

PERIODIC EYE EXAMINATIONS AND HEALTH LITERACY AMONG TYPE 2 DIABETES MELLITUS PATIENTS

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ABSTRACT

Aim: The aim of this study was to investigate the relationship of periodic eye examinations with health literacy in Diabetes Mellitus (DM) patients.

Methods: A cross-sectional study was designed. Patients with a diagnosis of DM registered at the Family Health Center were invited to participate. Of the 198 registered DM patients, 101 agreed to participate in the study (response rate: 51%). Sociodemographic characteristics and physical examination findings of the patients were recorded. Their knowledge about diabetes follow-up was questioned. The patients were asked the Newest Vital Sign (NVS) and European Health Literacy Survey Questionnaire Short Form (HLS-EU-Q16) questions and the answers were recorded.

Results: HLS-EU-Q16 showed a significant difference with the eye examination of patients with DM ($p=0.041$). The NVS scale showed a significant difference with DM control ($p=0.032$), DM diet ($p=0.008$), and eye examination ($p=0.002$). And, NVS also showed a significant difference with eye examination ($p=0.015$) in the last 1 year.

Conclusions: Participation in the study was limited. According to the NVS results from the health literacy scales, the condition of DM patients having disease control and eye check-ups was positively associated with health literacy. We think that improving health literacy of DM patients may have a positive effect on disease control and prevention of complications.

Keywords: Diabetes Mellitus, health literacy, HLS-EU-Q16, Newest Vital Sign, retinopathy

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Introduction

The relationship between health literacy and chronic diseases has been shown in many studies (1-5). Good health literacy makes it easier for a person to make the right decisions about their health. Health literacy is also expressed in the form of a person being their own doctor (6). If a person has sufficient health literacy, they act as an expert in protecting, developing and benefiting from health services.

Diabetes Mellitus is one of the most common diseases that threaten health very seriously with the related complications (7). The main complications observed in diabetes are known as triopathy (8). These are: retinopathy, nephropathy and neuropathy. Retinopathy is one of the most common causes of non-traumatic blindness (9). Patients who develop nephropathy can be treated with dialysis, and sometimes kidney transplantation is required for these patients. Neuropathy can cause pain and sometimes indirectly diabetic foot disease. As a result of neuropathy and subsequent diabetic foot disease, finger, foot or leg amputations may need to be performed on patients.

Poor health literacy is associated with poor disease control in DM patients (10). When health literacy is low, patient compliance with medication use decreases and their compliance with nutrition and exercise warnings decreases. Patients with poor health literacy do not regularly go to the doctor for check-ups about their disease, and complications occur more often and seriously in patients who do not have regular check-ups (11).

The aim of this study was to investigate the relationship of periodic eye examinations with health literacy in Diabetes Mellitus (DM) patients. In previous studies on this subject, it has been shown that the probability of retinopathy increases as health literacy decreases. In our study, both the relationship of

periodic eye examination and health literacy and the compliance of the cases for which an appointment with an ophthalmologist was made with the examination recommendation were examined.

Methods

A cross-sectional research study was designed. Patients with a diagnosis of DM registered to the Bursa Yildirim Namazgah Family Health Center (# 173 Unit) were invited to participate in March 2022. Of the 198 registered DM patients, 101 agreed to participate in the study (response rate: 51%). The approval of the ethics committee for the research was obtained from the Bursa Yuksek Ihtisas Training and Research hospital Ethics Committee. The patients were informed before the research study and their written consents were obtained.

Sociodemographic characteristics and physical examination findings of the patients were recorded. Height and weight measurements were performed appropriately. Body mass index (BMI) values were calculated with the weight/height² formula. Waist circumference measurements were performed in an appropriate manner. Alcohol and smoking conditions were recorded. Chronic diseases were noted.

Their knowledge about diabetes follow-up was questioned. The situations of receiving DM education in the last 1 year were noted. Diabetes control conditions, dietary compliance, retinopathy examination conditions within the last 1 year, DM diagnosis times, eye training for DM, blood sugar measurements, DM treatment, medication use, and eye examination after referral were recorded.

The patients were asked the Latest Vital Sign (NVS) and European Health Literacy Survey Questionnaire Short Form (HLS-EU-Q16) questions and the answers

were recorded. The results obtained from the health literacy scales were compared with other study data.

The NVS scale is a scale consisting of 6 questions. To measure the health literacy status of people, patients were asked questions about information on the back of an ice cream label. Each correct answer receives 1 point. The cut-off point for adequate health literacy is calculated as 4. The Turkish validity and reliability study of the scale was conducted by Çiftçi et al. (12).

