RESEARCH ARTICLE / *Araştırma Makalesi*

Influenza, Hepatitis B and Pneumococcal Vaccination Rates and Factors Influencing Vaccination Status in Patients with Diabetes

Diyabet Hastalarında İnfluenza, Hepatit B ve Pnömokok Aşılama Oranları ve Aşılanma Durumlarını Etkileyen Faktörler

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Geliş Tarihi / Received : **17.12.2020** Kabul Tarihi / Accepted : **18.01.2021**

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(Sakarya Tıp Dergisi / ***Sakarya Med J*** **2021, 11(1):148-154) DOI: 10.31832/smj.842236**

Abstract

Objective Diabetes Mellitus is a health problem that has increasingly become a worldwide concern due to its high frequency and complications. Infections in patients with diabetes are major cause of mortality and morbidity. The purpose of this study is to determine the rates of vaccination with influenza, pneumococcal, hepatitis B vaccine in diabetic patients, their awareness of the importance and necessity of vaccination, and how they reach on those awareness levels.

Materials and Methods This study was designed as a questionnaire based observational study. 504 patients aged 18 years and older who were admitted to Family Medicine and Diabetes Outpatient clinics, completed a questionnaire comprised of 15 questions regarding their socio-demographic profile, their awareness of higher risks of Influenza, Hepatitis B, Streptococcus infections in patients with diabetes, their knowledge about vaccinations for those infections, factors that encourage them to get vaccinated, other ways to protect themselves against vaccine-preventable diseases.

Results Of the patients who participated in the study, 76.4% were unvaccinated. The rates of patients vaccinated against Influenza, Hepatitis B, Pneumococcal, Pneumococcal+Influenza and Hepatitis B+Influenza were 10.1%, 6.9%, 5%, 1% and 0.6%, respectively. 22% of the patients had knowledge of governmental support for the vaccination of patients with Diabetes.

Conclusion As a result; it is seen that awareness of vaccination in both patients and health care providers are not enough. We reach the conclusion that those vaccination rates may increase with the cooperation between the Ministry of Health and the physicians by actively using visual, printed and social media and by broadcasting of public service announcements.

Keywords Diabetes Mellitus; Vaccination; Influenza; Pneumococcal; Hepatitis B

Öz

Amaç *Diyabet, tüm dünyada sıklığı ve neden olduğu komplikasyonlar nedeniyle önemi gitgide artan bir sağlık sorunudur. Diyabetik hastaların geçirmiş oldukları enfeksiyonlar ise önemli bir mortalite ve morbidite sebebidir. Çalışmamızda esas olarak; diyabetik hastaların influenza, pnömokok ve hepatit B aşılanma oranları, hastaların bu aşıların yapılmasının önemi ve gereklilikleri konusundaki farkındalıkları ve bu farkındalık seviyelerine hangi kanal yoluyla ulaştıkları incelenmiştir.*

Gereç ve Yöntemler *Çalışmamızda Aile Hekimliği ve Diyabet Polikliniğine başvuran 18 yaş ve üzeri 504 hastaya sosyodemografik profilleri, diyabetik hastalarda influenza, hepatit b, pnömokok enfeksiyonlarının daha ağır seyredebileceğinin farkındalığı, bu hastalıkların aşıları hakkında bilgi sahibi olup olmadıkları, onları aşılanmaya teşvik eden faktörleri, aşı ile önlenebilen hastalıklara karşı nasıl önlemler aldıklarını sorgulayan 15 soruluk bir anket uygulanmıştır.*

Bulgular *Çalışmamıza katılan hastaların %76,4'ü hiçbir aşı yaptırmamıştır. Veriler değerlendirildiğinde; diyabet tanısı aldıktan sonra influenza aşısı yaptıranların oranı %10,1, pnömokok aşısı yaptıranların oranı %5, Hepatit B aşısı yaptıranların oranının %6,9, pnömokok ve influenza aşılarını yaptıranların oranı %1, Hepatit B ve influenza aşılarını yaptıranların oranı ise %0,6 olarak bulunmuştur. Ayrıca hastaların yalnızca %22 kadarı diyabeti olan hastalarda devletin aşılanmayı desteklediğinin farkındaydı.*

