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The Relationship between Illness of Acceptance and Health Literacy with Type 2 Diabetes[1]

Tip 2 Diyabetli Hastalarda Hastalık Kabulü ve Sağlık Okuryazarlığı Arasındaki İlişki

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ABSTRACT

Introduction: To adopt healthy lifestyles for managing chronic diseases and ensure self-management and control of illness, individuals must accept their illness and have good health literacy knowledge.

Aim: The study aimed to investigate the correlation between health literacy and illness acceptance in patients with Type 2 diabetes.

Method: The study was carried out as a cross-sectional study in Türkiye between December 2019 and April 2020. The sample consisted of 406 participants diagnosed with Type 2 diabetes admitted to a public hospital. Data was collected with the Information Form, the Acceptance of Illness Scale, and the European Health Literacy Survey. Descriptive statistical methods, regression, and correlation tests were employed for analysis.

Results: Participants had a mean the Acceptance of Illness Scale score of 26.21 ± 7.11. The participants had a mean the European Health Literacy Survey score of 92.25 ± 15.76. Health literacy, age, gender, people living together, smoking status, hospitalization, knowing about chronic complications, the presence of other chronic illnesses, foot care, and blood glucose monitoring were predictors of the acceptance of illness. A positive correlation was observed between the Acceptance of Illness Scale and the European Health Literacy Survey ($r = 0.46$; $p < 0.001$).

Conclusion: Participants demonstrated high levels of both Health literacy and illness acceptance. The level of illness acceptance increased with the level of Health literacy. It is necessary to develop educational content and materials tailored to the needs and Health literacy levels of the patients to enhance their health literacy.

Keywords: Acceptance; health literacy; nursing; self-management; type 2 diabetes.

ÖZ

Giriş: Kronik hastalıkların yönetiminde sağlıklı yaşam tarzlarını benimsemek, hastalığın öz yönetimini ve kontrolünü sağlamak için bireylerin hastalığı kabul etmesi ve iyi bir sağlık okuryazarlığı bilgisine sahip olmaları gerekmektedir.

Amaç: Çalışma, Tip 2 diyabet hastalarında sağlık okuryazarlığı ile hastalık kabulü arasındaki ilişkiyi araştırmayı amaçlamıştır.

Yöntem: Çalışma Türkiye'de Aralık 2019 ile Nisan 2020 tarihleri arasında kesitsel bir araştırma olarak gerçekleştirilmiştir. Örneklem, bir kamu hastanesine başvuran 406 Tip 2 diyabet tanısı konmuş katılımcıdan oluşmaktadır. Veriler Bilgi Formu, Hastalığı Kabul Ölçeği ve Avrupa Sağlık Okuryazarlığı Ölçeği ile toplandı. Analiz için tanımlayıcı istatistikler, regresyon ve korelasyon testleri kullanılmıştır.

Bulgular: Katılımcıların Hastalığı Kabul Ölçeği puanı ortalaması 26,21 ± 7,11 idi. Avrupa Sağlık Okuryazarlığı Ölçeği puanı ortalaması 92,25 ± 15,76 idi. Sağlık okuryazarlığı, yaş, cinsiyet, birlikte yaşanan kişiler, sigara içme durumu, hastaneye yatış, kronik komplikasyonları bilme, diğer kronik hastalıkların varlığı, ayak bakımı ve kan şekeri takibi, hastalık kabulünün belirleyicileri olarak bulunmuştur. Hastalığı Kabul Ölçeği ile Avrupa Sağlık Okuryazarlığı Anketi arasında pozitif bir korelasyon gözlenmiştir ($r = 0.46$; $p < 0.001$).

Sonuç: Katılımcılar yüksek düzeyde sağlık okuryazarlığı ve hastalık kabulü gösterdiler. Sağlık okuryazarlığı düzeyi arttıkça hastalık kabulü düzeyi de artmıştır. Hastaların sağlık okuryazarlığını artırmak için ihtiyaçlarına ve sağlık okuryazarlık seviyelerine uygun eğitim içerikleri ve materyallerinin geliştirilmesi gerekmektedir.

