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THE RELATIONSHIP BETWEEN HEALTH LITERACY AND VACCINATION STATUS IN PATIENTS WITH DIABETES MELLITUS

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ABSTRACT

Aim: Aim: In this study, we aimed to investigate the relationship between health literacy and vaccination status in patients with Diabetes Mellitus (DM).

Methods: This research was carried out with 283 volunteer DM patients over the age of 18 who applied to the Bursa Yuksek Ihtisas Training and Research Hospital between November 2017 and January 2018. The Public Health Literacy Knowledge Scale (PHLKS) was applied to the patients.

Results: Of the 283 patients who participated in the study, 239 (84.50%) declared that they did not get vaccinated because they did not have knowledge about vaccinating diabetics. The number of those who stated that they did not get their vaccinations yet had the opportunity to be vaccinated was 11 (3.90%). The number of those who said they did not need to be vaccinated because they were not sick was 10 (3.50%). Cronbach's alpha coefficient for the PHLKS scale was calculated as 0.56. Fasting plasma glucose and HbA1c values were negatively correlated with PHLKS total score (r_s=-0.18, p=0.004 and r_s=-0.12, p=0.046, respectively). The number of hospitalizations in the last 1 year and the PHLKS total score were not related (p=0.137). PHLKS total score was not associated with hepatitis B vaccination, influenza vaccination, or pneumococcal vaccination (p=0.678, p=0.442 and p=0.221, respectively).

Conclusions: The reliability of the PHLKS scale is low. While PHLKS is associated with blood glucose control, it is not associated with administration of the indicated vaccines. We believe that physicians have a greater role in making vaccines available. Relevant physicians should give necessary warnings to protect DM patients from these preventable infectious diseases.

Keywords: HbA1c, Hepatitis B vaccine, Influenza vaccine, Pneumococcal vaccine, Public Health Literacy Knowledge Scale

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Introduction

Influenza and pneumococcal infections are commonly seen in patients with diabetes mellitus (DM) [1-3]. Deaths due to influenza and pneumococcal infections are also more common in patients with DM compared to the general population [4]. Hospitalization due to influenza and pneumococcal infections is also more common in patients with DM [1]. Influenza and pneumococcus vaccines are effective in reducing morbidity and mortality in patients with DM [5,6]. Therefore, guidelines recommend annual influenza vaccination, and one or two doses of pneumococcal vaccination depending on age under or over 65 years for patients with DM [7,8].

Similarly, DM patients are also at high risk of hepatitis B infection and hepatitis B is an important cause of mortality and morbidity for DM patients. Hepatitis B is one of the vaccine-preventable diseases. Many guidelines recommend that the hepatitis B vaccine should be given 3 times for diabetics aged 19-59 years old, and in diabetics aged ≥ 60, if there is an additional risk of hepatitis B [9].

But unfortunately vaccination rates in patients with DM are not satisfactory in the world [10,11]. Various factors including barriers for availability of the vaccine, vaccine costs, health literacy, physician attitudes, social factors, and misbeliefs against vaccines were the causes of unsuccessful vaccination rates [12,13]. In this study, we aimed to investigate the relationship between health literacy status of DM patients and disease control and vaccination rates with the indicated vaccines.

METHODS

The population of the study consisted of DM patients over the age of 18 who applied to the internal medicine and diabetes outpatient clinic of the hospital between November 2017 and January 2018. Ethics committee approval was obtained from the hospital ethics committee. Consent was obtained from these 283 individuals and the research was carried out by applying a questionnaire method.

In this study, a form questioning the socio-demographic characteristics of the patients and Public Health Literacy Knowledge Scale (PHLKS) adapted from the 'Facts of Life' (FfL) realities of life questions were used to measure the health literacy level [14].

Public Health Literacy Knowledge Scale: The scale was developed by Pleasant et al. The scale is adapted from the 'Facts of Life' questions of facts of life. Pleasant et al. reported that the scale can be used to measure health literacy for both health professionals and the public [14]. Turkish validation of the scale was obtained by Ardic et al [15].