Sonuç *Araştırmamız sonucunda; aşı farkındalığı ve aşılanma konusunda hem hasta, hem sağlık hizmeti sağlayıcıları kaynaklı eksikliklerimiz olduğu görülmektedir. Sağlık Bakanlığı ve hekimlerin ortak çalışmalarıyla ve görsel, yazılı, sosyal medyanın da aktif olarak kullanılması, gerekli kamu spotlarının yayınlanmasıyla bu aşılanma oranlarının artacağı kanaatine vardık.*

Anahtar Kelimeler *Diyabet; influenza aşısı; pnömokok aşısı; hepatit B aşısı*

INTRODUCTION

Diabetes Mellitus is a health problem that has increasingly become a worldwide concern due to its high frequency and complications. The number of people with diabetes has been rapidly increasing, especially in developed countries, due to unhealthy and poor eating habits, sedentary lifestyle, obesity and an aging population. While the number of individuals with diabetes in 2016 was around 415 million, including 193 million undiagnosed cases, it is estimated that 642 million people will have diabetes in 2040.[1,2]

Patients with diabetes have a higher risk of infections when compared with non-diabetic patients because an abnormal glucose metabolism leads to impairment of leucocyte function. Therefore, common infections such as Influenza, Hepatitis B and Streptococcus Pneumonia occur more frequently and are more severe in patients with diabetes.[3-5] In this way the infections increase mortality and morbidity rates in patients with diabetes. Immunization is one of the most effective methods for protection against the adverse effects of these infections.[6,7]

The Turkish Society of Endocrinology and Metabolism recommends a yearly influenza vaccine for diabetic patients of six months of age and older (especially in November), the Pneumococcal vaccine at least once in a lifetime for patients two years of age and older, and the Hepatitis B vaccine for patients between 19-59 years of age if not vaccinated before.[8]

In this study, we investigate whether patients with diabetes are aware of their higher risk of infections, the ways they can protect themselves against vaccine-preventible diseases, their vaccination rates, and the most important factors that encourage them to get vaccinated.

MATERIALS and METHODS

This study is a descriptive cross-sectional study. A total of 504 patients aged 18 years and older who were admitted to Family Medicine and Diabetes Outpatient Clinics from November 2014 to November 2017 were enrolled in the study. All eligible patients were informed about the study and written informed consent was obtained from the patients who agreed to participate. Patients completed a questionnaire comprised of 15 questions regarding their socio-demographic profile, their awareness of higher risks of Influenza, Hepatitis B and Streptococcus infections in patients with diabetes, their knowledge about vaccinations for those infections, factors that encourage them to get vaccinated, and other ways to protect themselves against vaccine-preventible diseases. The questionnaire lasted approximately ten minutes per patient under the supervision of a researcher.

Ethical approval for the study was obtained from the ethics committee of University of Health Sciences Umraniye Training and Research Hospital on 19.11.2014 with the decision case numbered 16709.

Data were analysed with the SPSS software package version 22.0 (IBM SPSS, Turkey). The Shapiro-Wilk test was used to evaluate whether the data were normally distributed. Data were expressed as mean ± standard deviation and frequency. To analyze qualitative data the Chi-square and Yates's correction for continuity tests were used. A p-value less than 5% was regarded as statistically significant.

RESULTS

Of the 504 patients that participated in the study, 191 (37.9%) were male and 313 (62.1%) were female. The mean age was 58.21±11.78 years. There was no statistically significant difference between vaccinated and unvaccinated patients according to educational level (Table 1). Most of the patients had diabetes for more than five years (Table 2). 67.9% of patients were not aware that individuals with diabetes could acquire more severe infections and 77.4% of the patients were not informed about vaccination by a physician after being diagnosed.