Anahtar Kelimeler: Hemşirelik; kabul; öz yönetim; sağlık okuryazarlığı; tip 2 diyabet.

Introduction

Diabetes Mellitus is a metabolic disease characterized by poor glycemic control, stemming from insufficient insulin production or ineffective utilization of insulin by the body. An estimated 537 million adults worldwide currently live with diabetes, representing a prevalence of 10.5%. The incidence of diabetes is expected to increase yearly due to lifestyle changes, daily activities, and rising obesity rates (International Diabetes Federation, 2021). Individuals need to accept their disease to demonstrate appropriate healthy behaviors, adopt healthier lifestyles, and achieve effective control and self-management of the disease, all of which are essential for managing chronic conditions (Besen & Esen, 2012). A high level of illness acceptance improves the patient's psychological status, and life satisfaction (Brzoza et al., 2021). The studies on patients with diabetes have found that those with higher illness acceptance had lower HbA1c values and better glycemic control (Özkaptan, Kapucu & Demirci, 2019; Yılmaz, Şahin & Türesin, 2019; Brzoza et al., 2021).

Age, gender, duration of diabetes, marital status, presence of diabetic complications, and diabetes education are effective in accepting illness in diabetic patients. (Brzoza et al., 2021; Turen, Yılmaz & Gündoğdu, 2021; Rashidi & Yıldırım, 2024). Illness acceptance is positively influenced when individuals with diabetes receive education about their condition (Turen, Yılmaz & Gündoğdu, 2021). People with diabetes need information about complications and evolving treatment options. It is crucial for patients to obtain accurate information, understand it, and apply it in practice.

Health literacy (HL) is defined as "the ability to obtain, assess, and understand health services and information necessary to make appropriate decisions about an individual's health" (Mancuso, 2009). Being health literate is particularly important for accessing and understanding information at critical moments, making decisions, and enhancing diabetes self-efficacy, self-care behaviors, and health promoting behaviors as foot control, blood sugar control, health responsibility in patients with diabetes (Chahardah-Cherik, Gheibizadeh, Jahani & Cheraghian, 2018; Jafari, Moshki, Ghojogh & Nejatian, 2024). In cases of low HL, individuals with diabetes often experience high HbA1c levels, depression, low self-management (Maneze, Everett, Astorga, Yogendran & Salamonson, 2016; Marciano, Camerini & Schulz, 2019). Health education facilitates the individual's illness acceptance and raises health literacy level (Wittink & Oosterhaven, 2018; Rashidi & Yıldırım, 2024). To enhance health literacy, it is first necessary to assess patients' levels of HL and illness acceptance. This allows nurses to understand patients' levels of illness acceptance and the factors affecting it, enabling them to plan appropriate information, education, and counseling for individuals. Nurses' patient education on health literacy can increase the illness acceptance of individuals with diabetes. By doing so, possible complications can be prevented, and individuals' independence, self-management, and quality of life can be improved. This can also reduce healthcare costs and loss of labor due to reduced disability due to complications in individuals with diabetes.

Aim

This study aimed to investigate the correlation between illness acceptance and health literacy in Type 2 diabetes patients.

Research Questions

1. What are the levels of illness acceptance and HL in patients with Type 2 diabetes?

2. Is there a correlation between illness acceptance and HL in Type 2 diabetic patients?

3. What factors influence illness acceptance among patients with Type 2 diabetes?

Method

Study Design

The study was conducted as a cross-sectional research design between December 2019 and April 2020.

Study Setting

The study population comprised patients who admitted to a public hospital's endocrine diseases outpatient clinic and internal medicine clinic in Düzce, Türkiye. The internal medicine service has 30 beds. An average of 75 patients are examined at the endocrine diseases' polyclinic per day. Approximately 1/3 of these patients have Type 2 diabetes. A doctor, a diabetes nurse and three dietitians work in the polyclinic.

