the frequency of at least two vaccination doses was reported as 62.4% in our province, Sanliurfa (The Türkiye Ministry of Health announced the frequency of vaccination for only at least two doses in each province)[11]. When the study was conducted, our province ranked as one of the five provinces with the lowest vaccination rates. The frequency of at least two vaccination doses in our study group was 81.1%. Our results showed that DM patients were unaffected by high region-specific vaccine hesitancy. They were vaccinated at a rate similar to vaccination frequency across the country.

After the WHO declared a COVID-19 pandemic on March 11, 2020, it has been understood that the virus can affect all age groups and genders, spread rapidly, and cause serious complications and deaths. It was announced that those over 65 years of age and those with comorbidities such as hypertension, DM, chronic obstructive pulmonary disease (COPD), malignancy, and immunodeficiency are in the high-risk group[12,13]. Turkey's vaccination process started on January 13, 2021, and priority was given to chronic patients, including DM[14].

Routine vaccination against pneumococcal disease, influenza, and hepatitis B is highly recommended for diabetics[15,16]. In the studies about vaccination rates in Turkish patients with DM, influenza and pneumococcal vaccination rates were found between 14.6 to 27.0 % and 3.6 to 9.8 %, respectively[17–19]. In our study, influenza vaccination rates were 23.8% overall and 26.1% among vaccinated patients. The influenza vaccination rate was significantly higher in the vaccinated group than in the unvaccinated group. On the other hand, pneumococcal vaccination rates were 10.7 % overall and 11.7 % among vaccinated patients in this study. Therefore, we found almost the same rates as previous studies in Türkiye.

A Spanish study showed that influenza vaccination frequency in patients with type 2 diabetes is quite low. The main barrier to vaccination is a need for more knowledge about the necessity, risks, and advantages

of influenza vaccines[20]. Moreover, according to another study, the main reasons for refusing influenza and pneumococcal vaccines in patients with diabetes were cost, not being fully convinced of their benefits, fear of complications, and, rarely, fear of needles[21]. There is universal opposition to the COVID-19 vaccine, which arises due to fear of its side effects, suspicion about its safety, short duration of immunity, doubts about its necessity and efficacy, and lack of knowledge[22]. Our study showed diabetic patients did not affect regional vaccine hesitancy and had COVID-19 vaccination levels similar to the general population. It has been shown that diabetes in COVID-19 patients is associated with a two-fold increase in mortality and severity[9]. Since effective pharmacological treatment is still not possible, patients with DM must be vaccinated to avoid COVID-19 infection and its serious consequences in case of illness[22]. This may be one of the reasons why COVID-19 vaccination is high in diabetic patients. Another explanation for the high frequency of vaccinations is that the press and social media frequently emphasize the importance of the COVID-19 vaccine and the ease of access to the vaccine, free of charge and without a prescription. In addition, the severe and sometimes fatal course of the disease and the sudden global pandemic, especially in those with chronic diseases, do not allow for questioning the necessity and risks of the vaccine.

We also examined the socio-demographic characteristics of the patients. Vaccinated patients were older than unvaccinated ones, but this difference was insignificant. Studies have shown that vaccination frequency increases with age. This is likely related to the increase in hospital visits with increasing age[19,23–25]. Although it was not significant, female rates were high in the unvaccinated group in our study. Several studies with conflicting results report an association between gender and vaccination rate in the general population and risk groups. The TEMD vaccination study indicates that the majority of vaccinated patients are males[19]. Another study showed that male gender was associated with higher vaccination rates[20]. Vaccinated and unvaccinated patients did not differ significantly based on other socio-demographic characteristics such as marital status, education level, or living location, such as whether they lived in rural or urban areas. We also asked about the type and duration of diabetes and the use of insulin. There was no difference between the conditions. This suggested that fear of needles did not affect vaccination rates. Furthermore, having COVID-19 or their relatives at any time and dying of a relative for COVID-19 were similar between the two groups.

In conclusion, the patients with DM had higher COVID-19 vaccination rates than our overall province rate. Still, they were the same as the general population of Türkiye, regardless of demographical, social, and some individual properties. Therefore, providing greater support and information in various settings about the serious consequences of vaccine-preventable diseases such as influenza, pneumococcus, and hepatitis B in patients with DM could increase the rates of these vaccines, as is provided in COVID-19.

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