Table 1: Demographic characteristics and vaccination status of the diabetic patients

		Vaccination status		p
		Yes (n=119)	No (n=385)	
		Mean±SD	Mean±SD	
Age		59,5±12,55	57,81±11,53	**10,172**
Sex n (%)				
	Male	62 (52,1%)	129 (33,5%)	**2<0,001***
	Female	57 (47,9%)	256 (66,5%)	
Education level n (%)				
	Illiterate	16 (13,4%)	91 (23,6%)	**20,059**
	Primary school	81 (68,1%)	235 (61%)	
	Secondary school	9 (7,6%)	19 (4,9%)	
	High school	7 (5,9%)	31 (8,1%)	
	Graduate and more	6 (5%)	9 (2,3%)	

1Student t Test was used. 2Ki Kare Test was used.

Of the patients who participated in the study, 76.4% were unvaccinated. The proportion of patients vaccinated against Influenza, Hepatitis B, Pneumococcal, Pneumococcal+Influenza and Hepatitis B+Influenza were 10.1%, 6.9%, 5%, 1% and 0.6% respectively. 22% of patients had knowledge of governmental support for the vaccination of patients with chronic illnesses such as Diabetes.

Recommendations by their family physicians, awareness of higher risks of infections concerning them, and impact of television health programmes encouraged 39.1%, 16% and 16% of patients respectively to get vaccinated. Most of the patients were vaccinated in state hospitals and 65.5% of those vaccinated patients were informed about the duration of immunity (Table 2).

Table 2: Evaluation of vaccine and diabetes mellitus related factors

		n	%
Duration of diabetes (years)	0-5	181	35,9
	6-10	112	22,2
	11-15	101	20
	16-20	50	9,9
	More than 20 years	60	11,9
Past infections	None	52	10,3
	Influenza	434	86,1
	Pneumonia	15	3
	Hepatitis B+ Influenza	3	0,6
Are you aware of the higher severity of infections in diabetic patients?	Yes	162	32,1
	No	342	67,9
After being diagnosed have you received any physician recommendation for immunization?	Yes	114	22,6
	No	390	77,4
Vaccines received	Not vaccinated	385	76,4
	Influenza	51	10,1
	Pneumococcal vaccine	25	5
	Hepatitis B	35	6,9
	Pneumococcal+Influenza	5	1
	Hepatitis B+Influenza	3	0,6
Do you know the governmental support for the vaccines?	Yes	111	22
	No	393	78
Reasons to get vaccinated (n=119)	I heard from other vaccinated patients	14	11,8
	Diabetic patients could have more severe infections than healthy people	19	16
	A family physician recommended	47	39,5
	Health programmes on television	19	16
	Social and mass media	5	4,2
	Other reasons*	15	12,6
Place of vaccination (n=119)	Primary care center	40	33,6
	State hospital	49	41,2
	Private hospital	2	1,7
	Pharmacy	28	23,5
Do you know the duration of immunization? (n=119)	No	41	34,5
	Yes	78	65,5

*My children recommended, a pharmacist recommended, due to splenectomy operation, before going abroad or going on pilgrimage

Table 3 summarizes patients' reasons for not getting vaccinated and the the other ways patients protect themselves

against infections other than vaccination.

Table 2: Table3: Reasons for not receiving vaccination and precautions taken

		n	%
Reasons for not receiving vaccination (n=383)	Not recommended	308	80,4
	Concern about side effects	31	8,1
	I don't believe in immunization	40	10,4
	Cost of vaccines	3	0,8
	Other reasons	1	0,3
What kind of ways do you use for protection if you are not vaccinated?	pay attention to blood sugar control	78	20,3
	(n=385)	52	13,5
	pay attention to personal hygiene	38	9,9
	Wear mask	5	1,3
	any protection	202	52,5
	Other precautions	10	2,6

Correlations between each group of patients vaccinated for different types of infections and the impact of a physician's recommendation, reasons to get vaccinated and the rate of awareness of the higher severity of infections in patients with diabetes are shown in Table 4.