Study Population and Sample

Following a sampling method aimed at reaching a minimum of 378 patients with a 5% margin of error and 5% significance level, based on a sampling calculation of 25,124 diabetes patients admitted to the hospital one calendar year prior. A total of 406 patients with Type 2 diabetes who had been diagnosed at least six months prior, had no barriers to communication, and were literate were included. Patients who were diagnosed with Type 1 Diabetes, and who did not agree to participate in the study were excluded. In the post-hoc power analysis, the power of the study, which was completed with 406 patients with an effect size of 0.406 and a significance level of 0.05, was calculated as 100%.

Data Collection Tools

The data of the study was collected with Patient Information Form, Acceptance of Illness Scale (AIS) and European Health Literacy Survey (HLS-EU).

Patient Information Form: It consisted of 29 questions divided into two sections: socio-demographic characteristics and illness-related characteristics. The first section included questions regarding gender, age, education status, and family history. The second section included questions about diabetes duration, treatment method, presence of complications, medication adherence, physical activity, foot care, blood glucose monitoring, HbA1c level, sources of health-related information, and barriers to accessing information. This form was designed by the researchers (Özonuk & Yılmaz, 2019; Beyoğlu & Kuşaslan, 2020).

Acceptance of Illness Scale: This scale was originally developed by Felton and Reverson (1984), subsequently adapted into Turkish by Besen and Esen (2011). It consists of eight items rated as a five-point Likert type. The total score of the scale ranges from 8 to 40. As the scale score increases, illness acceptance increases. The reliability coefficient of the Turkish version was 0.79 (Besen and Esen, 2011), which was calculated as 0.87 in this research.

European Health Literacy Survey: It was developed by Sorensen et al. (2013) and adapted into Turkish by Aras and Bayık Temel, (2017). The scale consists of 25 items. The scale is rated from "1 = strongly disagree" to "5 = strongly agree" (total score 25-125). The scale has four subscales: accessing information, (five items), understanding information (seven items), appraisal/evaluation (eight items), and application/use (five items). Higher scores indicate better health literacy. The Cronbach's *α* score was 0.92 in Turkish adaptation study (Aras & Bayık Temel, 2017). The reliability coefficient was calculated as 0.93 in this study.

Ethical Considerations

The research was carried out in compliance with the Declaration of Helsinki. The study was approved by the ethics committee of Düzce University (Date: 04.11.2019 and No: 2019/238). Permission was obtained from the Provincial Health Directorate of Düzce (61518654-020) and the Düzce Atatürk State Hospital (58230125- 92). Authorization was received from the developers of the scales. All participants gave written consent.

Data Collection

Data collection was conducted face-to-face in-patient rooms or meeting rooms, lasting approximately 15 - 20 minutes each. Information on HbA1c levels was obtained from patient files. Independent variables included sociodemographic and disease characteristics, while dependent variables were levels of illness acceptance and health literacy.

Data Analysis

The study data were analyzed using the Statistical Package for Social Sciences Version 23.0 (SPSS, IBM, Armonk, NY, USA). A significant level of $p < 0.05$ was considered for all statistical tests. Descriptive statistical methods, regression, and correlation tests were employed for analysis. Pearson Correlation Coefficient was utilized to determine the degree of non-causal relationships between two numerical variables. Multiple linear regression analyses were performed to assess the level of impact of the parameters.

Results

Among participants, the mean age of the participants was 57.00 ± 12.51(Min: 25, Max: 80), 45.6% were 51 to 65 years of age, 54.9% were female, 92.6% were married, and 34.7% had at least a high school degree. Sixty-five point five percent of the participants had a neutral income (income = expense). Seventy-one point four percent of them were unemployed and 69.7% of the participants had no family history of diabetes. Participants had diabetes for an average of 11.51 ± 8.49 years and 38.4% had diabetes for 1 - 5 years. Among diabetic patients, 42.1% used both oral antidiabetic (OAD) and insulin; 66% had comorbidities; and 67% had at least one diabetes-related complication. Participants had a mean HbA1c score of 7.2 ± 1.25. Among participants, 31.8% visited the hospital for follow-ups once every 3 - 6 months; 83.5% were medicated regularly; 50.7% followed their diets; 18.7% exercised regularly; 43.1% performed foot care regularly; and 48.3% measured blood glucose at least twice a day. Moreover, 88.9% of participants were trained in diabetes, and 78.6% of them received training from nurses. Finally, 77.1% of the participants reported barriers to accessing health-related information, such as not knowing the sources of information (47.9%), not using the internet (47.9%), and not knowing how to access information (40.6%).