Statistical Analysis

The conformity of variables to normal distribution was examined using the Shapiro Wilk test. Continuous variables were expressed as mean ± standard deviation (minimum: maximum) or median (minimum: maximum). Categorical variables were expressed as n (%). Mann Whitney U test was used for comparisons between the two groups according to the results of the normality test. The relationship between the total score obtained PHLKS and fasting glucose, HbA1c and the number of hospitalizations in the last 1 year was examined by correlation analysis and the Spearman correlation coefficient was calculated. The internal consistency of the short form of PHLKS was examined using the Kuder Richardson 20 (KR-20) coefficient. SPSS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version21.0. Armonk, NY: IBM Corp.) program was used for statistical analysis and $p<0.05$ was considered statistically significant.

RESULTS

The socio-demographic data of the participants are given in Table 1. A total of 283 people were included in our study as participants. Of these patients, 171 were female and 112 were male, with a mean age of 55.04 (±12.56).

Table1. Socio-demographic characteristics of the participants

	n=283
Age (years)	55.04±12.56(19:82)
Height(m)	1.65±0.09(1.42:1.88)
Weight(kg)	83.04±16.12(45:140)
BMI(kg/m^2)	30.75±6.09(17.30:54.69)
Waist Circumference	90.23±13.34(65:129)
Gender (Female/Male)	171(60.40%)/112(39.60%)
Smoking	
No	222(78.40%)
1-5 cigarettes	16(5.70%)
6-10 cigarettes	13(4.60%)
11-20 cigarettes	25(8.80%)
>20 cigarettes	7(2.50%)
Marital Status	
Married	261(92.20%)
Single	10(3.50%)
Divorced	12(4.20%)
Education	
Illiterate	39(13.80%)
Literate	22(7.80%)
Primary	144(50.90%)
Secondary	33(11.70%)

High	33(11.70%)
Associate degree	4(1.40%)
Undergraduate	7(2.50%)
Graduate	1(0.40%)
Employment	
No	3(1.10%)
Housewife	121(42.80%)
Shopkeeper	22(7.80%)
Retired	103(36.40%)
Worker	19(6.70%)
Driver	4(1.40%)
Others	11(3.90%)
Income	
Very bad	4(1.40%)
Bad	42(14.80%)
Moderate	193(68.20%)
Good	43(15.20%)
Very good	1(0.40%)

Data are given as mean ± standard deviation and n(%).

Vaccination and hepatitis-B antibody level control status of the patients are given in Table 2. Accordingly, it was determined that 44 individuals (15.50%) received the influenza vaccine, 11 (3.90%) the pneumococcal vaccine, and 7 (2.50%) the Hepatitis B vaccine.

Table2. Vaccination and hepatitis-B antibody level control of the patients

	n=283
Vaccination status-Hepatitis B	
No	276(97.50%)
Yes	7(2.50%)
Vaccination status-Influenza	
No	239(84.50%)
Yes	44(15.50%)
Vaccination status-Pneumococcus	
No	272(96.10%)
Yes	11(3.90%)
Vaccination time – Hepatitis B	
This year	3(1.10%)
Before last year	4(1.40%)
Vaccination time – Influenza	
This year	19(6.70%)
Last Year	13(4.60%)
Before last year	12(4.20%)
Vaccination time – Pneumococcal	
Last Year	8(2.80%)
Before last year	3(1.10%)
Annual repeat of Influenza vaccine	18(6.40%)
Antibody level control after hepatitis B	37(13.10%)

Data are given as n(%).

The distribution of reasons for not getting vaccinated is shown in Table 3. Of the 283 patients who participated in the study, 239 (84.50%) declared that they did not get vaccinated because they did not have knowledge about vaccinating diabetics.

Table3. Reasons for not getting vaccinated

	n=283
I don't know about vaccinating diabetics.	239(84.50%)
I was very busy	11(3.90%)
I don't feel the need to get vaccinated because I am not sick.	10(3.50%)
I had my vaccinations as recommended. I did not do what is not recommended.	5(1.80%)
Other reasons	18(6.40%)

Data is given as n(%).

The mean scale score of the short form of the PHLKS was calculated as 12.42±2.21 (0:17). The reliability of the scale was evaluated using the Kuder-Richardson 20 (KR-20) coefficient and α=0.56. According to the alpha value obtained, the reliability of the scale was found to be "low".

A significant inverse relationship was determined between the total PHLKS score and blood fasting glucose (FG) and HbA1c levels. A decrease was observed in the measurements related to the increase in the PHLKS score (Table4). There was no relationship between the total PHLKS score and the number of hospitalizations in the last 1 year.