There was a statistically significant difference among sex distribution of vaccinated and unvaccinated patients (p:0.001; p<0.05). Among the vaccinated participants, the rate of men was higher and vaccinated females was significantly lower than the rate of unvaccinated females.

The rates of past infections, patients' awareness of the higher severity of infections in diabetic patients, being informed about vaccination by a physician after being diagnosed and having knowledge of governmental support for vaccinations, were significantly higher in vaccinated patients than unvaccinated ones (p: 0.001; p <0.05) (Table 5).

Table 4: Correlations between each group of patients vaccinated for different types of infections and the impact of a physician's recommendation, reasons to get vaccinated and the rate of awareness of the higher severity of infections in patients with diabetes.

		Vaccines					
		Not vaccinated	**Influenza**	**Pneumococcal vaccine**	**Hepatitis B**	**Pneumococcal+ Influenza**	**Hepatitis B+ Influenza**
		n(%)	n(%)	n(%)	n(%)	n(%)	n(%)
Are you aware of the higher severity of infections in diabetic patients?	Yes	75(19,5%)	34(66,7%)	19(76%)	27(77,1%)	5(100%)	2(66,7%)
	No	310(80,5%)	17(33,3%)	6(24%)	8(22,9%)	0(0%)	1(33,3%)
After being diagnosed have you received any physician recommendation for immunization?	Yes	23(6%)	30(58,8%)	23(92%)	31(88,6%)	5(100%)	2(66,7%)
	No	362(94%)	21(41,2%)	2(8%)	4(11,4%)	0(0%)	1(33,3%)
Reasons to get vaccinated (n=119)	I heard from other vaccinated patients	-	6(11,8%)	2(8%)	6(17,1%)	0(0%)	0(0%)
	Diabetic patients could have more severe infections than healthy people	-	9(17,6%)	5(20%)	4(11,4%)	1(20%)	0(0%)
	Family physician recommendation for vaccine	-	14(27,5%)	13(52%)	16(45,7%)	2(40%)	2(66,7%)
	Health programmes on television						
	Social and mass media	-	12(23,5%)	3(12%)	4(11,4%)	0(0%)	0(0%)
	Other reasons*	-	5(9,8%)	0(0%)	0(0%)	0(0%)	0(0%)

*My children recommended, a pharmacist recommended, due to splenectomy operation, before going abroad or going on pilgrimage

Tablo 5: Evaluation of vaccine and diabetes related factors among vaccinated and not vaccinated patients

		Vaccination status		p
		Yes (n=119)	No (n=385)	
		n (%)	n (%)	
Past infections	**Yes**	117 (98,3%)	335 (87%)	[2]**<0,001***
	No	2 (1,7%)	50 (13%)	
Are you aware of the higher severity of infections in diabetic patients?	**Yes**	87 (73,1%)	75 (19,5%)	[1]**<0,001***
	No	32 (26,9%)	310 (80,5%)	
After being diagnosed have you received any physician recommendation for immunization?	**Yes**	91 (76,5%)	23 (6%)	[1]**<0,001***
	No	28 (23,5%)	362 (94%)	
Do you know the governmental support for the vaccines?	**Yes**	90 (75,6%)	21 (5,5%)	[1]**<0,001***
	No	29 (24,4%)	364 (94,5%)	

[1]Pearson Chi-square Test
[2]Yate's Continuity for correction test
*p<0.05

DISCUSSION

In this study influenza, pneumococcal and hepatitis B vaccination rates of diabetic patients and patients' awareness of immunization were very low. Although childhood vaccination rates are quite high in our country[9], adult vaccination rates remain far behind the developed countries.