The average AIS score of the participants was 26.21 ± 7.11; and accordingly, their illness acceptance was high (Table 1). They had a mean HLS-EU score of 92.25 ± 15.76. The mean HLS-EU subscale scores was 19.37 ± 3.78 (Table 1). Participants had "above average" scores on HLS-EU "accessing information" (90.1%) and "application / use" (90.4%).

A multiple linear regression model was developed to explore the impact of variables on illness acceptance ($F = 11.03$, $p < 0.001$) (Table 2). The model explained 48.6% of illness acceptance scores (Adjusted $R^2 = 0.49$, $p < 0.001$). The results showed that age, gender, people with whom the patient lived together, smoking status, hospitalization due to diabetes, knowing chronic complications, the presence of other chronic illnesses, foot care, blood glucose monitoring, and health literacy scores had a statistical effect on illness acceptance scores ($p < 0.05$). Participants hospitalized at least three times due to diabetes in the last year had significantly lower illness acceptance scores than those who had never been hospitalized ($\beta = 6.45$). A one-unit increase in HLS led to a 0.14 increase in AIS ($\beta = 0.14$) (Table 2).

There was a moderate positive correlation between illness acceptance and HL total score ($r = 0.46$; $p < 0.001$) (Table 3). Statistically significances moderate positive correlation were observed between illness acceptance and health literacy across the accessing information ($r = 0.35$; $p < 0.001$), understanding information ($r = 0.43$; $p < 0.001$), appraisal/evaluation ($r = 0.36$; $p < 0.001$), and application/use ($r = 0.39$; $p < 0.001$) sub-scale scores.

Table 1: Characteristics of the Acceptance of Illness Scale and the European Health Literacy Survey scores (n = 406)

	Mean ± SD	Min - Max	Low (below mean)		High (above mean)	
			n	%	n	%
AIS total score	26.21 ± 7.11	8 - 40	133	32.8	273	67.2
HLS-EU total score	92.25 ± 15.76	53 - 125	69	17.0	337	83.0
Accessing Information	19.37 ± 3.78	9 - 25	40	9.9	366	90.1
Understanding Information	24.54 ± 5.96	10 - 35	101	24.9	305	75.1
Appraisal/Evaluation	29.66 ± 5.39	15 - 40	55	13.5	351	86.5
Application/Use	18.62 ± 3.63	9- 25	39	9.6	367	90.4

SD: Standard deviation; Min: Minimum value; Max: Maximum value; AIS: Acceptance of Illness Scale; HLS-EU: European Health Literacy Survey.

Table 2: Predictors of Illness Acceptance (n = 406)