The HLS-EU-Q16 scale consists of 16 questions. The scale has 3 sub-dimensions. The scale is a 5-point Likert scale. The Turkish validity and reliability study of the scale was conducted by Emiral et al. (13). The standardized index score points range from 0-50. The total is calculated with the formula of $\text{index} = (\text{average}-1) \cdot (50/3)$.

Statistical Analysis

In the study, demographic and clinical characteristics of the cases were examined by descriptive statistical analyses. The relationships between demographic and clinical characteristics and health literacy were evaluated by Pearson Correlation Analysis. Health literacy scores according to the control visit and diet status were compared with Independent Samples t test. The significance level for all analyses was determined as $p < 0.05$. IBM SPSS 26.0 Program was used in the application of the analyses.

Results

The average age of the participants was calculated as 57.88 ± 5.20 years. There were 68 female and 33 male participants. 66.3% of the participants had a poor income status (Table1).

Table.1 General characteristics of the participants

		n/Mean \pm SD	%/Min-Max
Age		57.88 \pm 5.20	42.00-65.00
Gender	Female	68	67.3
	Male	33	32.7
Location	Urban	96	95.0
	Rural	5	5.0
Marital Status	Single	27	26.7
	Married	74	73.3
Education	Secondary school	69	68.3
	High school	32	31.7
Occupation	No	81	80.2
	Yes	20	19.8
Income	Low	67	66.3
	Moderate and High	34	33.7

The mean BMI of the participants was calculated as 31.69±5.82. Only 45.5% of the participants had never smoked (Table2).

Table2. Clinical characteristics of the participants

		n/Mean±SD	%/Min-Max
Systolic Blood Pressure		123.56±13.53	100.00-160.00
Diastolic Blood Pressure		73.86±7.71	60.00-90.00
Body Mass Index		31.69±5.82	20.52-46.67
Waist Circumference		105.31±10.87	70.00-135.00
Alcohol	No	93	92.1
	Yes	8	7.9
Smoking	Never	46	45.5
	Quitted	29	28.7
	Active smoker	26	25.7

Hypertension was observed in 68.3% of the participants (Table3).

Table3. Chronic diseases of participants evaluated in the study

		n	%
Hypertension	No	32	31.7
	Yes	69	68.3
Hyperlipidemia	No	53	52.5
	Yes	48	47.5
Coronary Artery Disease	No	75	74.3
	Yes	26	25.7
Chronic Renal Disease	No	100	99.0
	Yes	1	1.0

The proportion of patients who complied with the eye appointment made by the physician was calculated as 20.8% (Table4).

Table4. Diabetes follow-up status of the participants evaluated in the study

		n/Mean±SD	%/Min-Max
Duration of DM (years)		6.09±3.87	1.00-25.00
Education for DM	No	74	73.3
	Yes	27	26.7
DM control status	No	38	37.6
	Yes	63	62.4
DM diet	No	36	35.6
	Yes	65	64.4
Eye examination	No	64	63.4
	Yes	37	36.6
Eye examination in the last year	I don't know it is important for my health	54	53.5
	I didn't want to go an ophthalmologist	30	29.7
	I didn't have enough time	17	16.8
Education for eye complication	No	58	57.4
	Yes	43	42.6
Blood glucose testing at home	No	56	55.4
	Yes	45	44.6
DM treatment	Diet	4	4.0
	Oral antidiabetics	79	78.2
	Insulin	5	5.0
	Oral antidiabetics +Insulin	13	12.9
Medication adherence	No	9	8.9
	Yes	92	91.1
Adherence to ophthalmologist appointment	Yes	21	20.8
	No	80	79.2

No relationship was found between the health literacy scales and age, BMI, waist circumference, systolic

blood pressure, diastolic blood pressure and duration of DM (Table5).

Table5. The relationship between demographic and clinical characteristics and health literacy

		NVS Total	HLS-EU-Q16	Health Care	Disease Prevention	Health Promotion
Age	r	-0.079	0.113	0.121	0.090	0.077
	p	0.432	0.261	0.229	0.371	0.447
BMI	r	-0.052	0.106	0.056	0.101	0.132
	p	0.605	0.296	0.581	0.315	0.189
Waist Circumference	r	-0.097	0.148	0.039	0.180	0.191
	p	0.334	0.143	0.697	0.073	0.057
Systolic Blood Pressure	r	-0.044	-0.039	0.016	-0.054	-0.082
	p	0.659	0.698	0.873	0.596	0.416
Diastolic Blood Pressure	r	0.051	-0.094	-0.007	-0.134	-0.123
	p	0.615	0.352	0.946	0.184	0.224
DM Duration	r	-0.102	0.030	0.119	-0.041	-0.019
	p	0.311	0.764	0.240	0.685	0.854

Cronbach-alpha coefficients were calculated for the NVS scale and the HLS-EU-Q16 scale. While the Cronbach-alpha coefficient was 0.626 for the NVS scale, this value was determined as 0.89 for the HLS-EU-Q16 scale.