Table4. The relationship between health literacy and diabetes management

	n=283	
Public Health Literacy Knowledge Score	**r_s**	**p-value**
Fasting Glucose	-0.18	**0.004**
HbA1c	-0.12	**0.046**
Hospitalization in the last 1 year	-0.09	0.137

r_s: Spearman correlation coefficient

HL total score did not differ according to hepatitis B vaccination, pneumococcal vaccination, influenza vaccination and post-interview vaccination status (Table 5).

Table5. The relationship between health literacy and vaccination status

	Public Health Literacy Knowledge Score
Hepatitis B Vaccination	
No (n=276)	12(0:17)
Yes (n=7)	13(6:16)
p-value	0.678[a]
Influenza Vaccination	
No (n=239)	13(0:17)
Yes (n=44)	12(9:17)
p-value	0.442[a]
Pneumococcal Vaccination	
No (n=272)	12(0:17)
Yes (n=11)	13(6:16)
p-value	0.221[a]

a: Mann-Whitney U test

DISCUSSION

Of the patients participating in the study, 84.50% declared that they did not get vaccinated because they did not have knowledge about vaccinating diabetics. The Cronbach α coefficient for the PHLKS was calculated as 0.56. The reliability of the scale is low. Fasting plasma glucose and HbA1c values were negatively correlated with PHLKS total score. The number of hospitalizations in the last 1 year and the PHLKS total score were not related. PHLKS total score was not associated with hepatitis B vaccination, influenza vaccination, and pneumococcal vaccination status.

In a multicenter study involving 5682 people in Turkey, Satman et al. found that 27% of DM patients had the influenza vaccine and 9.8% had the pneumococcal vaccine [16]. In the same study, physicians were trained and it was determined that the vaccination rates increased to 63.3% and 40.7% the following year. Researchers found that those who received the influenza vaccine were those who had DM for a long time, cases with hyperlipidemia, and those who used additional drugs in greater numbers. In the

presence of advanced age, long-term DM and concomitant cardiovascular disease, the pneumococcal vaccine was administered at a lower rate. In the current study, vaccination rates were found to be much lower for both the influenza vaccine and the pneumococcal vaccine. Satman et al. in their studies showed that physicians are very effective in promoting vaccination for protection from these two infectious diseases [16]. Although the characteristics of the patient affect the vaccination rates, it can be thought that the main axis in the vaccination of DM patients is the knowledge and recommendation of physicians. The fact that the health literacy of the patients in the current study was not related to the vaccination status also supports the idea that physicians are more effective in this regard.

The influenza vaccination rate in DM patients is reported to be 65%-75% in Europe [17]. Vaccination rates vary. For example, vaccination for influenza was 2% in Czechia and 66% in Spain. According to 2013 data, while 13.9% of individuals aged ≥60 years in the USA were vaccinated, this rate was reported as 26.3% in DM patients aged 19-59 years [18]. European data for HBV are not sufficient. The rates of HBV vaccination were also very low in the current study. Since testing should be done before HBV vaccination and it should be done 3 times within 6 months, this vaccine may be slightly lower than the other 2 vaccines. Increasing the rate of HBV vaccination in DM patients may be possible with the efforts of family physicians.

In the current study, health literacy was associated with blood sugar control in DM patients. Similarly, there are studies in the literature that argue that individuals with good health literacy have better blood sugar control [19].

84% of the patients stated that they did not know that the vaccine should be given as the reason for not being vaccinated. Although physicians are seen as the first source of information on this subject, we would expect individuals with better health literacy to have access to more information about the vaccine and to have had the vaccine. This issue should be investigated in detail in future studies.

There are limited studies on the relationship between health literacy and vaccination status in DM patients [20]. Patients with good health literacy are those who seek better treatment and follow doctor's recommendations. In our study, no relationship was found between health literacy and vaccination status of DM patients. The very low number of vaccinated cases prevents generalizations about the results of the study. Health literacy and vaccines should be examined in multicenter studies with a higher number of participants.

CONCLUSIONS

The reliability of the PHLKS is low. While the health literacy is associated with blood glucose control, it is not associated with administration of the indicated vaccines. We believe that physicians have a greater role in promoting vaccines. Relevant physicians should give necessary warnings to protect DM patients from these preventable infectious diseases.

Conflicts of Interest

None of the author has any conflict of interest to disclose

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