In a study conducted in the United States in 2012, vaccination rates in elderly age groups were 67%, whereas in a recent study in our country, adult vaccination rates were 27%.[10]

Results from this study concur with a study about vaccination in diabetic patients, conducted by Arslan et al. in 2016, in Turkey. In the study, the rate of influenza vaccination in diabetic patients was 14.6%5, whereas it was 10.1% and the rate of influenza vaccination both with hepatitis B or pneumococcal vaccine was 11,7% in our study. Influenza vaccination rate was 17.4% in a community-based study conducted by Asık et al. in 2013.[11] In a multicenter study conducted by Biberoğlu et al. in Aegean region of Turkey involving 11235 people, only 4.5% of participants received influenza vaccine.[12]

Pneumococcal vaccination rates vary between 1% and 4% in various studies conducted in different populations at different times in our country.[5,11,12] In our study, 5% of the patients were vaccinated only against pneumococcal diseases, while 6% of them were vaccinated against both influenza and pneumococcal diseases.

Among all the hepatitis B vaccinated diabetic patients (7,5%), 6,9% were vaccinated with hepatitis B vaccine alone, while 0,6% with both hepatitis B and influenza vaccines. Three previous studies in adults in different regions of Turkey determined hepatitis B vaccination rates as 15,5%, 10% and 4,1% respectively.[5,11,12]

In addition to low diabetic vaccination rates, the precautions patients took against vaccine-preventable diseases were insufficient. Most of the unvaccinated patients in this study had not taken any precautions against these diseases. Paying attention to blood sugar level, avoiding crowded places and sick individuals were the most commonly used ways for protection among unvaccinated patients.

In this study, vaccination rates of diabetic patients were less than rates in other studies. This may be due to differences in socioeconomic status of study groups, access to health care, and attitudes of health-care workers about vaccination. More comprehensive studies should be designed to better estimate the effects of these factors.

In this study the most important factor that encouraged all

groups of patients to get vaccinated was a physicians recommendation. After being diagnosed, 114 of the 504 diabetic patients were given information about one or more of the vaccinations. It appears that the rate of vaccination in diabetic patients is strongly affected by physicians' attitudes towards vaccination. Physicians neglect to provide this medical advice may be due to concerns about vaccine safety, lack of adequate knowledge of current recommendations for immunizations for adults and short doctor visit lengths. With increased efforts from the Ministry of Health, adult vaccination rates could be bettered with increased education of health-care workers about vaccination and active participation of primary care physicians in adult immunization.

Most of the patients received vaccines in state hospitals rather than at primary care centers, which are the cornerstones of preventive medicine in Turkey. Patients' preferences for the management of their chronic diseases by specialists in state hospitals might be a factor behind this. We believe that diabetic vaccination rates at primary care centers will increase if primary care physicians take an active role in chronic disease management through the implementation of the policies planned by the Ministry of Health.

In this study, 34.5% of vaccinated patients did not know the duration of their immunity. Patients' knowledge on the duration of immunity of Hepatitis B and Influenza vaccines was more than Pneumococcal vaccine. This might be due to inadequate information given to the patients by physicians and inefficient use of mass and social media by the Ministry of Health regarding the immunization schedules of the Pneumococcal vaccine.

80.4% of the 385 unvaccinated patients reported that they had not received any vaccinations due to not being informed about them. This supports our opinon that family physicians and The Ministry of Health were not efficiently involved in the vaccination process. 10.4% of the unvaccinated patients expressed that they did not believe in the benefits of vaccination. This points to the fact that patients might have other reasons, other than lack of information, that prevents them from getting vaccinated. As 8.1% of the patients stated their concern regarding side effects of vaccines, we think that anti-vaccination campaigns in social and mass media are strongly influential in this respect.

Patients awareness of the higher risk of infection in diabetic patients was very low in this study. We determined that television health programmes and a physician's recommendation for immunization were the most encouraging factors for receiving vaccinations in the few vaccinated diabetic patients.

It appears that there are deficiencies with both healthcare workers and patient regarding the awareness of immunization and getting vaccinated in Turkey. We concluded that in order to increase adult vaccination rates, healthcare workers should be educated about current recommendations for vaccinations, family physicians should take as active a role in adult vaccinations as in childhood vaccinations, and the use of public service announcements could be increased to inform patients of chronic diseases, higher risks of morbidity they face, and the importance of vaccination in preventing infections.

Acknowledgments

No conflict of interest was declared by the authors.

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