Variables	β	St. Error	St. β	t	p	VIF
Constant	20.88	3.50		5.97	0.001**	
Age	-0.11	0.03	-0.19	-3.46	0.001*	2.24
Gender (Female)						
Male	2.22	0.62	0.16	3.56	0.001**	1.51
People Living Together (Spouse)						
Children	1.43	0.91	0.07	1.58	0.12	1.71
Relative/Lonely	-3.17	0.96	-0.15	-3.30	0.001*	1.64
Spouse and Child	0.69	0.75	0.05	0.92	0.36	1.88
Smoking status (Current smoker)						
Non-smoker	-1.45	0.72	-0.10	-2.02	0.044*	1.86
Ex-smoker	-0.45	0.98	-0.02	-0.47	0.64	1.72
Hospitalization in the last year (None)						
1-2	-1.50	0.75	-0.09	-2.01	0.045*	1.55
3 and above	-6.45	1.20	-0.22	-5.36	0.001**	1.36
Complication knowledge (Yes)						
No	1.52	0.64	0.11	2.37	0.018*	1.58
To have another chronic disease (Yes)						
No	3.20	0.67	0.21	4.81	0.001**	1.55
Foot care (No)						
Daily	-3.20	1.01	-0.15	-3.16	0.002*	1.79
Weekly	-0.70	0.84	-0.04	-0.84	0.40	1.77
Monthly	-1.08	1.06	-0.05	-1.01	0.31	1.58
Blood glucose monitoring (No)						
Once a day	-0.34	1.04	-0.02	-0.33	0.74	2.94
Twice a day or more	-1.89	1.01	-0.13	-1.88	0.06	3.95
Once a week	-1.28	1.09	-0.06	-1.17	0.24	1.71
Once a month	-5.47	2.36	-0.10	-2.32	0.02*	1.48
Receiving education on diabetes (Yes)						
No	4.39	0.97	0.20	4.51	0.001**	1.46
HLS-EU Total	0.14	0.02	0.32	6.36	0.001**	1.98
Model Statistics	**Dependent Variable**: Illness Acceptance Score F=11.03, p=0.001*, R^2=0.53, Adjusted R^2=0.49, Durbin Watson = 1.92					

ß: Unstandardized Regression Coefficient; t: Test in Independent Groups; F: Simple Linear Regression Measurement Value; R^2: Linear Regression Analysis; VIF: Variance Inflation Factor; *: p < 0.05; **: p < 0.001.

Table 3: Correlations between the Acceptance of Illness Scale and the European Health Literacy Survey scores (n = 406)

		AIS
HLS-EU Total score	r	0.46
	p	0.001*
Accessing Information	r	0.35
	p	0.001*
Understanding Information	r	0.43
	p	0.001*
Appraisal / Evaluation	r	0.36
	p	0.001*
Application / Use	r	0.39
	p	0.001*

AIS: Acceptance of Illness Scale; HLS-EU: European Health Literacy Survey; r:Pearson Correlation Coefficient; *: p < 0.001.

Discussion

The study examined the relationship between AI and HL in patients with Type 2 diabetes. The results showed that participants had high levels of health literacy and illness acceptance. The study results also indicated a positive correlation between HL and illness acceptance. The patients had high levels of illness acceptance, which is consistent with the literature (Rogon, Kasprzak & Szcesniak, 2017; Şireci & Karabulutlu, 2017). High levels of illness acceptance led to an increased level of illness adaptation. Therefore, illness acceptance is critical for increasing patients' adherence to treatment regimens and improving their clinical states (Özkaptan et al., 2019).

The results showed that age and gender were significant predictors of illness acceptance, which is consistent with the literature. Some studies indicate that men with type 2 diabetes have higher levels of illness acceptance than female patients (Şireci & Karabulutlu, 2017; Can, Çicek & Ankaralı, 2020). Female patients with diabetes have a lower quality of life and a higher risk of depression than male (Rogon,

Kasprzak & Szczesniak, 2017). Therefore, it can be stated that the acceptance levels of female patients are lower than those of men. In the study, it was found that as the age of patients with diabetes increases, the total acceptance of illness scores decreases. Özkaptan et al. (2019) and Brzoza et al. (2021) reported that age is related to illness acceptance and that older individuals have lower illness acceptance. Rogon et al. (2017) also note that as individuals age, their level of acceptance of illness tends to decline. This decrease in acceptance is possibly attributable to the heightened count of chronic diseases and complications that typically accompany aging.

Family and spousal support play a crucial role in illness acceptance among people with diabetes (Besen & Esen, 2012). Our participants living alone or with relatives had a lower risk of diabetic complications and lower levels of illness acceptance than those living with their spouses. Özden and Sarıtaş (2021) also indicated that living arrangements play a significant role in illness acceptance. The results showed that the number of hospitalizations and additional chronic diseases were significant predictors of illness acceptance in this study. Increasing the number of hospitalizations reduces the acceptance. Treatment regimens, medications, and complications are significant challenges for illness adaptation and self-management in individuals with chronic diseases (Bonikowska, Szwamel & Uchmanowicz, 2021). Therefore, we can state that having chronic diseases and complications increases the burden of the disease and makes illness acceptance more difficult. The results of study are consistent with the literature (Can, Çicek & Ankaralı, 2020; Şahin & Cingil, 2020; Özden & Sarıtaş, 2021; Gerçek & Karakurt, 2024).