Both scales showed a significant difference with the educational status of the participants ($p=0.003$ for NVS and $p=0.006$ for HLS-EU-Q16).

The correlations between DM disease and the recorded parameters and health literacy scale scores were examined. HLS-EU-Q16 showed a significant difference with the eye examination of patients with DM ($p=0.041$). The NVS scale showed a significant difference with DM control ($p=0.032$), DM diet ($p=0.008$), eye examination ($p=0.002$) (Table6). And, NVS was also correlated with eye examination ($p=0.015$) in the last 1 year.

Table6. Health Literacy and DM Management and Eye Examination

	DM Control					DM Diet					Eye Examination				
	No		Yes		p- value	No		Yes		p- value	No		Yes		p- value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
NVS	1.13	.84	1.73	1.56	0.032	1.03	.77	1.77	1.54	0.008	1.19	1.01	2.05	1.70	0.002
HLSEUQ16	30.73	6.21	30.94	7.18	0.884	32.66	6.86	29.89	6.62	0.052	31.92	7.22	29.05	5.69	0.041
Health Care	13.27	3.00	13.48	3.05	0.744	14.14	3.04	13.00	2.95	0.071	13.76	3.19	12.78	2.63	0.118
Disease Prevention	9.59	2.41	9.87	2.92	0.625	10.23	2.60	9.52	2.78	0.219	10.06	3.00	9.27	2.14	0.162
Health Promotion	7.86	1.83	7.59	2.20	0.519	8.29	2.09	7.37	1.99	0.033	8.10	2.11	7.00	1.81	0.010

Discussion

While the Cronbach alpha coefficient was 0.626 for the NVS scale, this value was determined as 0.89 for the HLS-EU-Q16 scale. For both scales, health literacy showed a significant difference with the educational status of the participants. The relationship between the parameters related to DM disease and the health literacy scale scores were examined. HLS-EU-Q16 only showed a significant difference with the drug use status of patients with DM. On the other hand, the NVS scale showed a significant difference with DM control, DM diet, eye examination and eye examination in the last 1 year.

The fact that the Cronbach alpha coefficient was low with the NVS scale may be due to the low number of cases. In many previous studies, it has been shown that the NVS scale is a reliable scale (12, 14-16). The low participation rate in this study may have caused

the Cronbach alpha values to remain low for the NVS scale. However, throughout the research, the parameters related to DM control were generally related with the NVS score. On the other hand, the HLS-EU-Q16 scale showed a significant difference only with educational status and drug use status of DM patients. The relationship of patient education with health literacy is an expected situation, but it is not expected that the health literacy of every educated individual will be high. Health literacy is related to the sufficiency of a person in the subheadings of treatment services, disease prevention and promotion of health. The finding that treatment compliance was related to health literacy in this study coincides with the previous literature information (17).

On the other hand, the NVS scale showed a significant difference with DM control, DM diet, eye examination and eye examination in the last 1 year. The positive

effect of health literacy on blood sugar control has been demonstrated in previous studies (18-20). Patients with good health literacy are more successful in benefiting from treatment services. Better health literacy is also associated with lower drug doses. Patients with poor health literacy, on the other hand, achieve worse blood sugar control with higher insulin doses (10). Health literacy has also been associated with dietary compliance (21). Patients with better health literacy seek treatment at a higher rate and have shown a higher level of adherence to the diet recommended to them by health professionals.

The health literacy scores of the patients who had an eye examination were higher. According to the guidelines, eye examinations should be performed once a year for DM patients (22). Having an eye examination is not a situation that patients need to plan and do alone. Patients should go for regular check-ups and their physician should also recommend eye examinations, or even the patient should make an appointment with the ophthalmologist themselves. As a result of our study, as expected, health literacy was found to be associated with having regular eye examinations. The rates of retinopathy in these cases and the follow-up of treatment in those with detected retinopathy are outside the scope of this study. These issues should be examined in detail in prospective studies.

Limitations

Response rate for participation was low. It would be better to report the rate of retinopathy diagnosis in this sampling.

In conclusion, according to the NVS results from the health literacy scales, the condition of DM patients having disease and eye control check-ups is positively associated with health literacy. We think that

improving health literacy will contribute to disease control and prevention of complications in DM patients.

Conflict of Interests: The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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