A lack of education about diabetes was a significant predictor of lower levels of illness acceptance. Döner, Çırpan, and Çürük (2023) demonstrated that diabetic patients who received training in their conditions had higher levels of illness acceptance. However, Şahin et al. (2020) found no significant difference in illness acceptance between patients who were trained in diabetes education and those who were not.

In this study, not receiving education related to diabetes is one of the predictors of disease acceptance. Patients who effectively practice self-management tend to experience lower rates of complications, hospitalizations, and emergency visits (Powers et al., 2017). Our participants exhibited a high rate of regular medication use and dietary compliance, which may have facilitated better control over their diabetes management. It is plausible that individuals who successfully manage their diabetes perceive no need for additional training due to the absence of complications. Unlike the study finding, Rashidi and Gülay (2024) found that individuals who received diabetes education had a higher illness acceptance.

In this study, the frequency of blood glucose measurement was also a determinant of illness acceptance. Specifically, the results showed that people who measured their blood glucose two or more times per day exhibited lower levels of illness acceptance. Individuals with irregular blood sugar and high metabolic values may need to measure blood sugar more frequently. In fact, blood sugar irregularity and HbA1c level are associated with disease acceptance (Özkaptan et al., 2019; Brzoza et al., 2021).

The results also showed that health literacy was a significant predictor of illness acceptance. Diabetes self-management involves effectively managing diet, maintaining regular exercise, and adhering to treatment. Patients need to have adequate knowledge and skills to manage diabetes effectively (Shayan, Özcebe & Arici, 2018; Lee, Shin, Kim & Lee, 2019). Our participants with high illness acceptance had high illness adaptation and good self-management, consequently adopting healthy lifestyle behaviors (regular exercise, diet, etc.). This is probably because they increased their health literacy by doing research and participating in training sessions. Therefore, people with high levels of illness acceptance are more likely to have high HL levels. In a study conducted with individuals with hypertension, a relationship was reported between disease acceptance, disease self-management and health literacy (Qiu, Zhang, Zang & Zhao, 2020).

Limitations

It was conducted in a single institution, and therefore, the results cannot be generalized. Second, the data was based on patients' verbal statements. Therefore, they may be prone to self-report bias.

Conclusion

The results indicate that patients with Type 2 diabetes have high levels of illness acceptance and HL. Increasing health literacy increases acceptance of diabetes. Low acceptance of diabetes is associated with age, repeated hospitalization, the presence of comorbid chronic diseases, and health literacy. It is recommended to determine the disease acceptance and health literacy levels of individuals with diabetes, and to repeat the assessment in elderly individuals with recurrent hospitalizations and comorbid chronic diseases. By increasing the level of health literacy, disease acceptance can be enhanced. In the follow-up and treatment processes of individuals with diabetes, nurses should regularly provide education on proper medication use, regular exercise, adherence to diet, and access to information, and tailor the educational content according to the patients' needs and health literacy levels. Additionally, researchers are encouraged to conduct similar studies and determine the levels of disease acceptance and health literacy among elderly diabetic women hospitalized due to additional chronic diseases. Researchers should also conduct interventional studies on health literacy and compare individuals with different types of diabetes to contribute to the topic.

Ethical Considerations: Ethical approval was obtained from the Ethics Committee of Duzce University for this study (Date: 04.11.2019 and No: 2019/238).

Author Contribution: Study Idea (Concept) and Design – HED, TTK; Data Collection / Literature Review – HED, TTK; Analysis and Interpretation of Data – HED, TTK; Preparation of the Article – HED, TTK; Approval of the Final Version to be Published – HED, TTK.

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